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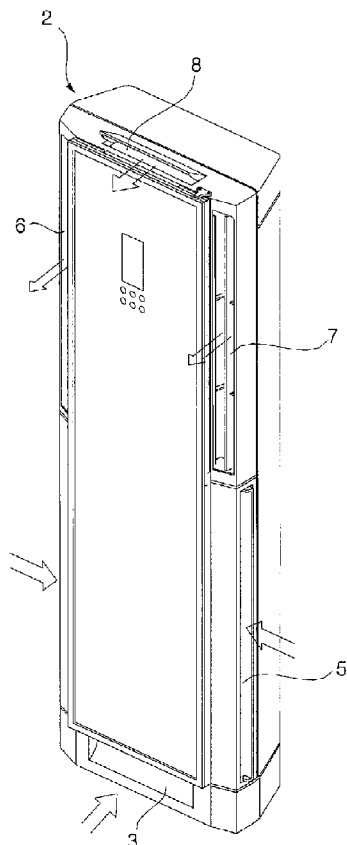
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(54) Title: AIR CONDITIONER



(57) Abstract: The present invention discloses an air conditioner including a passage extended from a suction hole to a discharge hole through a heat exchanger, a filter disposed on the passage, a case having an opening at its side facing the filter, and sucking dust from the filter through the opening, and a motor for moving the case along the filter.

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Description

AIR CONDITIONER

Technical Field

- [1] The present invention relates to an air conditioner, and more particularly, to an air conditioner which has a structure for easily moving a filter cleaner kit for automatically cleaning a filter.

Background Art

- [2] In general, in order to provide a pleasant indoor environment to the user, an air conditioner cools or heats an indoor space or purifies the air by using a refrigerant freezing cycle consisting of a compressor, a condenser, an expansion device and an evaporator. The air conditioner is roughly classified into a split type air conditioner and an integral type air conditioner.
- [3] The split type air conditioner and the integral type air conditioner are identical in function. In the case of the split type air conditioner, a cooling/heat radiation device is installed in an indoor unit, a heat radiation/cooling device and a compression device are installed in an outdoor unit, and the indoor unit and the outdoor unit are connected through a refrigerant tube. The integral type air conditioner integrates cooling and heat radiation functions. The integral type air conditioner is installed through holes punched in a wall of a house, or fixed to a window of the house.
- [4] To protect the components in the air conditioner and purify the air in the indoor space, a filter for collecting alien substances from the air sucked into the air conditioner is installed in the air conditioner.
- [5] That is, the filter performs the filtering function of collecting the alien substances from the air sucked into the air conditioner. As the using period of the filter increases, the alien substances are accumulated in the filter, to deteriorate the function of the filter. In addition, the accumulated alien substances interrupt the air flowing through the air conditioner, thereby deteriorating the function of the air conditioner.
- [6] It is thus necessary to often replace or clean the filter of the air conditioner to remove the alien substances collected in the filter.
- [7] For replacement or cleaning, the filter must be detachably installed in the air conditioner, which restricts the installation position or method of the filter or the layout of the peripheral components.
- [8] Moreover, the user or operator of the air conditioner must replace or clean the filter in person. Inconvenience of the replacement or cleaning of the filter and unpleasantness of contamination of the filter reduce sensitivity quality of the air conditioner.

- [9] In the case that the filter is installed in the air conditioner, the user cannot easily check the state of the filter. Accordingly, the user does not replace or clean the filter for a long time. The resulting function reduction of the filter or the air conditioner has the detrimental effect on sensitivity quality of the air conditioner. Furthermore, the filter or the air conditioner may be damaged.

Disclosure of Invention

Technical Problem

- [10] The present invention is achieved to solve the above problems. An object of the present invention is to provide an air conditioner which can automatically clean a filter.
- [11] Another object of the present invention is to provide an indoor unit of an air conditioner which can automatically clean a filter.
- [12] Yet another object of the present invention is to provide an air conditioner which has a structure for easily moving a filter cleaner kit for automatically cleaning a filter.

Technical Solution

- [13] In order to achieve the above-described objects of the present invention, there is provided an air conditioner, including: a passage extended from at least one suction hole to a discharge hole through a heat exchanger; a filter disposed on the passage; a case having an opening at its side facing the filter, and sucking dust from the filter through the opening; and a motor for moving the case along the filter.
- [14] In another aspect of the invention, the air conditioner includes a screw cooperating with the motor, for moving the case. By this configuration, the case can be stably moved along the filter. The air conditioner with the cleaning function improves durability as a whole.
- [15] In another aspect of the invention, the motor is coupled to the case to be moved with the case. This configuration has an advantage in that the air conditioner does not require an installation space of the motor and an installation space of a connection mechanism for the motor and the case.
- [16] In another aspect of the invention, the air conditioner includes a wire for connecting the motor to the case. This configuration reduces a number of members attached to the case to move the case. Accordingly, power is less consumed in the movement of the case. It is more advantageous to install the wire at the upper portion of the case.
- [17] In accordance with the present invention, the air conditioner automatically cleans the filter.
- [18] In addition, the air conditioner can easily move the filter cleaner kit for automatically cleaning the filter.

Brief Description of the Drawings

- [19] The present invention will become better understood with reference to the ac-

companying drawings which are given only by way of illustration and thus are not limitative of the present invention, wherein:

[20] Figs. 1 to 13 are views illustrating an air conditioner in accordance with a first embodiment of the present invention;

[21] Figs. 14 to 17 are views illustrating an air conditioner in accordance with a second embodiment of the present invention;

[22] Figs. 18 to 21 are views illustrating an air conditioner in accordance with a third embodiment of the present invention;

[23] Figs. 22 to 24 are views illustrating an air conditioner in accordance with a fourth embodiment of the present invention;

[24] Figs. 25 and 26 are views illustrating an air conditioner in accordance with a fifth embodiment of the present invention;

[25] Figs. 27 and 28 are views illustrating an air conditioner in accordance with a sixth embodiment of the present invention;

[26] Figs. 29 to 32 are views illustrating an air conditioner in accordance with a seventh embodiment of the present invention;

[27] Figs. 33 and 34 are views illustrating an air conditioner in accordance with an eighth embodiment of the present invention;

[28] Figs. 35 to 38 are views illustrating an air conditioner in accordance with a ninth embodiment of the present invention;

[29] Fig. 39 is a view illustrating an air conditioner in accordance with a tenth embodiment of the present invention; and

[30] Figs. 40 to 43 are views illustrating an air conditioner in accordance with an eleventh embodiment of the present invention.

Mode for the Invention

[31] An air conditioner in accordance with the preferred embodiments of the present invention will now be described in detail with reference to the accompanying drawings.

[32] Fig. 1 is a perspective view illustrating an air conditioner in accordance with a first embodiment of the present invention, and Fig. 2 is a front view illustrating the air conditioner in accordance with the first embodiment of the present invention.

[33] In accordance with the first embodiment of the present invention, in the air conditioner, air suction holes 3, 4 and 5 and air discharge holes 6, 7 and 8 are formed on a casing 2 forming the external appearance, so that the indoor air can be sucked into the casing 2 and externally discharged from the casing 2. The air suction hole 3 can be formed at the lower portion of the front surface of the casing 2. The air suction hole 3 is referred to as a lower air suction hole 3. The air suction holes 4 and 5 can be formed

at the lower portions of both side surfaces of the casing 2, or at both inclined lower portions of the front surface of the casing 2. Here, it is presumed that the air suction holes 4 and 5 are formed at the lower portions of both side surfaces of the casing 2. The air suction hole 4 is referred to as a left air suction hole 4, and the air suction hole 5 is referred to as a right air suction hole 5. The air discharge holes 6 and 7 can be formed at both inclined upper portions of the front surface of the casing 2, or at the upper portions of both side surfaces of the casing 2. Here, it is presumed that the air discharge holes 6 and 7 are formed at both inclined upper portions of the front surface of the casing 2. The air discharge hole 6 is referred to as a front left air discharge hole 6, and the air discharge hole 7 is referred to as a front right air discharge hole 7. The air discharge hole 8 can be formed on the top surface of the casing 2. The air discharge hole 8 is referred to as a top air discharge hole 8.

- [34] Fig. 4 is a disassembly perspective view illustrating major elements of the air conditioner in accordance with the first embodiment of the present invention, Fig. 5 is a cross-sectional view illustrating the air conditioner in accordance with the first embodiment of the present invention, Fig. 6 is a vertical-sectional view illustrating the air conditioner in accordance with the first embodiment of the present invention, and Fig. 7 is a disassembly perspective view illustrating A of Fig. 4.
- [35] A heat exchanger 10 for cooling or heating the air passing through the casing 2 by exchanging heat between the air and refrigerants, and a blower 20 for supplying the indoor air into the casing 2, heat-exchanging the air in the heat exchanger 10, and externally sending the air from the casing 2 are installed in the casing 2.
- [36] The heat exchanger 10 is disposed at the upper portion of the casing 2. A drain pan 12 for collecting condensed water generated in the heat exchanger 10 is installed at the lower portion of the heat exchanger 10. A condensed water drain hose 14 for guiding the condensed water collected in the drain pan 12 to the outside of the casing 21 is connected to the drain pan 12.
- [37] The blower 20 is installed at the inside lower portion of the casing 2, especially, to be shielded by a service cover 200 explained later. The blower 20 includes a ventilation motor 21 installed at the lower portion of the casing 2, a turbo fan 22 axially installed on a rotation shaft of the ventilation motor 21, a fan housing 25 for enclosing the turbo fan 22, the fan housing having an opening hole 123 on its front surface and a discharge hole 124 on its top surface, and an orifice 26 installed on the front surface of the fan housing 25 to be disposed on the opening hole 123.
- [38] At least one filter 31, 32, 33, 34, 35, 36, 37 and 38 for purifying the air sucked into the casing 2 is installed in the casing 2. In this embodiment, it is presumed that the left and right filters 31 and 32 are installed at the left and right air suction holes 4 and 5, the lower filters 33, 34 and 35 are installed at the upper portion of the lower air suction

hole 3, and the center filters 36, 37 and 38 are positioned in the forward direction of the blower 20, especially, installed on the service cover 200 explained later.

[39] Pre-filters for filtering off large alien substances from the air can be used as the left and right filters 31 and 32. The left and right filters 31 and 32 can be fixed to the casing 2, or detachably installed in the casing 2 for services. Here, it is presumed that the left and right filters 31 and 32 are detachably installed in the casing 2. The lower filters 33, 34 and 35 are different kinds of filters laminated in the up and down directions, for purifying the air step by step. For example, if three lower filters 33, 34 and 35 are provided, a pre-filter for filtering off large alien substances from the air is used as the bottommost lower filter 33, a HEPA filter which is a high performance filter for filtering off fine dust is used as the center lower filter 34, and a nano filter with excellent deodorization and antimicrobial performance is used as the topmost lower filter 35.

[40] The center filters 36, 37 and 38 are different kinds of filters laminated in the front and rear directions, for purifying the air step by step. For example, if three center filters 36, 37 and 38 are provided, a selectively-mounted option filter such as a sandy dust filter or a deodorization filter is used as the front center filter 36, a hybrid filter made of a non-woven fabric and a plurality of polyurethane pieces with different density is used as the middle center filter 37, and a plasma electric dust collection filter for ionizing and collecting dust is used as the rear center filter 38. Each of the center filters 36, 37 and 38 includes a filter information display portion (not shown) having filter information such as kinds, cleaning methods and replacement states of filters. Here, the information display portions can be printed matters printed on the center filters 36, 37 and 38, or information display sheets adhered to the center filters 36, 37 and 38. The information display portions can include at least one of characters, numbers and figures embossed or intaglioed on the center filters 36, 37 and 38.

[41] On the other hand, both sides of the front surface of the casing 2 are wholly inclined from the center portion of the front surface thereof. The casing 2 includes a base 60, a cabinet 70 being installed at the upper portion of the base 60, and having its front, top and bottom surfaces opened, a front upper panel 80 disposed in the forward direction of the upper portion of the cabinet 70, and left and right suction panels 100 and 110 disposed between both side lower portions of the front upper panel 80 and the top surface of the base 60.

[42] The cabinet 70 is put on the top surface of the base 60, fastened to the base 60 by fastening means such as screws, and disposed at the upper portion of the base 60 vertically in the up and down directions. The cabinet 70 includes a rear surface, a left surface orthogonally or slantly disposed in the forward direction of the left end of the rear surface, and a right surface orthogonally or slantly disposed in the forward

direction of the right end of the rear surface. A top panel 72 for covering the top surface of the cabinet 70 is installed at the upper portion of the cabinet 70.

[43] The front upper panel 80 includes a discharge hole panel 82 having the front left air discharge hole 6 at its front left side, the front right air discharge hole 7 at its front right side, and the top air discharge hole 8 on its top surface. On the front surface of the discharge hole panel 82, a front left door 83 for opening and closing the front left air discharge hole 6 is disposed to be slidable in the right and left directions, and a front right door 84 for opening and closing the front right air discharge hole 7 is disposed to be slidable in the right and left directions. As shown in Fig. 5, a door driving device 85 is installed on the front upper panel 80, for sliding the front left door 83 and the front right door 84 in the right and left directions. The door driving device 85 slides the front left door 83 in the right and left directions along the front surface of the discharge hole panel 82, for opening and closing the front left air discharge hole 6, and slides the front right door 84 in the right and left directions along the front surface of the discharge hole panel 82, for opening and closing the front right air discharge hole 7. Still referring to Fig. 5, the door driving device 85 includes a motor 86 installed at the center portion of the front surface of the discharge hole panel 82, a pinion 87 axially installed on a rotation shaft of the motor 86, a left driving member 88 having a rack engaged with the pinion 87, and being connected to the front left door 83, and a right driving member 89 having a rack engaged with the pinion 87, and being connected to the front right door 84. A top door 90 for opening and closing the top air discharge hole 8, and a top door motor (not shown) for rotating the top door 90 are installed on the top surface of the discharge hole panel 82. The front upper panel 80 further includes a door cover 92 for shielding the center portion of the front surface of the discharge hole panel 82.

[44] The left suction panel 100 includes a left surface 101 disposed between the left surface of the front upper panel 80 and the top surface of the base 60, the left air suction hole 4 being formed long on the left surface 101 in the up and down directions, and a front surface 102 disposed between the front left inclined portion of the front upper panel 80 and the top surface of the base 60. A left suction vane 104 for opening and closing the left air suction hole 4, and guiding the indoor air sucked through the left air suction hole 4, and a left suction vane driving motor (not shown) for rotating the left suction vane 104 are installed on the left suction panel 100. Upper and lower barriers 100A and 100B are protruded from the left suction panel 100 to the left filter 31, for sealing up the upper and lower portions between the left suction panel 100 and the left filter 31. A left filter guide 106 is disposed at the opposite side of the left suction panel 100 from the left filter 31, and the left filter 31 is detachably coupled to the left filter guide 106 to be slidable in the front and rear directions. The left filter

guide 106 includes a right surface 106B disposed at the right side of the left filter 31 with air inflow holes 106A, and a rear surface 106C disposed at the rear portion of the left filter 31, for sealing up the rear portion between the left suction panel 100 and the left filter 31.

[45] The right suction panel 110 includes a right surface 111 disposed between the right surface of the front upper panel 80 and the top surface of the base 60, the right air suction hole 5 being formed long on the right surface 111 in the up and down directions, and a front surface 112 disposed between the front right inclined portion of the front upper panel 80 and the top surface of the base 60. A right suction vane 114 for opening and closing the right air suction hole 5, and guiding the indoor air sucked through the right air suction hole 5, and a right suction vane driving motor (not shown) for rotating the right suction vane 114 are installed on the right suction panel 110. Upper and lower barriers (not shown) are protruded from the right suction panel 110 to the right filter 32, for sealing up the upper and lower portions between the right suction panel 110 and the right filter 32. A right filter guide 116 is disposed at the opposite side of the right suction panel 110 from the right filter 32, and the right filter 32 is detachably coupled to the right filter guide 116 to be slidable in the front and rear directions. The right filter guide 116 includes a left surface (not shown) disposed at the left side of the right filter 32 with air inflow holes (not shown), and a rear surface (not shown) disposed at the rear portion of the right filter 32, for sealing up the rear portion between the right suction panel 110 and the right filter 32.

[46] On the other hand, in the casing 2, an opening 130 can be formed among the base 60, the front upper panel 80, and the left and right suction panels 100 and 110. The large opening 130 is formed in a square shape at the lower portion of the front surface of the casing 2. A front panel 150 is installed to open and close the center portion of the front surface of the casing 2. The front panel 150 opens and closes the space between the top end of the front center portion of the front upper panel 80 and the upper portion of the lower air suction hole 3 which is the top end of the front surface of the base 60. The top end of the front panel 150 is rotatably connected to an upper hinge bracket 151 installed on the top surface of the front upper panel 80, and the bottom end thereof is rotatably connected to a lower hinge bracket 152 installed on the top surface of the base 60.

[47] Fig. 3 is a perspective view illustrating the open state of the front panel of the air conditioner in accordance with the first embodiment of the present invention, Fig. 4 is a disassembly perspective view illustrating major elements of the air conditioner in accordance with the first embodiment of the present invention, Fig. 5 is a cross-sectional view illustrating the air conditioner in accordance with the first embodiment of the present invention, and Fig. 6 is a vertical-sectional view illustrating the air

conditioner in accordance with the first embodiment of the present invention.

[48] The service cover 200 for shielding the opening 130 of the casing 2 is formed on the opening 130.

[49] When the front panel 150 is opened in the forward direction, the service cover 200 prevents the inside of the casing 2 from being externally shown through the opening 130 to improve the external appearance of the air conditioner. In addition, the service cover 200 prevents the user from contacting various electric components disposed in the backward direction of the opening 130. Preferably, the service cover 130 covers the opening 130 as much as possible.

[50] The service cover 200 can shield the opening 130 to open the front portions of some of the left and right filters 31 and 32, the lower filters 33, 34 and 35 and the center filters 36, 37 and 38, shield the opening 130 to open the front portions of all of the left and right filters 31 and 32, the lower filters 33, 34 and 35 and the center filters 36, 37 and 38, or shield all of the left and right filters 31 and 32, the lower filters 33, 34 and 35 and the center filters 36, 37 and 38. Here, it is presumed that the service cover 200 shields the whole opening 130.

[51] The service cover 200 includes a shielding member 201 shielding most of the opening 130, and having a door hole 210 in the forward direction of the blower 20, and a filter door 260 rotatably installed on the shielding member 201, for opening and closing the door hole 210 of the shielding member 201, the center filters 36, 37 and 38 being detachably coupled to the filter door 260.

[52] The shielding member 201 is mounted on the casing 2 by fastening screws 202. A fastening portion 94 with fastening holes 93 is formed at the lower portion of the front upper panel 80 of the casing 2. Fastening holes 204 corresponding to the fastening holes 93 of the fastening portion 94 are formed on the shielding member 201. In a state where the fastening holes 204 of the shielding member 201 correspond to the fastening holes 93 of the fastening portion 94, the fastening screws 202 are inserted into the fastening holes 204 and 93, thereby coupling the shielding member 201 to the front upper panel 80. As shown in Fig. 3, handles 206 are installed on the shielding member 201 for easy handling in the installation or service. The handles 206 are formed at the right and left sides of the upper and lower portions of the shielding member 201, so that the user or operator can easily hold the service cover 200 with both hands. A remote controller keeping portion 208 can be formed on the shielding member 201, for keeping a remote controller for remotely controlling the air conditioner unseen.

[53] The lower portion of the filter door 260 is coupled to the shielding member 201 through a hinge 262. As the filter door 260 is rotated in the forward direction around the lower portion, the upper portion of the filter door 260 is opened. The upper portion of the filter door 260 is hooked or unhooked on the upper portion of the shielding

member 201 by a hook which is one example of the close state keeping means.

- [54] The filter door 260 serves as a filter holder to which the center filters 36, 37 and 38 are detachably coupled, and a door for opening and closing the door hole 210 of the shielding member 201. The filter door 260 includes a front plate 261 for opening and closing the door hole 210, and left and right center filter guides 270 and 280 formed in the backward direction of the front plate 261, the center filters 36, 37 and 38 being slidably detachably coupled to the left and right center filter guides 270 and 280. Left and right openings 275 and 285 are formed on the left and right center filter guides 270 and 280, so that the air sucked through the air suction holes 3, 4 and 5 of the casing 2 can flow in the forward directions of the center filters 36, 37 and 38 and pass through the center filters 36, 37 and 38. A plurality of left and right guide ribs 271 and 281 are isolated from each other on the left and right center filter guides 270 and 280 in the front and rear directions at intervals of the thickness of the center filters 36, 37 and 38, for guiding sliding of the center filters 36, 37 and 38.
- [55] The filter door 260 further includes a bottom plate 290 on which the center filters 36, 37 and 38 are positioned after sliding. A bottom opening 291 is formed on the bottom plate 290, so that the air sucked through the air suction holes 3, 4 and 5 of the casing 2 can flow in the forward directions of the center filters 36, 37 and 38 and pass through the center filters 36, 37 and 38. The bottom plate 290 is protruded from the lower portion of the front plate 261 in the backward direction. The bottom opening 291 is formed on the front portion of the bottom plate 290 in the up and down directions. Here, the left and right center filter guides 270 and 280 and the bottom plate 290 can be incorporated with the front plate 261, or individually molded and coupled to the front plate 261 by coupling means such as fastening bolts or hooks.
- [56] A high voltage generator housing portion for housing a high voltage generator for applying a high voltage to the plasma electric duct collection filter among the center filters 36, 37 and 38 is installed on the filter door 260.
- [57] Fig. 4 is a disassembly perspective view illustrating major elements of the air conditioner in accordance with the first embodiment of the present invention, and Fig. 5 is a cross-sectional view illustrating the air conditioner in accordance with the first embodiment of the present invention.
- [58] The air conditioner includes a filter cleaner for automatically cleaning the filter by using power without separating the filter from the casing 2. The filter cleaner can be applied to at least one of the left and right filters 31 and 32, the lower filters 33, 34 and 35, and the center filters 36, 37 and 38. Considering that the left and right filters 31 and 32 are not easily connected or disconnected, it is presumed that the filter cleaners are applied only to the left and right filters 31 and 32. The filter cleaners include kit cases 300 installed on the left and right filters 31 and 32 to be movable in the up and down

directions, respectively, for collecting alien substances from the left and right filters 31 and 32, kit case moving units 310 for moving the kit cases 300 in the up and down directions, and suction force generation units 320 connected to the kit cases 300, respectively, for generating suction force for collecting the alien substances of the left and right filters 31 and 32 in the kit cases 300.

[59] Fig. 6 is a vertical-sectional view illustrating the air conditioner in accordance with the first embodiment of the present invention, Fig. 7 is a disassembly perspective view illustrating A of Fig. 4, Fig. 8 is a partial assembly view illustrating A of Fig. 4, Fig. 9 is a cross-sectional view taken along line C-C of Fig. 4, and Fig. 10 is a cross-sectional view taken along line D-D of Fig. 4.

[60] Alien substances of the air are mostly collected on the air suction surfaces of the left and right filters 31 and 32. Preferably, the kit cases 300 are disposed on the air suction surfaces of the left and right filters 31 and 32. Therefore, the kit cases 300 are installed between the left suction panel 100 and the left filter 31 and between the right suction panel 110 and the right filter 32, respectively. The left and right filters 31 and 32 are extended in the up and down directions, and the widths of the left and right filters 31 and 32 are relatively smaller than the up/down lengths thereof. Accordingly, the kit cases 300 are preferably moved on the left and right filters 31 and 32 in the up and down directions, for sucking the alien substances from the left and right filters 31 and 32. Although the kit cases 300 are moved on the left and right filters 31 and 32 in the up and down directions, in order to clean the whole left and right filters 31 and 32, the front/rear direction lengths 300L of the kit cases 300 corresponding to the front/rear direction widths of the left and right filters 31 and 32 are equal to or larger than the front/rear direction widths of the left and right filters 31 and 32. In this embodiment, it is presumed that the front/rear direction lengths 300L of the kit cases 300 are larger than the front/rear direction widths of the left and right filters 31 and 32. The up/down direction heights 300H of the kit cases 300 can be smaller than the up/down direction lengths of the left and right filters 31 and 32, and relatively smaller than the front/rear direction lengths 300L of the kit cases 300. When the left and right filters 31 and 32 are not cleaned, the kit cases 300 are preferably disposed at the upper or lower portions of the left and right filters 31 and 32 not to interrupt the air flowing through the left and right filters 31 and 32. Since the up/down direction heights 300H of the kit cases 300 are low, the kit cases 300 do not require a large space in the cleaning standby state.

[61] Collection spaces 300A for collecting the alien substances from the left and right filters 31 and 32 are formed at the center lower portions of the kit cases 300, respectively. Discharge holes 300B connected to the suction force generation units 320 for discharging the alien substances collected in the collection spaces 300A of the kit cases 300 are formed in the collection spaces 300A of the kit cases 300. The discharge

holes 300B of the kit cases 300 are disposed at the bottom center portions of the collection spaces 300A of the kit case 300, for easily discharging the alien substances from the kit cases 300 by the suction force of the suction force generation units 320. Kit drain hoses 326 for connecting the kit cases 300 to the suction force generation units 320 are coupled to the discharge holes 300B of the kit cases 300. Suction holes 300C for sucking the alien substances of the left and right filters 31 and 32 into the kit cases 300 are formed in the collection spaces 300A of the kit cases 300 to face the left and right filters 31 and 32. Preferably, the front/rear direction lengths 300C_L of the suction holes 300C of the kit cases 300 are equal to or larger than the front/rear direction widths of the left and right filters 31 and 32, for cleaning the whole left and right filters 31 and 32 only by the up/down movement of the kit cases 300. If the suction holes 300C of the kit cases 300 are too large, they require relatively large suction force of the suction force generation units 320. Therefore, preferably, the up/down direction lengths of the suction holes 300C of the kit cases 300 are relatively smaller than the front/rear direction lengths 300C_L of the suction holes 300C of the kit cases 300.

[62] Power spaces 300D isolated from the collection spaces 300A of the kit cases 300 by barriers 300E, for rotating agitators 302 are formed in the front and rear inner portions of the kit cases 300.

[63] Flanges 300F for combining the kit cases 300 to the kit case moving units 310 are formed at the front and rear outer portions of the kit cases 300.

[64] On the other hand, the agitators 302 contacting the left and right filters 31 and 32 to agitate the alien substances of the left and right filters 31 and 32 can be formed in the kit cases 300, so that the alien substances of the left and right filters 31 and 32 can be more easily sucked in the collection spaces 300A of the kit cases 300. The agitators 302 are rotatably installed on the suction holes 300C of the kit cases 300 to contact the left and right filters 31 and 32 through the suction holes 300C of the kit cases 300. The front/rear direction lengths of the agitators 302 are at least equal to the front/rear direction widths of the left and right filters 31 and 32, for agitating the whole left and right filters 31 and 32 only by the up/down movement of the kit cases 300. Each of the agitators 302 includes an agitator rotation shaft 302A rotated in the front and rear directions of the kit case 300, and agitator bristles 320B planted on the agitator rotation shaft 302A to contact the left or right filter 31 or 32. The agitator rotation shaft 302A is formed by twisting two wires. The agitator bristles 320B are spirally planted along the axial direction of the agitator rotation shaft 302A. Especially, the pitches 302B_P of the spirally-planted agitator bristles 320B are shorter than the lengths 302B_L thereof, so that the agitator bristles 320B can be densely planted to evenly agitate the alien substances of the left and right filters 31 and 32. Each of the agitators 302 can be man-

ufactured by overlapping the two wires for forming the agitator rotation shaft 302A, arranging the agitator bristles 302B between the two wires in a straight line shape along the agitator rotation shaft 302B, and twisting the two wires.

[65] The agitators 302 can be rotatably installed in the kit cases 300, for easily agitating the alien substances of the left and right filters 31 and 32. The agitators 302 are connected to agitator driving units 304 to be rotated by power. Motors for generating rotation force by electricity can be used as the agitator driving units 304. The agitator driving units 304 can be connected to the agitators 302 directly, or indirectly through agitator power transfer units 306. In this embodiment, it is presumed that the agitator driving units 304 are indirectly connected to the agitators 302 through the agitator power transfer units 306. In addition, the agitator driving units 304 can be installed inside or outside the kit cases 300. In this embodiment, it is presumed that the agitator driving units 304 are installed outside the kit cases 300. The agitator driving units 304 are disposed at the upper portions of the kit cases 300, and fastened to the kit cases 300 by fastening members 305 such as screws. The agitator power transfer units 306 can be embodied by using a gear method or a belt-pulley method. Besides, the agitator power transfer units 306 can be embodied in various methods suitable for power transfer. In this embodiment, it is presumed that the agitator power transfer units 306 are embodied by using the gear method. Each of the agitator power transfer units 306 includes a drive gear 306A connected directly to the agitator driving unit 304, and an agitator driven gear 306B engaged with the drive gear 306A and connected directly to the agitator 302. The drive gear 306A is a spur gear disposed at the inside upper portion of the power space 300D of the kit case 300. One drive gear 306A can be disposed at any one of the front, rear and middle portions of the agitator driving unit 304, or two drive gears 306A can be disposed at the front and rear portions of the agitator driving unit 304. In this embodiment, it is presumed that one drive gear 306A is provided. The agitator driven gear 306B is a spur gear disposed at the inside lower portion of the power space 300D of the kit case 300.

[66] In addition, the kit cases 300 include agitator alien substance removing units 308 contacting the agitators 302, removing the alien substances sticking to the agitators 302, and preventing leakage of the alien substances sucked into the kit cases 300. Each of the agitator alien substance removing units 308 includes an alien substance removing support body 308A fixed to the kit case 300, and a plurality of alien substance removing teeth 308B protruded from the alien substance removing support body 308A to the agitator 302 to contact the agitator 302. The alien substance removing support body 308A is extended in the rotation shaft direction of the agitator 302 to remove the alien substances from the whole agitator 302. That is, the alien substance removing support body 308A can be extended in the front and rear

directions. The agitator alien substance removing unit 308 can be disposed at the upper portion, lower portion, right side or left side of the agitator 302. In this embodiment, it is presumed that the agitator alien substance removing unit 308 is disposed at the lower portion of the agitator 302. The plurality of alien substance removing teeth 308B can be arranged in the rotation shaft direction of the agitator 302 to completely remove the alien substances from the whole agitator 302. That is, the plurality of alien substance removing teeth 308B can be arranged in the front and rear directions. The plurality of alien substance removing teeth 308B can be isolated at regular or irregular intervals along the rotation shaft direction of the agitator 302. Since the agitator bristles 302B are planted at regular intervals along the rotation shaft direction of the agitator 302, it is presumed that the plurality of alien substance removing teeth 308B are isolated at the regular intervals. More preferably, the plurality of alien substance removing teeth 308B are arranged between the agitator bristles 302B, respectively, for removing the alien substances inserted between the agitator bristles 302B. The plurality of alien substance removing teeth 308B can be disposed closely to the agitator rotation shaft 302A in order to remove the alien substances inserted deeply between the agitator bristles 302B. The plurality of alien substance removing teeth 308B can be formed with triangular sections, rectangular sections or arc sections in consideration of suction force loss of the suction force generation units 320, the alien substances left on the left and right filters 31 and 32, or rolling of the agitator bristles 302B. Besides, the plurality of alien substance removing teeth 308B can be formed in various geometrical shapes within the scope of the technical ideas of the present invention. In this embodiment, it is presumed that the plurality of alien substance removing teeth 308B are formed with the rectangular sections. The agitator alien substance removing units 308 can be incorporated with the kit cases 300, or individually molded and coupled to the kit cases 300. Here, it is presumed that the agitator alien substance removing units 308 are individually molded and coupled to the kit cases 300.

- [67] Each of the kit case moving units 310 includes a first slide guide 312 being fixed to the kit case 300 and having a first screw portion 312A, a second slide guide 314 being fixed to the casing 2 and having a second screw portion 314A screw-fastened to the first screw portion 312A, and a second slide guide rotation unit 316 for rotating the second slide guide 314, so that the first slide guide 312 can be moved in the up and down directions with regard to the second slide guide 314 by the screw motion between the first and second slide guides 312 and 314. Each of the kit case moving units 310 can include the plurality of first and second slide guides 312 and 314, so that the kit case 300 cannot be spirally rotated but slide in the up and down directions by the screw motion between the first and second slide guides 312 and 314. In addition, the kit case moving units 310 can include kit guides for restricting rotation of the kit

cases 300 and guiding up/down sliding of the kit cases 300. In this embodiment, it is presumed that the first and second slide guides 312 and 314 are provided in a multiple number. Especially, it is presumed that the two first and second slide guides 312 and 314 are provided.

[68] The first slide guides 312 can be incorporated with the kit cases 300, or individually molded and coupled to the kit cases 300. In this embodiment, it is presumed that the first slide guides 312 are individually molded and coupled to the kit cases 300. That is, the first slide guides 312 can be coupled to the kit cases 300 through the flanges 300F of the kit cases 300 by fastening members such as screws.

[69] Each of the first slide guides 312 includes a hollow first guide frame 312B opened in the up and down directions to be inserted onto the second slide guide 314, the first screw portion 312A being formed on the inner wall of the first guide frame 312B in the up and down directions, and a first guide boss 312C disposed outside the first guide frame 312B to surface-contact the flange 300F of the kit case 300, and fastened to the flange 300F of the kit case 300 by the fastening member such as the screw. The first screw portion 312A can be spirally continuously formed, or at least part of the first screw portion 312A can be cut in the circumferential direction of the first guide frame 312B. The first guide boss 312C can be provided in a multiple number to firmly couple the first slide guide 312 to the kit case 300. The plurality of first guide bosses 312C can be isolated along the circumferential direction of the first guide frame 312B.

[70] Each of the second slide guides 314 includes a second guide frame 314B formed in a rod shape and inserted into the first guide frame 312A of the first slide guide 312, the second screw portion 314A being formed on the outer wall of the second slide guide 314 in the up and down directions. The second guide frame 314B is extended in the up and down directions, for guiding up/down sliding of the kit case 300. The second slide guides 314 are installed at the sides of the left and right filters 31 and 32 not to interrupt the air flowing through the left and right filters 31 and 32. That is, the second slide guides 314 can be disposed at the front and rear portions of the left and right filters 31 and 32.

[71] The second slide guide rotation unit 316 includes a second slide guide power generator 317 connected to the second slide guides 314, for generating rotation force. The second slide guide power generator 317 can be connected to the second slide guides 314 directly, or indirectly through a second slide guide power transfer unit 318. The second slide guide power generator 317 can be provided in the same number as that of the second slide guides 314 to correspond to the second slide guides 314, respectively, or provided in a smaller number than that of the second slide guides 314 to be connected to one or more second slide guides 314 at the same time. In this embodiment, it is presumed that the second slide guide power generator 317 is

connected to the second slide guides 314 through the second slide guide power transfer unit 318, and that one second slide guide power generator 317 is connected to the two second slide guides 314 at the same time. The second slide guide power transfer unit 318 can be embodied by using a gear method or a belt-pulley method. Besides, the second slide guide power transfer units 318 can be embodied in various methods suitable for power transfer. In this embodiment, it is presumed that the second slide guide power transfer unit 318 is embodied by using the gear method. The second slide guide power transfer unit 318 includes a second slide guide drive gear 318A connected directly to the second slide guide power generator 317 and rotated by the second slide guide power generator 317, and second slide guide driven gears 318B engaged with the second slide guide drive gear 318A, coupled to the second slide guides 314, and rotated monolithically with the second slide guides 314. The second slide guide drive gear 318A and the second slide guide driven gears 318B can be spur gears. A shaft coupling portion 318C coupled to a shaft 317A of the second slide guide power generator 317 as a single body is protruded from the center portion of the second slide guide drive gear 318A. The second slide guide driven gears 318B can be formed outside the lower portions of the second slide guides 314.

[72] The second slide guide rotation unit 316 further includes a slide guide holder 319 for preventing shaking or separation of the second slide guide drive gear 318A and the second slide guide driven gears 318B. The slide guide holder 319 includes first through holes 319A into which the second slide guides 314 are inserted, and a second through hole 319B into which the shaft coupling portion 318C of the second slide guide drive gear 318A is inserted. The diameter of the first through holes 319A is smaller than the outside diameter of the second slide guide driven gears 318B, so that the second slide guide driven gears 318B can be upwardly hooked in the first through holes 319A. The diameter of the second through hole 319B is smaller than the outside diameter of the second slide guide drive gear 318A, so that the second slide guide drive gear 318A can be upwardly hooked in the second through hole 319B. The slide guide holders 319 can be coupled to the casing 2 by fastening members such as screws.

[73] The positions of the kit cases 300 can be sensed by filter cleaner kit position sensing units for position control. The filter cleaner kit position sensing units can sense the whole positions of the kit cases 300, or the partial positions of the kit cases 300 on the moving paths. In this embodiment, it is presumed that the filter cleaner kit position sensing units sense the partial positions of the kit cases 300 on the moving paths in order to simplify the control of the kit cases 300 and the whole structure of the air conditioner and minimize the cost. Each of the filter cleaner kit position sensing units includes a kit upper position sensor 348 for sensing whether the kit case 300 exists in the topmost position, and a kit lower position sensor 349 for sensing whether the kit

case 300 exists in the bottommost position, thereby sensing both end positions of the kit cases 300 on the moving paths. The kit upper position sensor 348 and the kit lower position sensor 349 can be embodied by using a limit switch method, a photo sensor method or an infrared method. All position sensing techniques can be used.

[74] Fig. 4 is a disassembly perspective view illustrating major elements of the air conditioner in accordance with the first embodiment of the present invention, Fig. 5 is a cross-sectional view illustrating the air conditioner in accordance with the first embodiment of the present invention, Fig. 11 is an enlarged view illustrating B of Fig. 4, Fig. 12 is a disassembly perspective view illustrating B of Fig. 4, and Fig. 13 is a cross-sectional view taken along line E-E of Fig. 11.

[75] As described above, the blower 20 which can generate the suction force is installed in the casing 2. Therefore, the blower 20 can perform the function of the suction force generation units 320. In addition, the suction force generation units 320 can be formed exclusively for the filter cleaners. However, the suction force required by the filter cleaners is much smaller than the capacity of the blower 20. It is thus presumed that the suction force generation units 320 are formed exclusively for the filter cleaners to improve the lifespan of the blower 20. Each of the suction force generation units 320 includes a kit fan 322 connected to the kit case 300 and rotated to generate the suction force, and a kit fan motor 324 for rotating the kit fan 322.

[76] A variety of fans such as a centrifugal fan, an axial flow fan and a sirocco fan can be used as the kit fan 322 within the scope of the technical ideas of the present invention. In this embodiment, it is presumed that the kit fan 322 is the centrifugal fan. The kit fan 322 can be installed inside or outside the casing 2. Here, it is presumed that the kit fan 322 is installed inside the casing 2 for modulization of the air conditioner. The kit fan 322 can be connected to the kit case 300 directly through the kit drain hose 326 or indirectly through a cyclone 350 discussed later. In this embodiment, it is presumed that the kit fan 322 is indirectly connected to the kit case 300 through the cyclone 350. As the kit fan 322 is installed inside the casing 2, it can directly discharge the sucked air into the casing 2. In addition, the kit fan 322 can be connected to the condensed water drain hose 14, for externally discharging the sucked air from the casing 2 through the condensed water drain hose 14. If a kit fan hole is formed on the casing 2, the kit fan 322 can be connected to the kit fan hole directly or indirectly through a hose, for externally discharging the sucked air from the casing 2. In this embodiment, in order to freely install the suction force generation unit 320 and avoid duplicate installation of the similar elements, it is presumed that the kit fan 322 is connected to the condensed water drain hose 14, for discharging the sucked air.

[77] The kit drain hoses 326 can be formed in a flexible structure to be elastically extended or shrunken with the movement of the kit cases 300. The kit drain hoses 326

can be connected to the upper portions or lower portions of the kit cases 300. In this embodiment, since the discharge holes 300B are formed at the lower portions of the kit cases 300, the kit drain hoses 326 are coupled to the discharge holes 300B of the kit cases 300, and thus connected to the lower portions of the kit cases 300. The kit drain hoses 326 are interposed between the left and right filters 31 and 32 and the left and right suction panels 100 and 110 through the upper portions or lower portions of the left and right filters 31 and 32, and connected to the kit cases 300. In this embodiment, it is presumed that the kit drain hoses 326 are interposed between the left and right filters 31 and 32 and the left and right suction panels 100 and 110 through the lower portions of the left and right filters 31 and 32, and connected to the kit cases 300. The spaces between the left and right filters 31 and 32 and the left and right suction panels 100 and 110 are sealed up. Accordingly, the kit drain hoses 326 are disposed through left and right drain hose holes formed on the lower barriers 100B and 110B of the left and right suction panels 100 and 110.

[78] On the other hand, the filter cleaners can directly discharge the alien substances collected in the kit cases 300 through the suction force generation units 320. In this case, the suction force generation units 320 are easily damaged, and need to be often cleaned. Moreover, dust is floated by the alien substances discharged from the suction force generation units 320. Therefore, in order to easily discharge the alien substances sucked into the kit cases 300, the filter cleaners further include filter cleaner dust collection units for collecting the alien substances from the kit cases 300. Each of the filter cleaner dust collection units can be a cyclone 350 installed between the kit case 300 and the suction force generation unit 320, for sucking the alien substances collected in the kit case 300 with the air by the suction force of the suction force generation unit 320, separating the sucked alien substances from the air, collecting the alien substances, and discharging the separated air to the suction force generation unit 320. The cyclone 350 includes a separator 352 for separating the alien substances sucked into the cyclone 350 from the air, and a dust collector 354 for collecting the alien substances separated from the air in the separator 352.

[79] The separator 352 includes a cylindrical portion 352A formed with a predetermined diameter, so that the alien substances and the air sucked into the separator 352 can be rotated along the inner wall of the separator 352, and a cone portion 352B connected to the lower portion of the cylindrical portion 352A, the radius of which being reduced toward the lower portion. A suction hole 352C is formed on the cylindrical portion 352A of the separator 352. The kit drain hose 326 is coupled to the suction hole 352C and connected to the kit case 300, so that the alien substances collected in the kit case 300 can be sucked into the separator 352 with the air. The suction hole 352C of the separator 352 is formed in the tangent line direction of the cylindrical portion 352A of

the separator 352, so that the alien substances and the air sucked by the separator 352 can be rotated along the inner wall of the separator 352. The suction hole 352C of the separator 352 can be protruded in a pipe structure from the separator 352 to be easily coupled to the kit drain hose 326. The suction hole 352C of the separator 352 can be provided in a single or multiple number. In this embodiment, as the cyclones 350 and the kit cases 300 correspond to each other, one suction hole 352C is formed on one separator 352. An air discharge hole 352D connected to the suction force generation unit 320, for discharging the air separated from the alien substances in the separator 352 to the suction force generation unit 320 is formed on the cylindrical portion 352A of the separator 352. The air discharge hole 352D of the separator 352 can be positioned on the axial center of the top surface of the cylindrical portion 352A, for discharging only the air separated from the alien substances in the separator 352 to the suction force generation unit 320. The kit fan 322 of the suction force generation unit 320 can be coupled directly to the air discharge hole 352D of the separator 352, or a passage for connecting the separator 352 to the kit fan 322 of the suction force generation unit 320 can be coupled to the air discharge hole 352D of the separator 352. In this embodiment, it is presumed that the kit fan 322 of the suction force generation unit 320 is coupled directly to the air discharge hole 352D of the separator 352. A mesh net 352F for preventing leakage of the alien substances to the suction force generation unit 320 can be installed on the air discharge hole 352D of the separator 352. An alien substance discharge hole 352E for discharging the alien substances separated from the air in the separator 352 to the dust collector 354 is formed on the cone portion 352B of the separator 352. The alien substance discharge hole 352E of the separator 352 can be disposed at the lower portion of the cone portion 352B of the separator 352, so that the alien substances separated in the separator 352 can be downwardly rotated along the inner wall of the separator 352 and smoothly discharged to the dust collector 354. The dust collector 354 can be coupled directly to the alien substance discharge hole 352E of the separator 352, so that the alien substances separated in the separator 352 can be efficiently discharged to the dust collector 354. In the case that the dust collector 354 is installed separately from the separator 352 to overcome the installation position limit, a hose for connecting the separator 352 to the dust collector 354 can be coupled to the alien substance discharge hole 352E of the separator 352. In this embodiment, it is presumed that the dust collector 354 is coupled directly to the alien substance discharge hole 352E of the separator 352. The alien substance discharge hole 352E of the separator 352 can be protruded in a pipe structure from the separator 352 to be easily coupled to the dust collector 354.

[80] The dust collector 354 can be disposed inside or outside the casing 2. Here, it is presumed that the dust collector 354 is disposed inside the casing 2 to improve the

external appearance of the air conditioner. In addition, the dust collector 354 can be installed closely to the separator 352 or separately from the separator 352. As described above, it is presumed that the dust collector 354 is installed closely to the separator 352. The dust collector 354 can be a disposable dust collection bag or a recyclable container. In this embodiment, it is presumed that the dust collector 354 is formed in a container structure. The dust collector 354 is detachably coupled to the casing 2, so that the user can easily remove the alien substances from the dust collector 354. For example, the dust collector 354 includes a dust collector housing 355 being detachably installed in the casing 2 and connected to or disconnected from the separator 352, and having a dust collection space 355A for collecting the alien substances separated in the separator 352, and a dust collector cover 356 for opening and closing the dust collector housing 355. A suction hole 355B is formed on the dust collector housing 355 to overlap with the alien substance discharge hole 352E of the separator 352, so that the alien substances separated in the separator 352 can be sucked into the dust collector 354. The top surface of the dust collector housing 355 is opened, so that the alien substances collected in the dust collector housing 355 can be taken out of the dust collector housing 355. A dust collector handle 357 for enabling the user to easily hold the dust collector 354 can be formed outside the dust collector housing 355. The dust collector cover 356 opens or closes the opened top surface of the dust collector housing 355. The dust collector cover 356 can be detachably coupled to the dust collector housing 355 by using hooks or screws. In addition, the dust collector cover 356 can be detachably slidably inserted or separated to/from the dust collector housing 355 in the up and down directions, or detachably hinge-coupled to the dust collector housing 355. That is, the dust collector cover 356 can be coupled in various ways within the scope of the technical ideas of the present invention. The dust collector 354 can be detachably installed on the base 60 to be positioned at the rear portions of the lower filters 33, 34 and 35. The dust collector 354 can be detachably installed on the base 60 without using a special detachable member, or by using a dust collector detachable member 358 such as a hook. In this embodiment, it is presumed that the dust collector 354 is detachably installed on the base 60 by using the dust collector detachable member 358 such as the hook.

[81] The dust collector detachable member 358 includes a dust collector detachable hook 358A protruded from the rear surface of the cabinet 70 in the forward direction of the casing 2, and a dust collector detachable hooking jaw 358B disposed outside the dust collector housing 355, so that the dust collector detachable hook 358A can be hooked thereon. The dust collector detachable member 358 can be variously modified by those skilled in the art.

[82] In order to easily connect and disconnect the dust collectors 354 and determine the

detachable positions of the dust collectors 354, it is possible to guide the dust collectors 354 on the base 60. That is, the base 60 includes dust collector guides 359 for guiding the dust collectors 354. Each of the dust collector guides 359 includes a pair of dust collector guide rails, thereby guiding the dust collectors 354 in the detachable directions. The dust collectors 354 can have rollers or balls to reduce friction with the dust collector guides 359.

[83] The dust collectors 354 can be detachably installed through the opening 130 of the casing 2. An inlet for the dust collectors 354 can be formed on the service panel 200, so that the dust collectors 354 can be detachably installed through the service panel 200. An inlet for the dust collectors 354 can be formed on the left surface or the right surface of the cabinet 70, so that the dust collectors 354 can be detachably installed through the left surface or the right surface of the cabinet 70. In this embodiment, it is presumed that the dust collectors 354 are detachably installed through the opening 130 of the casing 2.

[84] The air conditioner includes cyclone dust collection sensing units 360 for sensing the amount of the alien substances in the dust collectors 354, so that the user can decide discharge of the alien substances from the dust collectors 354 without separating the dust collectors 354. As the using time of the air conditioner or the filter cleaners increases, the filter cleaners more clean the left and right filters 31 and 32. The cyclone dust collection sensing units 360 sense the amount of the alien substances in the dust collectors 354 according to the accumulated using time of the air conditioner or the filter cleaners. The cyclone dust collection sensing units 360 can be embodied by using a photosensor method. In addition, if cameras are provided to photograph the upper portions of the dust collector housings 355, the cyclone dust collection sensing units 360 sense the amount of the alien substances in the dust collectors 354 according to the photographing results of the cameras.

[85] The air conditioner can further include a cyclone dust collection display 362 for displaying the sensing results of the cyclone dust collection sensing units 360, so that the user can decide discharge of the alien substances from the dust collectors 354 without separating the dust collectors 354. The cyclone dust collection display 362 can be disposed outside the casing 2 to be easily recognized by the user of the air conditioner. The cyclone dust collection display 362 is embodied as an LCD, PDP, LED, animation, etc. The cyclone dust collection display 362 includes a sound unit for providing the sensing results of the cyclone dust collection sensing units 360 by sound.

[86] The operation of the air conditioner in accordance with the first embodiment of the present invention will now be described.

[87] When the blower 20 is driven by the operation request for the air conditioner, the outdoor air of the casing 2 is sucked into the casing 2 through the air suction holes 3, 4

and 5 of the casing 2. Here, the air sucked into the casing 2 is purified through the left and right filters 31 and 32 and the lower filters 33, 34 and 35, and sent in the forward direction of the blower 20.

[88] The air sent in the forward direction of the blower 20 passes through the side openings 275 and 285 and the bottom opening 291 of the filter door 60, and flows in the forward direction of the front filter 36 among the center filters 36, 37 and 38. The air is purified sequentially through the center filters 36, 37 and 38.

[89] The air which has passed through the center filters 36, 37 and 38 passes through the blower 20, is sent to the upper portion of the blower 20, and is heat-exchanged by the heat exchanger 10.

[90] The air heat-exchanged by the heat exchanger 10 is externally discharged from the casing 2 through the air discharge holes 6, 7 and 8 of the casing 2.

[91] The operation of the filter cleaners of the air conditioner in accordance with the first embodiment of the present invention will now be described.

[92] According to the operation request for the filter cleaners, the kit cases 300 are moved in the up and down directions along the left and right filters 31 and 32 by the kit case moving units 310, the agitators 302 are rotated, and the suction force generation units 320 are operated.

[93] The alien substances of the left and right filters 31 and 32 are sucked into the kit cases 300 by the suction force of the suction force generation units 320. The alien substances sucked into the kit cases 300 are sucked into the cyclones 350 with the air, and collected in the cyclones 350 by the cyclone principle. The air separated from the alien substances in the cyclones 350 is transferred from the cyclones 350 to the suction force generation units 320, and exhausted from the suction force generation units 320. The above process is repeated to clean the left and right filters 31 and 32.

[94] The operations of the kit case moving units 310, the cyclones 350 and the suction force generation units 320 will now be explained in detail.

[95] First, the operation of the kit case moving units 310 is explained.

[96] When the second slide guide power generators 317 are driven, the second slide guide drive gears 318A are rotated by the driving force of the second slide guide power generators 317, to rotate the second slide guide driven gears 318B. The second slide guides 314 are rotated monolithically with the second slide guide driven gears 318B, to perform the screw motion with the first slide guides 312. The first slide guides 312 slide in the up and down directions monolithically with the kit cases 300 by the screw motion with the second slide guides 314. Here, the rotation directions of the second slide guides 314 are changed according to the power directions of the second slide guide power generators 317. The first slide guides 312 are upwardly or downwardly moved with the kit cases 300 according to the rotation directions of the second slide

guides 314.

[97] The operation of the cyclones 350 is explained in detail.

[98] As described above, when the alien substances of the left and right filters 31 and 32 are sucked into the kit cases 300, the alien substances sucked into the kit cases 300 are sucked, with the air, into the separators 352 of the cyclones 350 through the kit drain hoses 326 by the suction force of the suction force generation units 320. The alien substances sucked into the separators 352 of the cyclones 350 are separated from the air by the cyclone principle, and collected in the dust collectors 354 of the cyclones 350. The clean air separated from the alien substances in the separators 352 of the cyclones 350 is discharged to the suction force generation units 320.

[99] The operation of the suction force generation units 320 is explained in detail.

[100] To operate the suction force generation units 320, the kit fan motors 324 are driven to generate power. The power of the kit fan motors 324 rotates the kit fans 322. The suction force to the suction force generation units 320 is generated by the rotation force of the kit fans 322.

[101] The filter cleaners can clean the left and right filters 31 and 32 in the upward movement, downward movement or upward and downward movement on the left and right filters 31 and 32.

[102] When the filter cleaners clean the left and right filters 31 and 32, the filter cleaners can be reciprocated once or more on the left and right filters 31 and 32. When the filter cleaners alternately clean the left and right filters 31 and 32, the filter cleaners can clean any one of the left and right filters 31 and 32 first, and then clean the other. When the filter cleaners clean the left and right filters 31 and 32 only in the downward movement, the filter cleaners are upwardly moved on any one of the left and right filters 31 and 32, and downwardly moved to clean the other.

[103] The filter cleaners can be operated in the air conditioning operation and the non-operation of the air conditioner. If the filter cleaners are operated during the air conditioning operation of the air conditioner, the filter cleaners interrupt the air flows sucked through the left and right air suction holes 4 and 5 of the casing 2. In addition, the alien substances of the air are not collected on the left and right filters 31 and 32, and the alien substances of the left and right filters 31 and 32 are shaken off and floated by the filter cleaners. Accordingly, the filter cleaners are preferably operated during the non-operation of the air conditioner.

[104] The filter cleaners can be operated every time before or after the air conditioning operation of the air conditioner, periodically operated according to the accumulated number of the air conditioning operations of the air conditioner, operated according to filter cleaner switch signals inputted by the user or operator of the air conditioner, or operated according to contamination of the left and right filters 31 and 32.

- [105] In the above-described filter cleaners, after the alien substances are collected in the dust collectors 354 of the cyclones 350, the dust collection amount of the dust collectors 354 of the cyclones 350 is sensed by the cyclone dust collection sensing units 360, and the sensing results of the cyclone dust collection sensing units 360 are displayed through the cyclone dust collection display 362.
- [106] As mentioned above, the dust collection amount of the dust collectors 352 of the cyclones 350 is limitative. The user of the air conditioner can discharge the alien substances collected in the dust collectors 352 of the cyclones 350 according to the display contents of the cyclone dust collection display 362 or the sixth sense.
- [107] When the user intends to remove the alien substances collected in the dust collector 352 of the cyclone 350, the user opens the front panel 150 and separates the service cover 200 from the casing 2, thereby opening the opening 130 of the casing 2. The user puts his/her hand into the casing 2 through the opened opening 130 of the casing 2, holds the dust collector handle 357 of the dust collector 354 of the cyclone 350, and pulls out the dust collector 354 of the cyclone 350. Therefore, the dust collector 354 of the cyclone 350 is separated from the separator 352 of the cyclone 350. As the dust collector detachable hook 358A is unhooked from the dust collector detachable hooking jaw 358B, the dust collector 354 of the cyclone 350 is disconnected along the dust collector guide 359.
- [108] After disconnecting the dust collector 354 of the cyclone 350 from the casing 2, the user opens the dust collector cover 356 of the dust collector 354 of the cyclone 350, to open the top surface of the dust collector housing 355 of the dust collector 354 of the cyclone 350. The user removes the alien substances collected in the dust collector 354 of the cyclone 350 through the opened top surface of the dust collector housing 355 of the dust collector 354 of the cyclone 350.
- [109] After removing the alien substances collected in the dust collector 354 of the cyclone 350, the user closes the dust collector cover 356 of the dust collector 354 of the cyclone 350, to block the top surface of the dust collector housing 355 of the dust collector 354 of the cyclone 350. The user puts the dust collector 354 of the cyclone 350 into the casing 2, and pushes the dust collector 354 of the cyclone 350 toward the separator 352 of the cyclone 350 along the dust collector guide 359. As soon as the dust collector 354 of the cyclone 350 is coupled to the separator 352 of the cyclone 350, the dust collector detachable hook 358A is hooked on the dust collector detachable hooking jaw 358B. The dust collector 354 of the cyclone 350 is mounted in the casing 2, and thus the alien substance discharge process of the dust collector 354 of the cyclone 350 is finished.
- [110] In the air conditioner of the present invention, the dust collectors of the cyclones can be detachably installed through a cyclone inlet formed on the cabinet of the casing or a

cyclone inlet formed on the service cover. The detachable structure of the dust collectors of the cyclones is not limited to the above examples, but variously modified within the technical scope of the present invention.

[111] Second Embodiment : first embodiment + kit wheel + rack gear + agitator gear

[112] Fig. 14 is a disassembly perspective view illustrating major elements of a filter cleaner of an air conditioner in accordance with a second embodiment of the present invention, Fig. 15 is a partial assembly view illustrating the filter cleaner of Fig. 14, Fig. 16 is a cross-sectional view taken along line F-F of Fig. 15, and Fig. 17 is a cross-sectional view taken along line G-G of Fig. 15. The aforementioned members are not explained.

[113] In accordance with the second embodiment of the present invention, the filter cleaners of the air conditioner include kit cases 300 installed on the left and right filters 31 (and not shown) to be movable in the up and down directions, for sucking alien substances from the left and right filters 31 (and not shown), respectively, agitators 302 rotatably installed in the kit cases 300, first slide guides 312 being fixed to the kit cases 300 and having first screw portions 312A, second slide guides 314 being fixed to the casing 2 and having second screw portions 314A screw-fastened to the first screw portions 312A, second slide guide rotation units 316 for rotating the second slide guides 314, so that the first slide guides 312 can be moved in the up and down directions with regard to the second slide guides 314 by the screw motion between the first and second slide guides 312 and 314, and agitator rotation units 360 for rotating the agitators 302.

[114] The agitator rotation units 360 include kit wheels 362 being rotatably installed on the kit cases 300, contacting the left and right filter guides 106 (and not shown), and being rotated along the left and right filter guides 106 (and not shown) in the up/down movement of the kit cases 300, and power transfer units 364 for transferring the rotation force of the kit wheels 362 to the agitators 302.

[115] The kit wheels 362 can be provided in a multiple number to firmly support the kit cases 300 and balance and stabilize the up/down movement of the kit cases 300. For example, as in this embodiment, the kit wheels 362 can be respectively disposed at the front and rear portions of the kit cases 300. The two kit wheels 362 can be protruded toward the left and right filters 31 and 32 through slots formed in the power spaces 300D of the kit cases 300. The two kit wheels 362 can be separated from each other and individually rotated, or connected to each other and cooperatively rotated. In this embodiment, it is presumed that the kit wheels 362 are connected through kit wheel rotation shafts 363 to simplify the structure. The kit wheel rotation shafts 363 can be disposed to cross the collection spaces 300A of the kit cases 300 in the front and rear directions.

- [116] The power transfer units 364 can be embodied by using a gear method or a belt-pulley method. Besides, the power transfer units 364 can be embodied in various methods suitable for power transfer. In this embodiment, it is presumed that the power transfer units 364 are embodied by using the gear method. Each of the power transfer units 364 includes drive gears 364A coupled to the kit wheels 362 or the kit wheel rotation shaft 363, and driven gears 364B engaged with the drive gears 364A and connected directly to the agitator 302. The drive gears 364A can be incorporated with the kit wheels 362. That is, the drive gears 364A can be provided by forming the kit wheels 362 in the gear structure.
- [117] In order to smoothly rotate the kit wheels 362, kit wheel rack gears 366 are additionally disposed at the left and right filter guides 106 (and not shown), and engaged with the gear structure kit wheels 362, for guiding the kit wheels 362.
- [118] The operations of the major elements of the filter cleaners of the air conditioner in accordance with the second embodiment of the present invention will now be described.
- [119] When the kit cases 300 are moved in the up and down directions along the left and right filters 31 (and not shown) by the mutual screw motion of the first and second slide guides 312 and 314 by power of the second slide guide rotation units 316, the kit wheels 362 are engaged with the kit wheel rack gears 366 and rotated, and the driven gears 364B are rotated by the rotation of the drive gears 364A monolithically formed with the kit wheels 362. The rotation force of the kit wheels 362 is transferred to the agitators 302 through the power transfer units 364, thereby rotating the agitators 302.
- [120] Third Embodiment : one first slide guide, one second slide guide, direct connection of second slide guide power generator, kit case guide
- [121] Fig. 18 is a disassembly perspective view illustrating major elements of a filter cleaner of an air conditioner in accordance with a third embodiment of the present invention, Fig. 19 is a partial assembly view illustrating the filter cleaner of Fig. 18, Fig. 20 is a cross-sectional view taken along line H-H of Fig. 19, and Fig. 21 is a cross-sectional view taken along line I-I of Fig. 19. The aforementioned members are not explained.
- [122] In accordance with the third embodiment of the present invention, a kit case moving unit of the filter cleaner of the air conditioner includes a first slide guide 412 being fixed to the kit case 300 and having a first screw portion 412A, a second slide guide 414A being fixed to the casing 2 and having a second screw portion 414A screw-fastened to the first screw portion 412A, a second slide guide power generator 418 for rotating the second slide guide 414, and a kit case guide 430 for guiding the kit case 300 to be movable only in the up and down directions.
- [123] The first slide guide 412 can be disposed at the center portion of the rear surface of

the kit case 300.

[124] The second slide guide power generator 418 is disposed at the lower portion of the second slide guide 414, and connected directly to the second slide guide 414.

[125] The second slide guide power generator 418 is connected directly to the second slide guide 414.

[126] The kit case guides 430 guide up/down sliding of the kit cases 300. If the kit cases 300 are not close to the left and right filters 31 and 32, suction force loss of the suction force generation units 320 increases. The alien substances of the left and right filters 31 and 32 are not efficiently sucked and agitated by the agitators 302. Therefore, the kit case guides 430 serve to adhere the kit cases 300 to the left and right filters 31 and 32, respectively. Each of the kit case guides 430 includes a kit guide protrusion 432 protruded from the kit case 300, and kit guide rails 434 into which the kit guide protrusion 432 is movably inserted, so that the kit cases 300 cannot be moved in the isolation and adhesion directions to the left and right filters 31 and 32, namely, the right and left directions of the casing 2. The kit guide protrusion 432 can be protruded from the front surface or rear surface of the kit case 300 to prevent the kit case 300 from being moved in the right and left directions of the casing 2. The kit guide protrusion 432 can be protruded from the front surface and rear surface of the kit case 300, respectively, for firmly supporting the kit case 300 at both sides. In addition, two kit guide protrusions 432 can be formed on the front and rear surfaces of the kit case 300 and isolated in the up and down directions, respectively, for firmly supporting the kit case 300 in the up and down directions. The kit guide protrusions 432 can be formed in a round shape such as a hemispherical shape to simplify coupling and minimize friction to the kit guide rails 434. The kit guide rails 434 can be disposed on the left and right suction panels 100 (and not shown) to be coupled to the kit guide protrusions 432 formed on the front surfaces of the kit cases 300, and also disposed on the left and right filter guides 106 (and not shown) to be coupled to the kit guide protrusions 432 formed on the rear surfaces of the kit cases 300. As the kit cases 300 are moved in the up and down directions, the kit guide rails 434 are extended in the up and down directions. The kit guide rails 434 can be individually manufactured from the left and right suction panels 100 (and not shown) or the left and right filter guides 106 (and not shown), and fastened to the left and right suction panels 100 (and not shown) or the left and right filter guides 106 (and not shown) by fastening members such as screws. In addition, the kit guide rails 434 can be incorporated with the left and right suction panels 100 (and not shown) or the left and right filter guides 106 (and not shown). In this embodiment, it is presumed that the kit guide rails 434 are incorporated with the left and right suction panels 100 (and not shown) or the left and right filter guides 106 (and not shown) to simplify and miniaturize the structure. The kit guide

rails 434 can be protruded from the left and right suction panels 100 (and not shown) or the left and right filter guides 106 (and not shown) to the kit guide protrusions 432, or formed in a groove structure on the left and right suction panels 100 (and not shown) or the left and right filter guides 106 (and not shown). In this embodiment, it is presumed that the kit guide rails 434 are formed in the groove structure on the left and right suction panels 100 (and not shown) or the left and right filter guides 106 (and not shown).

[127] The operation of the kit case moving unit of the filter cleaner of the air conditioner in accordance with the third embodiment of the present invention will now be described.

[128] When the second slide guide power generator 418 is driven, the second slide guide 414 is rotated, and the first and second slide guides 412 and 414 perform the mutual screw motion. The first slide guide 412 can be moved only in the up and down directions by the kit case guide 430. Accordingly, the kit case 300 can be moved only in the up and down directions with the first slide guide 412.

[129] Fourth Embodiment : first embodiment + filter cleaner damper

[130] Fig. 22 is a structure view illustrating filter cleaners of an air conditioner in accordance with a fourth embodiment of the present invention, Fig. 23 is a cross-sectional view taken along line J-J of Fig. 22, and Fig. 24 is a cross-sectional view illustrating an open mode of a filter cleaner damper of the air conditioner in accordance with the fourth embodiment of the present invention. The aforementioned members are not explained.

[131] In accordance with the fourth embodiment of the present invention, in the filter cleaners of the air conditioner, at least two kit cases 300 are installed on the left and right filters 31 and 32, respectively, for cleaning the left and right filters 31 and 32, a suction force generation unit 320 is provided in a smaller number than that of the kit cases 300 applied to the air conditioner, and connected to the two kit cases 300, for supplying suction force for sucking the alien substances of the left and right filters 31 and 32 to the two kit cases 300, and a filter cleaner damper 500 is further installed to selectively supply the suction force of the suction force generation unit 320 to any one of the two kit cases 300 connected to one suction force generation unit 320.

[132] In this embodiment, as the two kit cases 300 are provided, one suction force generation unit 320 is installed.

[133] The filter cleaner damper 500 includes a damper duct 510 connected respectively to the suction force generation unit 320 and the two kit cases 300, for connecting the suction force generation unit 320 to the two kit cases 300, and a damper valve unit 520 installed in the damper duct 510, for connecting or disconnecting the suction force generation unit 320 to/from each kit case 300.

[134] The damper duct 510 includes a united duct portion 512 connected to the suction

force generation unit 320, and first and second branched duct portions 514 and 516 branched from the united duct portion 512 and connected to the kit cases 300, respectively. A united inlet 512 is formed by opening the end of the united duct portion 512 facing the first and second branched duct portions 514 and 516, or formed at part of the end of the united duct portion 512 facing the first and second branched duct portions 514 and 516. In this embodiment, it is presumed that the united inlet 512 is formed at part of the end of the united duct portion 512 facing the first and second branched duct portions 514 and 516. First and second branched inlets 514A and 516A are formed by opening the ends of the first and second branched duct portions 514 and 516 facing the united duct portion 512, or formed at parts of the ends of the first and second branched duct portions 514 and 516 facing the united duct portion 512. In this embodiment, it is presumed that the first and second branched inlets 514A and 516A are formed at parts of the ends of the first and second branched duct portions 514 and 516 facing the united duct portion 512. The first and second branched inlets 514A and 516A are radially formed on the surface parallel to the united inlet 512 of the united duct portion 512, so that any one of the first and second branched inlets 514A and 516A can be selectively opened by the damper valve unit 520. At least the first and second branched inlet sides 514A and 516A of the first and second branched duct portions 514 and 516 contact each other.

- [135] The damper valve unit 520 includes a damper valve plate 522 being rotated around the center of the radially-arranged first and second branched inlets 514A and 516A, and having its inlet 521 overlap with any one of the first and second branched inlets 514A and 516A, and a damper valve plate rotation unit 524 for rotating the damper valve plate 522. The damper valve plate 522 can be installed inside the united duct portion 512. If a damper body forming the external appearance of the damper valve unit 520 is provided, the damper valve plate 522 can be installed in the damper body. In this embodiment, it is presumed that the damper valve plate 522 is installed inside the united duct portion 512. The damper valve plate 522 can be provided to partition off the united duct portion 512. Also, the damper valve plate 522 can be formed smaller than the inside of the united duct portion 512, but surface-contact the first and second branched duct portions 514 and 516 and cover the first and second branched inlets 514A and 516A. Here, it is presumed that the damper valve plate 522 surface-contacts the first and second branched duct portions 514 and 516. The inlet 521 of the damper valve plate 522 can overlap with the first or second branched inlet 514A or 516A. The damper valve plate rotation unit 524 includes a damper motor 524A connected directly to the damper valve plate 522, or connected indirectly to the damper valve plate 522 through a power transfer unit using a gear method or a belt-pulley method. In this embodiment, it is presumed that a rotation shaft 524B of the damper

motor 524A is connected directly to the damper valve plate 522. In addition, the damper motor 524A can be installed inside or outside the united duct portion 512. Here, it is presumed that the damper motor 524A is installed outside the united duct portion 512. The damper motor 524A is disposed to face the damper valve plate 522 with its rotation shaft 524B interposed between the first and second branched duct portions 514 and 516. A damper motor bearing 525 can be installed between the rotation shaft 524B of the damper motor 524A and the first and second branched duct portions 514 and 516, for rotating the rotation shaft 524B of the damper motor 524A.

- [136] The filter cleaner damper 500 can be connected directly to the kit cases 300 to use only one cyclone 350, and connected to the suction force generation unit 320 through the cyclone 350.
- [137] The operation of the filter cleaners of the air conditioner in accordance with the fourth embodiment of the present invention will now be explained.
- [138] To clean the left filter 31 of the left and right filters 31 and 32, the kit case 300 formed on the left filter 31 is moved in the up and down directions. Here, the kit case 300 formed on the right filter 32 is stopped. The filter cleaner damper 500 opens the first branched inlet 514A of the first and second branched inlets 514A and 516A, so that the kit case 300 formed on the left filter 31 can be connected to the suction force generation unit 320.
- [139] Accordingly, the alien substances of the left filter 31 are sucked into the kit case 300 formed at the left filter 31 by the suction force of the suction force generation unit 320. As indicated by an arrow of Fig. 24, the alien substances sucked into the kit case 300 with the air sequentially pass through the first branched duct portion 514 and the united duct portion 512 of the filter cleaner damper 500, and flow into the cyclone 350. The alien substances sucked into the cyclone 350 are separated from the air and collected in the cyclone 350. The air separated from the alien substances in the cyclone 350 is discharged from the cyclone 350, sucked into the suction force generation unit 320, and exhausted.
- [140] To clean the right filter 32, the kit case 300 formed on the left filter 31 is stopped, and the kit case 300 formed on the right filter 32 is moved in the up and down directions. As shown in Fig. 24, the filter cleaner damper 500 opens the second branched inlet 516A, so that the kit case 300 formed on the right filter 32 can be connected to the suction force generation unit 320. Therefore, the right filter 32 is cleaned in the same manner.
- [141] In accordance with the present invention, the air conditioner can use a filter cleaner damper including a damper valve plate rotated to cover any one of the first and second branched inlets, or a filter cleaner damper including solenoid valve type damper valve units installed on the first and second branched inlets, respectively. However, the filter

cleaner damper is not limited to the above examples, but formed in various types within the technical scope of the present invention.

[142] Fifth Embodiment : two kits, one suction force generation unit, damper, condensed water drain

[143] Fig. 25 is a structure view illustrating major elements of an air conditioner in accordance with a fifth embodiment of the present invention, and Fig. 26 is a cross-sectional view taken along line G-G of Fig. 25. The aforementioned elements are not explained.

[144] In accordance with the fifth embodiment of the present invention, a drain unit 580 of the air conditioner does not collect the alien substances of the kit cases 300 in the dust collection units, but directly externally discharges the alien substances. The drain unit 580 can externally discharge only the alien substances sucked into the kit cases 300 from the casing 2, or both the alien substances sucked into the kit cases 300 and the condensed water collected in the drain pan (not shown) from the casing 2. In this embodiment, it is presumed that the drain unit 580 is provided to externally discharge the alien substances sucked into the kit cases 300 and the condensed water collected in the drain pan (not shown) in order to avoid duplicate installation of the similar elements. The drain unit 580 includes a condensed water drain hose 582 connected to the drain pan, a filter cleaner drain hose 584 connected to the suction force generation unit 320, and a drain dust collection hose 586 being connected to the condensed water drain hose 582 and the filter cleaner drain hose 584, and having its one side externally extended from the casing 2. The condensed water drain hose 582 can be connected to a condensed water drain pump to easily discharge the condensed water, or installed in the up and down directions to naturally drop the condensed water from the drain pan by gravity and guide the condensed water to the drain dust collection hose 586.

[145] If a small amount of condensed water is discharged through the condensed water drain hose 582, the alien substances discharged through the filter cleaner drain hose 584 are accumulated in the drain dust collection hose 586 by the condensed water, to block the drain dust collection hose 586. As the alien substances sucked into the kit cases 300 as well as the condensed water is not discharged through the drain dust collection hose 586, bad smell or germs are generated in the drain dust collection hose 586. Accordingly, the drain unit 580 can include a drain damper for selectively connecting the drain dust collection hose 586 to any one of the condensed water drain hose 582 and the filter cleaner drain hose 584, so that the condensed water discharged through the condensed water drain hose 582 cannot be mixed with the alien substances discharged through the filter cleaner drain hose 584. In addition, the drain unit 580 can include a drain dust collection unit 588 for collecting the condensed water discharged through the condensed water drain hose 582 and the alien substances discharged

through the filter cleaner drain hose 584, and discharging the condensed water and the alien substances through the drain dust collection hose 586 over a predetermined amount. In this embodiment, it is presumed that the drain unit 580 includes the drain dust collection unit 588. The drain dust collection unit 588 includes a drain dust collection container 589 for collecting the condensed water discharged through the condensed water drain hose 582 and the alien substances discharged through the filter cleaner drain hose 584, and discharging the condensed water and the alien substances through the drain dust collection hose 586, a drain dust collection water level sensor 590 for sensing the water level of the drain dust collection container 589, and a drain dust collection opening/closing valve 591 for selectively discharging the condensed water and the alien substances collected in the drain dust collection container 589 through the drain dust collection hose 586 according to the sensing result of the drain dust collection water level sensor 590. A first suction hole 589A connected to the condensed water drain hose 582, a second suction hole 589B connected to the filter cleaner drain hose 584, and a discharge hole 589C connected to the drain dust collection hose 586 are formed on the drain dust collection container 589. The drain dust collection water level sensor 590 is installed at the inside upper portion of the drain dust collection container 589, for sensing the water level of the drain dust collection container 589 over a predetermined level. The drain dust collection water level sensor 590 can be embodied in a floating method. The drain dust collection opening/closing valve 591 is installed on the discharge hole 589C of the drain dust collection container 589, for connecting or disconnecting the drain dust collection container 589 to/from the drain dust collection hose 586.

[146] The major operation of the air conditioner in accordance with the fifth embodiment of the present invention will now be described.

[147] The suction force generation unit 320 is connected to any one of the kit cases 300 formed on the left and right filters 31 and 32 by the filter cleaner damper 550, so that the alien substances of the left or right filter 31 or 32 can be sucked into the kit case 300 connected to the suction force generation unit 320.

[148] The alien substances sucked into the kit case 300 are collected in the drain dust collection container 589 through the suction force generation unit 320. Here, the condensed water discharged through the condensed water drain hose 582 is collected in the drain dust collection container 589.

[149] While the alien substances sucked into the kit case 300 and the condensed water are collected in the drain dust collection container 589, if the water level of the drain dust collection container 589 is sensed by the drain dust collection water level sensor 590, the discharge hole 589C of the drain dust collection container 589 is opened by the drain dust collection opening/closing valve 591, and the alien substances and the

condensed water collected in the drain dust collection container 589 are discharged through the drain dust collection hose 586.

[150] Sixth embodiment : dust discharge bypass passage

[151] Fig. 27 is a structure view illustrating an application example of filter cleaners in accordance with a sixth embodiment of the present invention, and Fig. 28 is a cross-sectional view taken along line H-H of Fig. 27. The aforementioned elements are not explained.

[152] In accordance with the sixth embodiment of the present invention, the air conditioner includes filter cleaner kits 600 installed on the left and right filters 31 (and not shown) to be movable in the up and down directions, for sucking the alien substances from the left and right filters 31 (and not shown), the filter cleaner kits 600 having alien substance bypass passages so that the sucked alien substances can be bypassed to the lower portions and discharged to the upper portions.

[153] The filter cleaner kits 600 having the alien substance discharge bypass passages include kit cases 610 having suction chambers 612 for sucking the alien substances from the left and right filters 31 (and not shown), and being movable in the up and down directions on the left and right filters 31 (and not shown), and drain bodies 620 being coupled to the outer portions of the kit cases 610, communicating with the lower portions of the suction chambers 612 of the kit cases 610, and having discharge chambers 622 with discharge holes 622A at their upper portions.

[154] Suction holes 612A for sucking the alien substances from the left and right filters 31 (and not shown) are formed on the surfaces of the suction chambers 612 of the kit cases 610 facing the left and right filters 31 (and not shown), and discharge holes 612B for discharging the alien substances sucked into the suction chambers 612 of the kit cases 610 to the drain bodies 620 are formed at the lower portions of the suction chambers 612 of the kit cases 610 surface-contacting the drain bodies 620.

[155] The drain bodies 620 can be disposed on the rear surfaces of the kit cases 610 not to interrupt suction of the alien substances of the left and right filters 31 (and not shown) to the suction chambers 612 of the kit cases 610. The drain bodies 620 communicate with the discharge holes 612B of the suction chambers 612 of the kit cases 610 in order to suck the alien substances from the suction chambers 612 of the kit cases 610. The portions of the drain bodies 620 surface-contacting the kit cases 610 can be opened to cut down the production cost. The discharge holes 622A of the drain bodies 620 can be upwardly protruded from the drain bodies 620 to be easily coupled to the kit drain hoses 326. The drain bodies 620 can be individually molded and coupled to the kit cases 610, or incorporated with the kit cases 610.

[156] As described above, as the filter cleaner kits 600 have the alien substance discharge passages, even if the alien substances sucked into the filter cleaner kits 600 are

discharged directly through the filter cleaner kits 600, the suction force of the suction force generation unit 320 is not reduced. Accordingly, the kit drain hoses 326 are coupled to the discharge holes 622A of the drain bodies 620 to be connected to the upper portions of the filter cleaner kits 600, so that the kit drain hoses 326 are not twisted and do not interrupt the up/down movement of the filter cleaner kits 600.

[157] The kit drain hoses 326 can be interposed between the left and right filters 31 (and not shown) and the left and right suction panels 100 (and not shown) through the upper or lower portions of the left and right filters 31 (and not shown), and connected to the filter cleaner kits 600. In this embodiment, it is presumed that the kit drain hoses 326 are interposed between the left and right filters 31 (and not shown) and the left and right suction panels 100 (and not shown) through the upper portions of the left and right filters 31 (and not shown), and connected to the filter cleaner kits 600. Therefore, even if the filter cleaner kits 600 are disposed at the bottommost ends of the left and right filters 31 (and not shown), the kit drain hoses 326 are not spatially limited. In addition, when the filter cleaner kits 600 are stopped, special lamination spaces for the kit drain hoses 326 are not necessary. The kit drain hoses 326 can be disposed to pass through left and right kit drain hose through holes formed at the upper portions of the left and right filters 31 (and not shown), or to pass through left and right kit drain hose through holes 100D (and not shown) formed on the upper barriers 100A (and not shown) of the left and right suction panels 100 (and not shown). In this embodiment, it is presumed that the kit drain hoses 326 are disposed to pass through the left and right kit drain hose through holes 100D (and not shown) of the left and right suction panels 100 (and not shown). Especially, the portions of the kit drain hoses 326 positioned at the upper portions of the left and right filters 31 (and not shown) can be fixed to prevent twisting of the kit drain hoses 326 and not to interrupt the up/down movement of the filter cleaner kits 600. For example, flanges 326A surface-contacting the upper barriers 100A (and not shown) of the left and right suction panels 100 (and not shown) are formed at the portions of the kit drain hoses 326 passing through the left and right kit drain hose through holes 100D (and not shown) of the left and right suction panels 100 (and not shown). The flanges 326A of the kit drain hoses 326 are hook-coupled to the upper barriers 100A (and not shown) of the left and right suction panels 100 (and not shown), or fastened thereto by fastening members 327 such as screws. The kit drain hoses 326 can be formed in a flexible structure to be elastically extended or shrunk. The portions of the kit drain hoses 326 disposed between the filter cleaner kits 600 and the upper portions of the left and right filters 31 (and not shown), and the portions of the kit drain hoses 326 disposed between the upper portions of the left and right filters 31 (and not shown) and the suction force generation unit 320 can be individually molded and coupled to each other. In addition, the portions of the kit drain

hoses 326 disposed between the filter cleaner kits 600 and the upper portions of the left and right filters 31 (and not shown), and the portions of the kit drain hoses 326 disposed between the upper portions of the left and right filters 31 (and not shown) and the suction force generation unit 320 can be molded as a single body. The kit drain hoses 326 can be installed at any one of the front and rear edges of the left and right filters 31 (and not shown) not to interrupt the air flowing through the left and right filters 31 (and not shown) in the air conditioning operation of the air conditioner.

[158] The operation of the filter cleaners in accordance with the sixth embodiment of the present invention will now be described in detail.

[159] The alien substances of the left and right filters 31 (and not shown) are sucked into the suction chambers 612 of the kit cases 610 by the suction force of the suction force generation unit 320. The alien substances sucked into the suction chambers 612 of the kit cases 610 are bypassed to the lower portions of the kit cases 610, and discharged to the discharge chambers 622 of the drain bodies 620 through the discharge holes 612B of the suction chambers 612 of the kit cases 610. The alien substances sucked into the discharge chambers 622 of the drain bodies 620 are lifted from the lower portions of the discharge chambers 622 of the drain bodies 620 to the upper portions thereof, and discharged to the kit drain hoses 326 through the discharge holes 622A of the drain bodies 620. The alien substances discharged to the kit drain hoses 326 can be collected in the dust collection units such as the cyclones 350 or directly discharged.

[160] Fig. 29 is a cross-sectional view illustrating an air conditioner in accordance with a seventh embodiment of the present invention, Fig. 30 is a disassembly perspective view illustrating a filter cleaner of an air conditioner in accordance with the seventh embodiment of the present invention, Fig. 31 is a structure view illustrating the operation of the filter cleaner of the air conditioner in accordance with the seventh embodiment of the present invention, and Fig. 32 is a cross-sectional view illustrating the filter cleaner of the air conditioner in accordance with the seventh embodiment of the present invention. The aforementioned elements are not explained.

[161] The air conditioner includes filter cleaners 1300 for automatically cleaning the filters by power without separating the filters from the casing 2.

[162] Each of the filter cleaners 1300 includes a kit case 300, a kit case moving unit 310 for moving the kit case 300, and a suction force generation unit 320 connected to the kit case 300, for generating suction force into the kit case 300.

[163] The kit cases 300 include filter cleaner spaces 1311 with a predetermined size, for sucking and collecting the alien substances from the left and right filters 31 and 32, respectively.

[164] As discussed later, part of the kit case moving unit 310 is inserted into the filter cleaner space 1311. Therefore, a first barrier 1312 is formed to separate the installation

space of the kit case moving unit 310, so that the kit case moving unit 310 cannot be contaminated with the alien substances collected in the filter cleaner space 1311.

[165] As explained below, the agitator driving unit 304 is inserted into the filter cleaner space 1311. A second barrier 1313 is formed to separate the installation space of the agitator driving unit 304, so that the agitator driving unit 304 cannot be contaminated with the alien substances collected in the filter cleaner space 1311.

[166] Each of the kit cases 300 includes an upper case 1314 forming the upper portion of the kit case 300, and a lower case 1315 forming the lower portion of the kit case 300 and being coupled to the upper case 1314.

[167] Agitators 1330 are inserted into the lower cases 1315. Suction holes 1316 are formed on the surfaces of the lower cases 1315 facing the left and right filters 31 and 32, respectively, so that the agitators 1330 can contact the left and right filters 31 and 32.

[168] A discharge hole 1317 for discharging the alien substances from the filter cleaner space 1311 of the kit case 300 is formed on the lower case 1315.

[169] The discharge hole 1317 can be formed on the side surface or the bottom surface of the lower case 1315. In this embodiment, it is presumed that the discharge hole 1317 is formed on the bottom surface of the lower case 1315.

[170] A discharge hole boss 1318 downwardly protruded from the lower case 1315 is formed on the discharge hole 1317 to be connected to a filter cleaner dust collection unit 1350 explained later.

[171] Preferably, the kit case moving unit 310 is disposed at the inside upper portion of the kit case 300, namely, in the upper case 1314, so that the alien substances of the kit case 300 can be easily discharged through the discharge hole 1317.

[172] The kit case moving unit 310 includes filter cleaner case wheels 1322 rotatably disposed on the kit case 300, filter cleaner case guides 1344 for guiding the up/down movement of the kit case 300, and a filter cleaner case driving motor 1326 for generating power for moving the kit case 300.

[173] Each of the filter cleaner case wheels 1322 includes a plurality of pinion gear teeth 1322a arranged in the circumferential direction of the filter cleaner case wheel 1322 and engaged with the filter cleaner case guides 1344. Accordingly, when the filter cleaner case driving motor 1326 is stopped, the filter cleaner case wheels 1322 serve as stoppers for restricting the up/down movement of the kit case 300 with the filter cleaner case guides 1344.

[174] Each of the filter cleaner case guides 1344 includes a pair of filter cleaner case guide ribs 1344a and 1344b disposed at the front and rear portions of the filter cleaner case wheel 1322, for housing the filter cleaner case wheel 1322 therebetween.

[175] Each of the filter cleaner case guides 1344 includes a plurality of rack gear teeth 1344c disposed between the filter cleaner case guide ribs 1344a and 1344b, arranged in

the up and down directions, and engaged with the pinion gear teeth 1322a of the filter cleaner case wheel 1322, so that the filter cleaner case guides 1344 can serve as stoppers with the filter cleaner case wheels 1322.

[176] The power of the filter cleaner case driving motor 1326 can be transferred to the filter cleaner case wheels 1322 by a filter cleaner case power transfer unit 1328 discussed later.

[177] The filter cleaner case power transfer units 1328 can be embodied by using a gear method or a belt-pulley method. Besides, the filter cleaner case power transfer units 1328 can be embodied as apparatuses for transferring power. In this embodiment, it is presumed that the filter cleaner case power transfer units 1328 are embodied by using the gear method.

[178] Each of the filter cleaner case power transfer units 1328 includes a drive gear 1328a connected directly to a rotation shaft 1326a of the filter cleaner case driving motor 1326, and a driven gear 1328b always engaged with the drive gear 1328a, and rotated monolithically with a support shaft 1323 of the filter cleaner case wheels 1322.

[179] In the case that the rotation shaft 1326a of the filter cleaner case driving motor 1326 is parallel with the support shaft 1323 of the filter cleaner case wheels 1322, bevel gears are preferably used as the drive gear 1328a and the driven gear 1328b.

[180] On the other hand, the filter cleaners 1300 include the agitators 1330 rotatably installed in the kit cases 300, for agitating the alien substances of the left and right filters 31 and 32 to easily separate and suck the alien substances of the left and right filters 31 and 32, and agitator driving units 304 for rotating the agitators 1330.

[181] Preferably, the agitators 1330 are installed at the inside lower portions of the kit cases 300, namely, in the lower cases 1315, so that the alien substances collected in the kit cases 300 cannot be sent to the kit case moving units 310 or the agitator driving units 304.

[182] The agitators 1330 include agitator bodies 1332 rotatably disposed in the kit cases 300, especially, on the suction holes 1316, brush bristles 1334 planted on the agitator bodies 1332 to contact the left and right filters 31 and 32, and first and second agitator rotation shafts 1336 and 1337 protruded from the front and rear ends of the agitator bodies 1332, for rotatably supporting the agitators 1330.

[183] Preferably, the front and rear direction lengths of the agitator bodies 1332 are almost identical to at least the left and right filters 31 and 32. Therefore, even if the kit cases 300 are moved only in the up and down directions, the whole left and right filters 31 and 32 can be cleaned.

[184] The brush bristles 1334 can be spirally planted along the agitator bodies 1332.

[185] Any one of the first and second agitator rotation shafts 1336 and 1337 can be rotatably coupled to the kit case 300, and the other is coupled to the agitator driving

unit 304.

- [186] The agitator driving units 304 include agitator driving motors 1342 for generating power for rotating the agitators 1330.
- [187] The agitator driving motors 1342 can be installed inside or outside the kit cases 300. In this embodiment, it is presumed that the agitator driving motors 1342 are disposed inside the kit cases 300 to easily transfer power and minimize the power transfer path.
- [188] The agitator driving motors 1342 can be connected directly or indirectly to the agitators 1330. In this embodiment, it is presumed that the agitator driving motors 1342 are arranged in a row with the agitators 1330 in the front and rear directions, and connected directly to the agitators 1330 to simplify the structure and minimize the power transfer path.
- [189] The filter cleaner dust collection unit 1350 includes a filter cleaner dust collector 1360 having a dust collection space 361 for collecting the alien substances from the kit case 300, and a filter cleaner dust collection guide path 1370 for connecting the filter cleaner dust collector 1360 to the filter cleaner 1300, especially, the discharge hole 1317 of the kit case 300.
- [190] Fig. 33 is a disassembly perspective view illustrating major elements of an air conditioner in accordance with an eighth embodiment of the present invention, and Fig. 34 is a cross-sectional view illustrating a filter cleaner of the air conditioner in accordance with the eighth embodiment of the present invention. The aforementioned elements are not explained.
- [191] The air conditioner includes filter cleaners 1500. Each of the filter cleaners 1500 includes a kit case 300, an agitator 1530, and a kit case moving unit 310 for moving the kit case 300 and rotating the agitator 1530.
- [192] The kit case moving unit 310 includes filter cleaner case wheels 1544 installed in the kit case 300, and rotated with filter cleaner guides 1344 installed in the casing 2, a filter cleaner driving motor 1546 connected directly to the filter cleaner case wheels 1544 or the agitator 1530, and a filter cleaner driving motor power transfer unit 1550 for transferring power of the filter cleaner driving motor 1546 to one of the filter cleaner case wheels 1544 and the agitator 1530 which is not directly connected to the filter cleaner driving motor 1546.
- [193] The filter cleaner driving motor 1546 can be connected directly to the agitator 1530 as in this embodiment, or connected directly to the filter cleaner case wheels 1544 as mentioned above.
- [194] The filter cleaner driving motor 1546 can generate bi-directional power to upwardly and downwardly move the kit case 300. If the filter cleaner driving motor 1546 is rotated in one direction, the power transfer direction of the filter cleaner driving motor 1546 to the filter cleaner case wheels 1544 can be changed by a change unit. In this

embodiment, it is presumed that the filter cleaner driving motor 1546 generates bi-directional power to simplify the structure.

- [195] The filter cleaner driving motor 1546 is a double axis motor having one side connected directly to the agitator 1530 and the other side connected directly to the filter cleaner driving motor power transfer unit 1550.
- [196] The filter cleaner driving motor power transfer unit 1550 can be embodied by using a gear method or a belt-pulley method. Besides, the filter cleaner driving motor power transfer unit 1550 can be embodied as an apparatus for transferring power. In this embodiment, it is presumed that the filter cleaner driving motor power transfer unit 1550 is embodied by using the belt-pulley method.
- [197] The filter cleaner driving motor power transfer unit 1550 includes a drive pulley 1552 connected directly to the filter cleaner driving motor 1546, a driven pulley 1554 connected directly to the filter cleaner case wheels 1544, and a belt 1556 for connecting the drive pulley 1552 to the driven pulley 1554.
- [198] The kit case moving unit 310 further includes a clutch 1560 installed between the filter cleaner driving motor 1546 and the agitator 1530. Therefore, even if the filter cleaner driving motor 1546 generates bi-directional rotation force, the agitator 1530 can receive only one direction rotation force of the filter cleaner driving motor 1546.
- [199] Fig. 35 is a disassembly perspective view illustrating major elements of an air conditioner in accordance with a ninth embodiment of the present invention, Fig. 36 is a cross-sectional view illustrating the air conditioner in accordance with the ninth embodiment of the present invention, Fig. 37 is a disassembly perspective view illustrating A of Fig. 35, and Fig. 38 is a disassembly perspective view illustrating 310 of Fig. 37. The aforementioned elements are not explained.
- [200] Each of the kit case moving units 310 includes a wire 2312 connected to the kit case 300, a reel 2314 connected to the end of the wire 2312 far from the kit case 300, and rotatably installed in the casing 2, for reeling or unreeling the wire 2312, and a reel rotation motor 2316 for rotating the reel 2314.
- [201] The end of the wire 2312 close to the kit case 300 is coupled to the boss portion 300F of the kit case 300. Here, the two wires 2312 are coupled to the two boss portions 300F of the kit case 300, respectively, to firmly stably support the kit case 300 and not to interrupt the air flowing to the left and right filters 31 and 32.
- [202] Each of the wires 2312 includes a wire portion 2311 easily wound around the reel 2314, and a connection rod portion 2313 disposed at the end of the wire portion 2311 close to the kit case 300, and coupled to the boss portion 300F of the kit case 300. Each of the connection rod portions 2313 of the wires 2312 includes a wire insertion portion 2313A which does not pass through a boss hole 300G of the kit case 300, the wire portion 2311 of the wire 2312 being inserted into the wire insertion portion 2313A, a

connection rod 2313B protruded from the wire insertion portion 2313A to pass through the boss hole 300G of the kit case 300, and a stopper for preventing the connection rod 2313B passing through the boss hole 300G of the kit case 300 from being separated from the boss hole 300G of the kit case 300. Each of the stoppers of the wires 2312 includes a screw portion 2313C formed on the connection rod 2313B, and a wire nut 2313D screw-fastened to the screw portion 2313C.

[203] Two reels 2314 can be provided to correspond to the two wires 2312, respectively, or one reel 2314 can be provided for the two wires 2312. In this embodiment, it is presumed that one reel 2314 is provided. The reels 2314 can be installed at the left and right suction panels 100 and 110, the cabinet 70 or the base 60, respectively, for reeling the wires 2312 through the upper portions of the left and right filters 31 and 32. In this embodiment, it is presumed that the reels 2314 are installed on the left and right suction panels 100 and 110 to efficiently reel the wires 2312. That is, the reels 2314 can be installed on the upper barriers 100A and 110A of the left and right suction panels 100 and 110. Each of the reels 2314 includes a reel main body 2314A around which the two wires 2312 are wound, and a reel rotation shaft 2314B being rotated monolithically with the reel main body 2314A, and having one end rotatably coupled to the left or right suction panel 100 or 110 and the other end connected to the reel rotation motor 2316. The reel main body 2314A includes a wire winding portion 2314C on which the two wires 2312 are wound, and flanges 314D protruded in the radial direction of the reel main body 2314A from both sides of the wire winding portion 2314C in the axial direction of the reel main body 2314A, for preventing separation of the wires 2312 from the wire winding portion 2314C. Two wire winding portions 2314C can be provided to the reel main body 2314A, so that the two wires 2312 can be individually wound around the wire winding portions 2314C without being twisted. Each of the flanges 314D of the reel main body 2314A can be comprised of a plurality of ribs isolated along the circumferential direction of the reel main body 2314A, or formed in a ring structure. In this embodiment, it is presumed that the flanges 314D of the reel main body 2314 are formed in the ring shape to completely prevent separation of the wires 2312.

[204] The reel rotation motors 2316 can be installed at the left and right suction panels 100 and 110, the cabinet 70 or the base 60. The reel rotation motors 2316 can be connected to the reels 2314 directly, or indirectly through reel power transfer units 2318. In this embodiment, it is presumed that the reel rotation motors 2316 are installed in the cabinet 70 and connected indirectly to the reels 2314 through the reel power transfer units 2318. The reel power transfer units 2318 can be embodied by using a gear method or a belt-pulley method. In this embodiment, it is presumed that the reel power transfer units 2318 are embodied by using the belt-pulley method. Each of the reel

power transfer units 2318 includes a drive pulley 2318A connected directly to the reel rotation motor 2316, a driven pulley 2318B connected directly to the reel 2314, and a belt 2318C wound on the drive pulley 2318A and the driven pulley 2318B at the same time. A supplementary shaft can be formed on the reel rotation motor 2316 and used to drive the wires 2312.

- [205] The kit moving units 310 further include kit case guides 430 disposed at the left and right suction panels 100 and 110 or the left and right filter guides 106 and 116, for smoothly moving the wires 2312 and guiding the moving paths of the wires 2312. Each of the kit case guides 430 includes a kit guide protrusion 432 protruded from the kit case 300, and kit guide rails 434 into which the kit guide protrusion 432 is movably inserted, so that the kit cases 300 cannot be moved in the isolation and adhesion directions to the left and right filters 31 and 32, namely, the right and left directions of the casing 2.
- [206] Fig. 39 is a cross-sectional view illustrating a filter cleaner of an air conditioner in accordance with a tenth embodiment of the present invention. The aforementioned members are not explained.
- [207] In accordance with the tenth embodiment of the present invention, each of the filter cleaners of the air conditioner includes a drive gear 2364A, a driven gear 2364B connected directly to the agitator 302, and a kit wheel rack gear 2366, thereby rotating the agitator 302 without using a motor.
- [208] Figs. 40 to 43 are structure views illustrating an air conditioner in accordance with an eleventh embodiment of the present invention. The aforementioned members are not explained.
- [209] In accordance with the eleventh embodiment of the present invention, the kit cases 300 can be moved by the motors 304 with the help of the filter cleaner case guides 1344 and the kit wheels 1322. The movement of the kit cases 300 is guided by the kit guide protrusions 432 and the kit guide rails 434. The rotation of the motors 304 is transferred by gears 1304, and the rotation of the gears 1304 is transferred to the kit wheels 1332, so that the kit cases 300 can be moved by the kit wheels 1332 and the filter cleaner case guides 134. The rotation of the kit wheels 1332 is transferred to gears 1302, for rotating the agitators 302.
- [210] Although the preferred embodiments of the present invention have been described, it is understood that the present invention should not be limited to these preferred embodiments but various changes and modifications can be made by one skilled in the art within the spirit and scope of the present invention as hereinafter claimed.

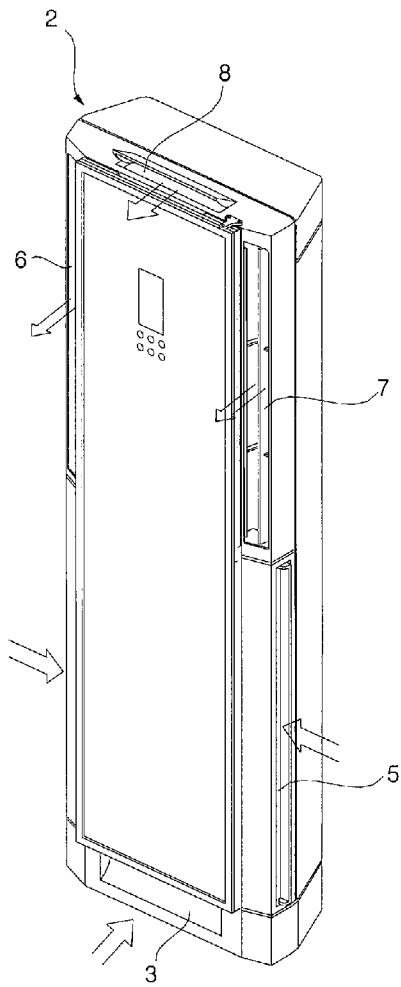
Claims

- [1] An air conditioner, comprising:
a passage extended from at least one suction hole to a discharge hole through a heat exchanger;
a filter disposed on the passage;
a case having an opening at its side facing the filter, and sucking dust from the filter through the opening; and
a motor for moving the case along the filter.
- [2] The air conditioner of claim 1, comprising a screw cooperating with the motor, for moving the case.
- [3] The air conditioner of claim 1, wherein the motor is coupled to the case to be moved with the case.
- [4] The air conditioner of claim 1, comprising a wire for connecting the motor to the case.
- [5] The air conditioner of claim 2, comprising two screws cooperating with the motor, for moving the case.
- [6] The air conditioner of claim 2, comprising a guide for guiding the case to be moved along the screw without rotation.
- [7] The air conditioner of claim 6, wherein the guide is one of a rail and a protrusion formed on the case.
- [8] The air conditioner of claim 2, comprising:
first teeth provided at one side of the screw; and
second teeth cooperating with the first teeth and coupled to the motor.
- [9] The air conditioner of claim 3, comprising:
teeth coupled to the motor; and
a rack disposed along the filter and cooperating with the teeth.
- [10] The air conditioner of claim 3, comprising a guide for guiding the case to be moved along the filter.
- [11] The air conditioner of claim 3, comprising an agitator disposed at the opening to contact the filter, and rotated by the motor.
- [12] The air conditioner of claim 4, comprising:
two wires coupled to the case at both sides of the opening; and
a reel disposed at the upper portion of the case, for reeling the two wires.
- [13] The air conditioner of claim 4, comprising:
two wires coupled to the case at both sides of the opening; and
a reel disposed at the upper portion of the case, for reeling the two wires.
- [14] The air conditioner of claim 4, comprising an agitator disposed at the opening to

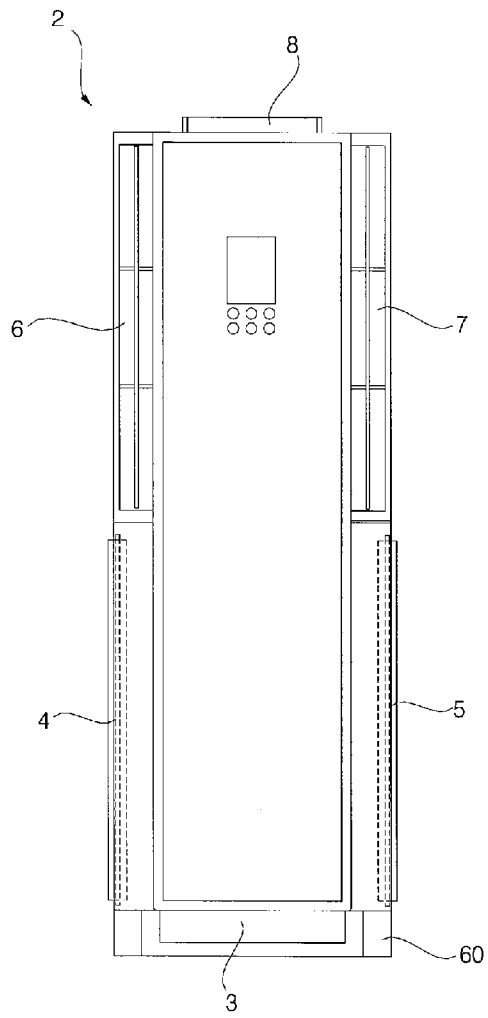
contact the filter, and rotated with the movement of the case.

- [15] The air conditioner of claim 1, comprising:
a discharge hole provided at the case, for discharging dust out of the case; and
a dust passage extended from the opening to the discharge hole, so that dust can be transferred via the bottom to top side of the case.
- [16] The air conditioner of claim 1, comprising a position sensor for sensing the position of the case.
- [17] The air conditioner of claim 1, comprising an agitator being disposed at the opening to contact the filter, and having a rotation shaft with teeth.
- [18] The air conditioner of claim 1, comprising:
an agitator disposed at the opening to contact the filter; and
an additional motor for rotating the agitator.
- [19] The air conditioner of claim 1, comprising:
two filters disposed on the passage;
two cases corresponding to the two filters, respectively;
two hoses connected respectively to the two cases, for discharging dust;
a fan cooperating with the two hoses; and
a damper disposed between the two hoses and the fan, for selectively opening and closing the two hoses.
- [20] The air conditioner of claim 1, which is an indoor unit of the air conditioner, comprising:
a hose connected to the case to discharge dust; and
a dust collection unit connected to the hose to filter off dust.
- [21] The air conditioner of claim 1, comprising:
a suction force generation unit positioned at the opposite side of the case from the filter, for sucking dust; and
a dust passage extended from the case to the suction force generation unit over the upper portion of the filter, so that dust can pass through the dust passage.

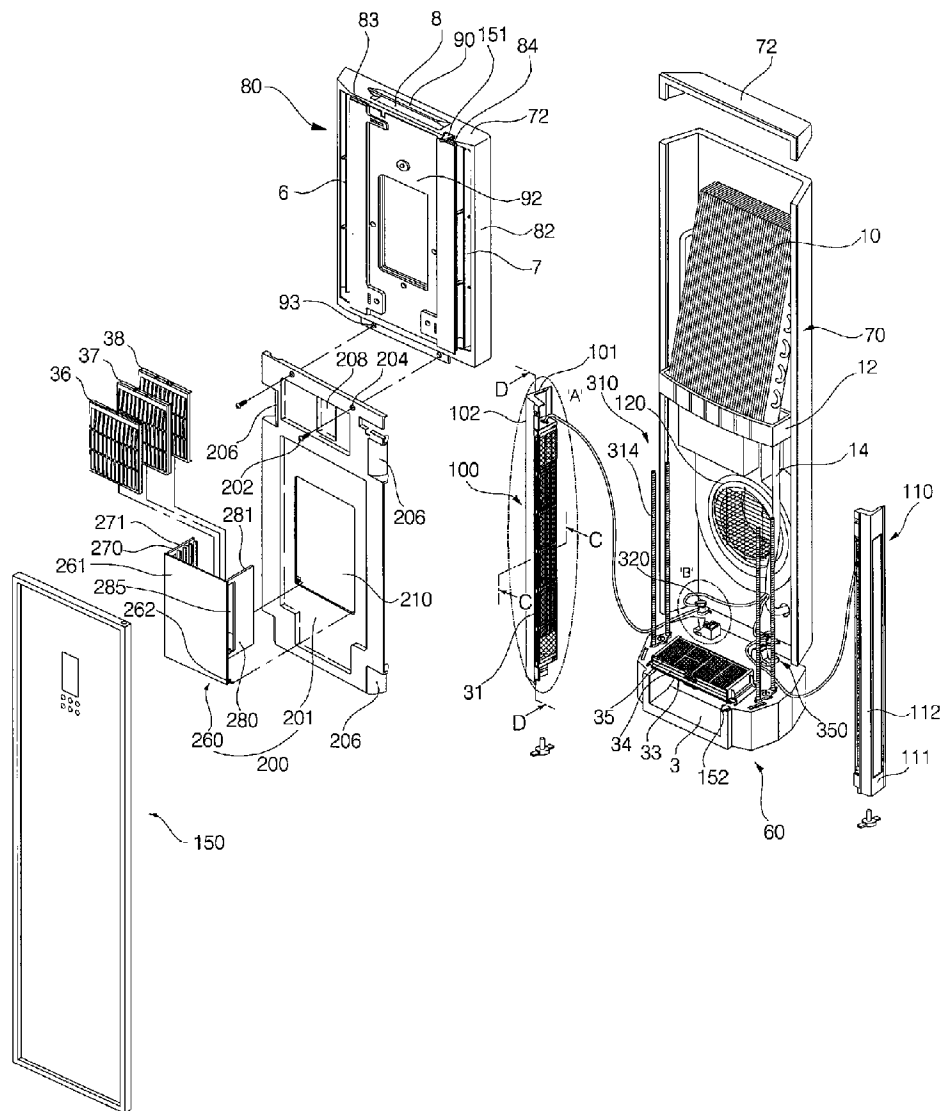
[Fig. 1]



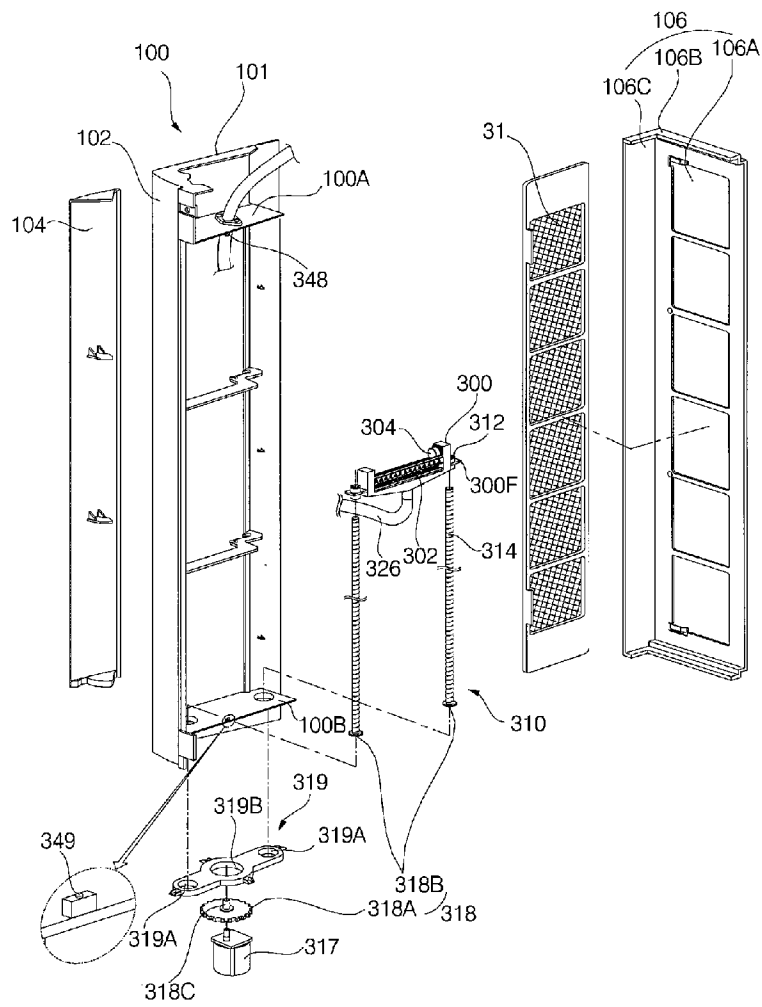
[Fig. 2]



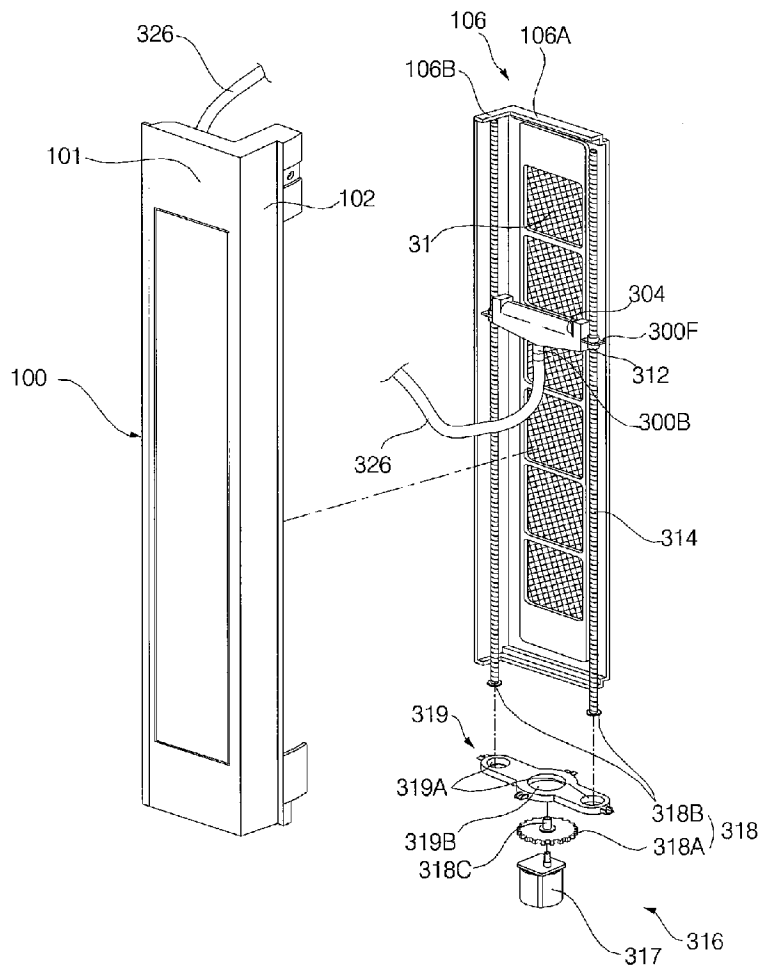
[Fig. 4]



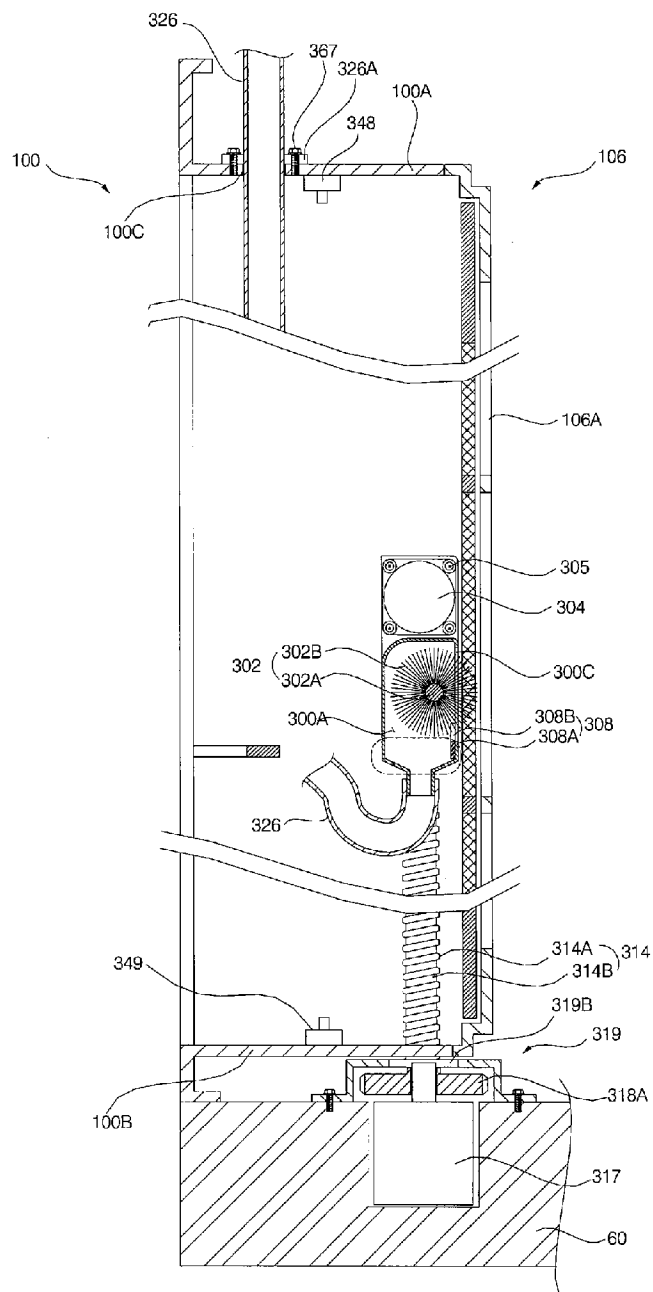
[Fig. 7]



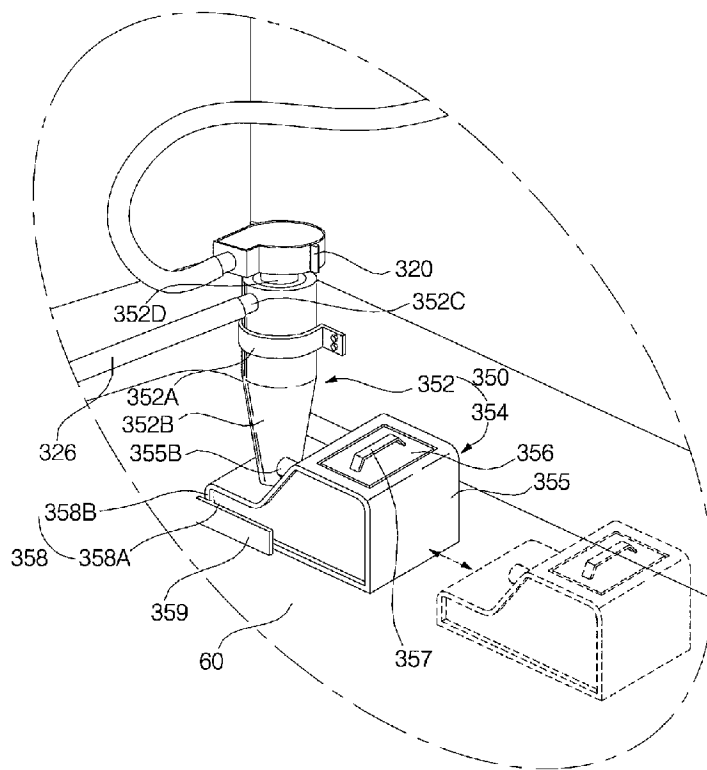
[Fig. 8]



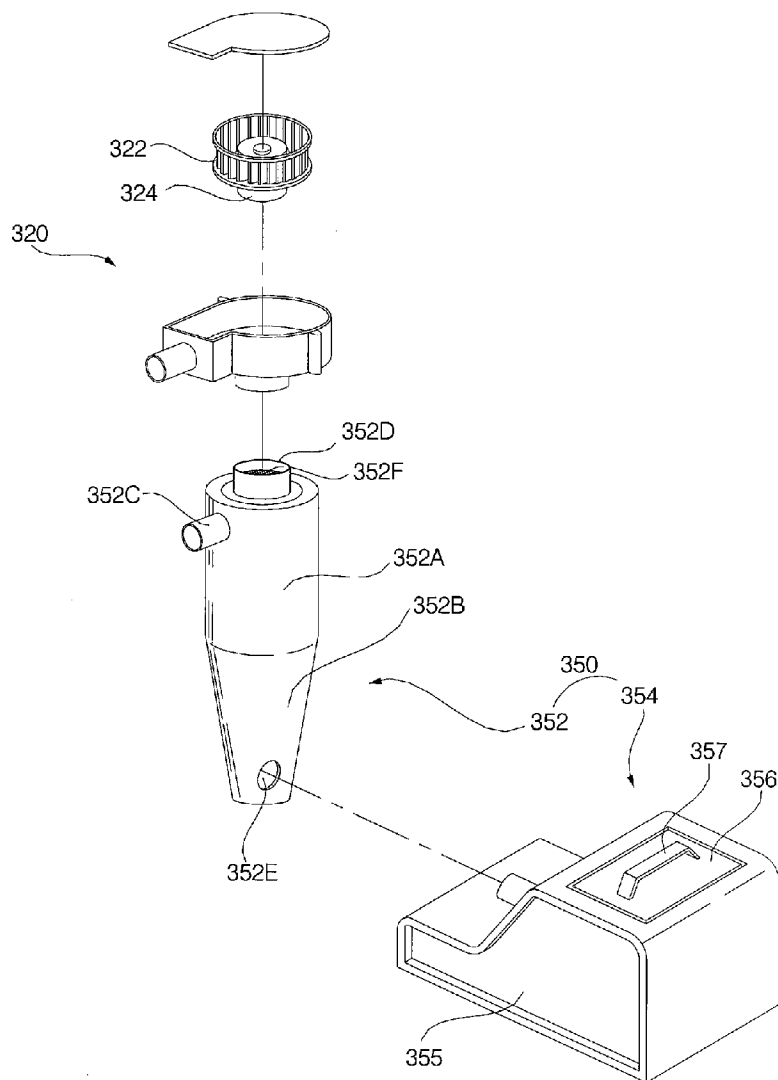
[Fig. 10]



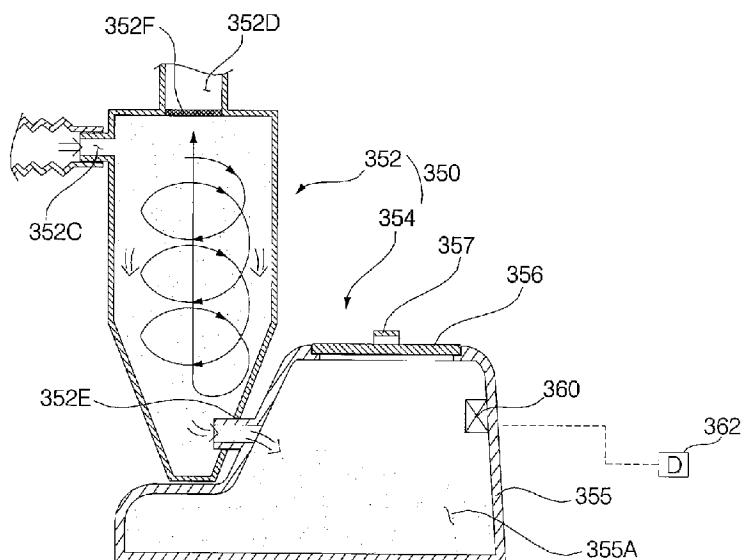
[Fig. 11]



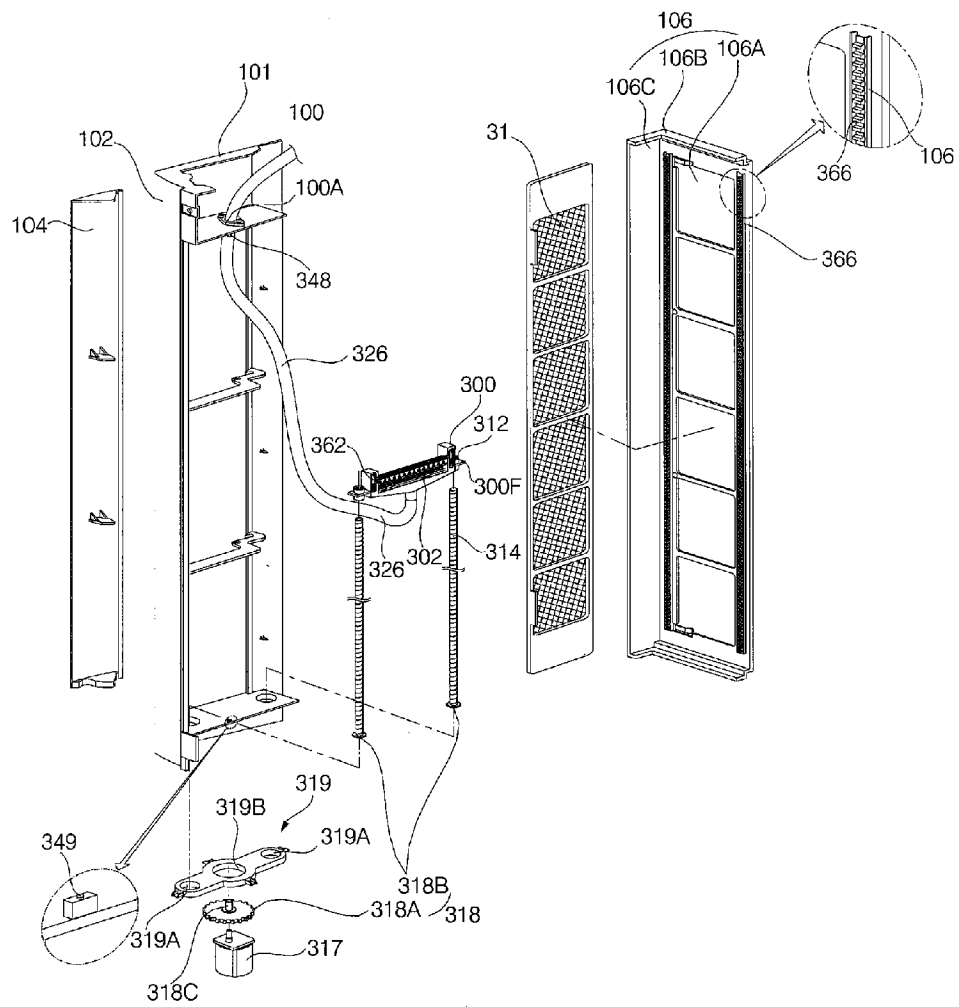
[Fig. 12]



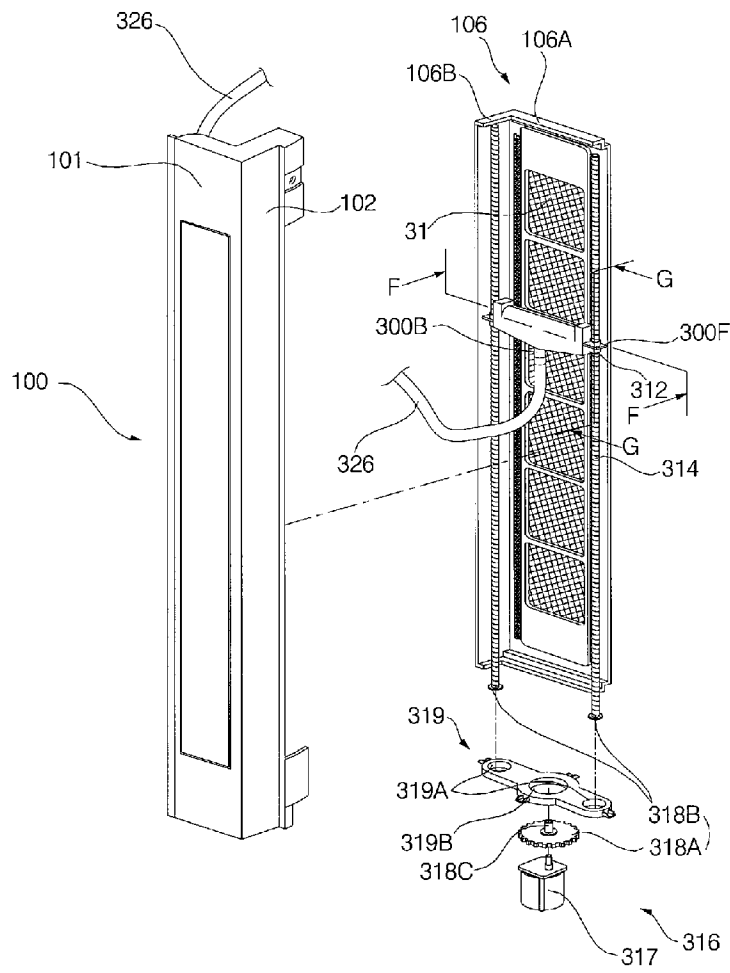
[Fig. 13]



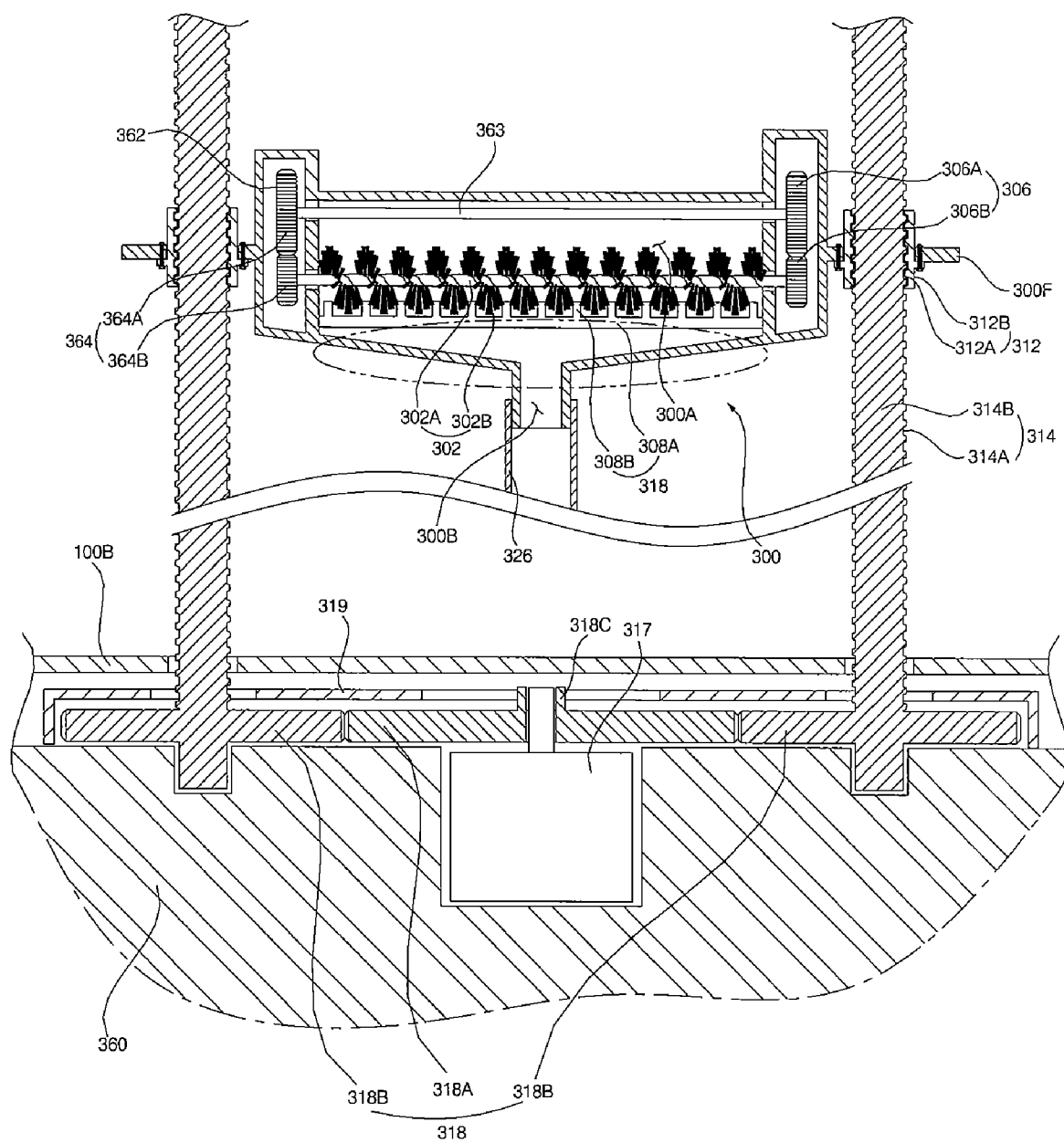
[Fig. 14]



[Fig. 15]

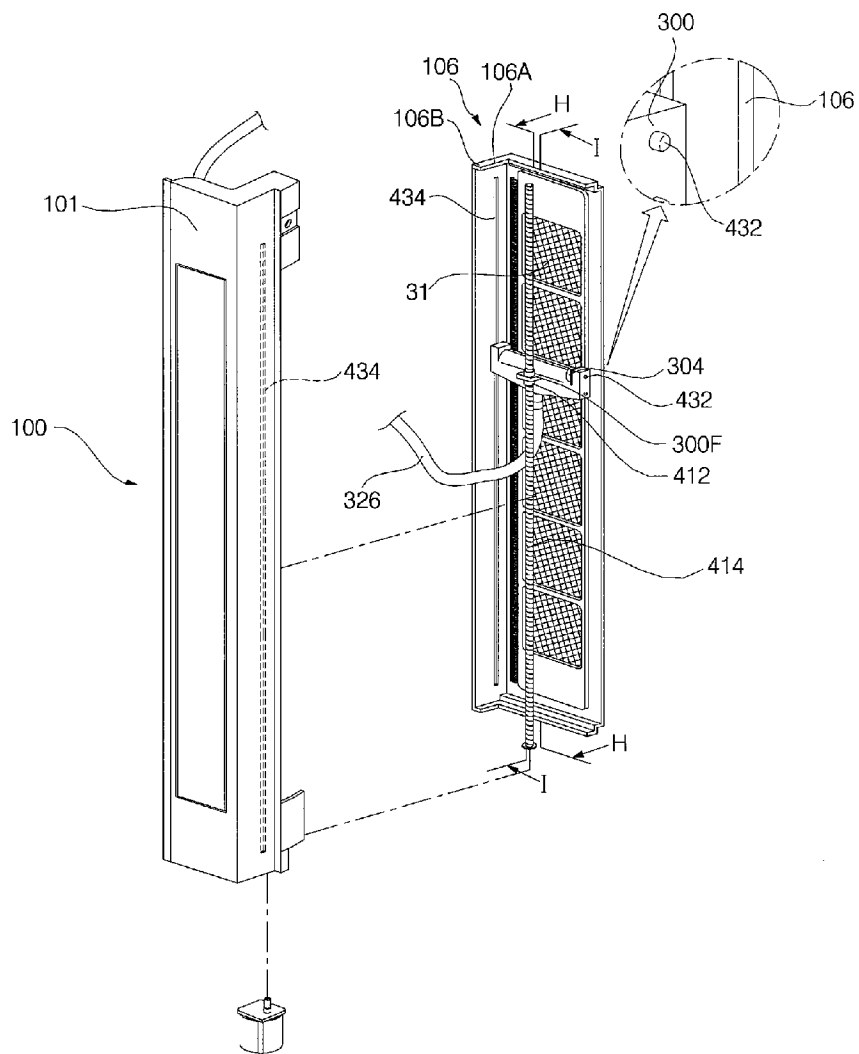


[Fig. 16]

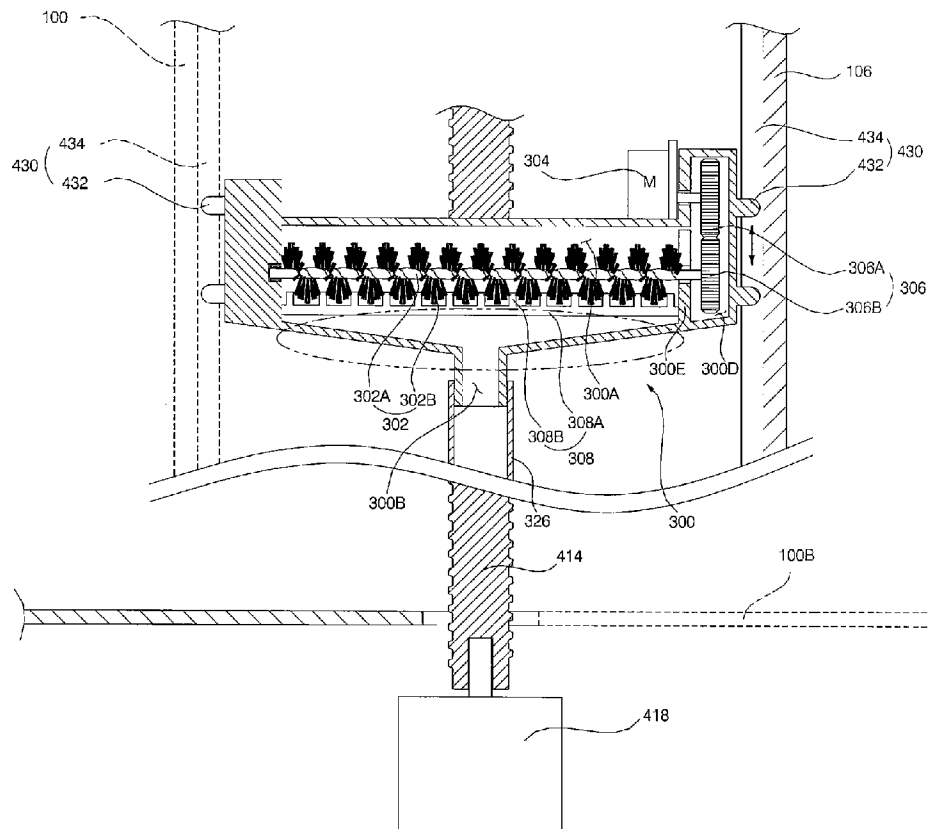


This exploded perspective view shows the assembly of the vehicle interior trim. The main trim panel 100 is shown with a top edge 101 and a side edge 102. A cable 348 is connected to a control unit 300, which is mounted to the trim panel. The control unit 300 has a connector 412 and a cable 414. A speaker 418 is shown at the bottom, connected to the trim panel via a cable 349. The trim panel 100 is shown in an exploded view relative to the vehicle body 104, which has a mounting bracket 100A. The trim panel 100 is also shown in an exploded view relative to the door panel 31, which has a mesh grille 434. The door panel 31 is shown in an exploded view relative to the door frame 106, which has a mounting bracket 106A and a cable 106B. The door frame 106 is shown in an exploded view relative to the vehicle body 104, which has a mounting bracket 106C.

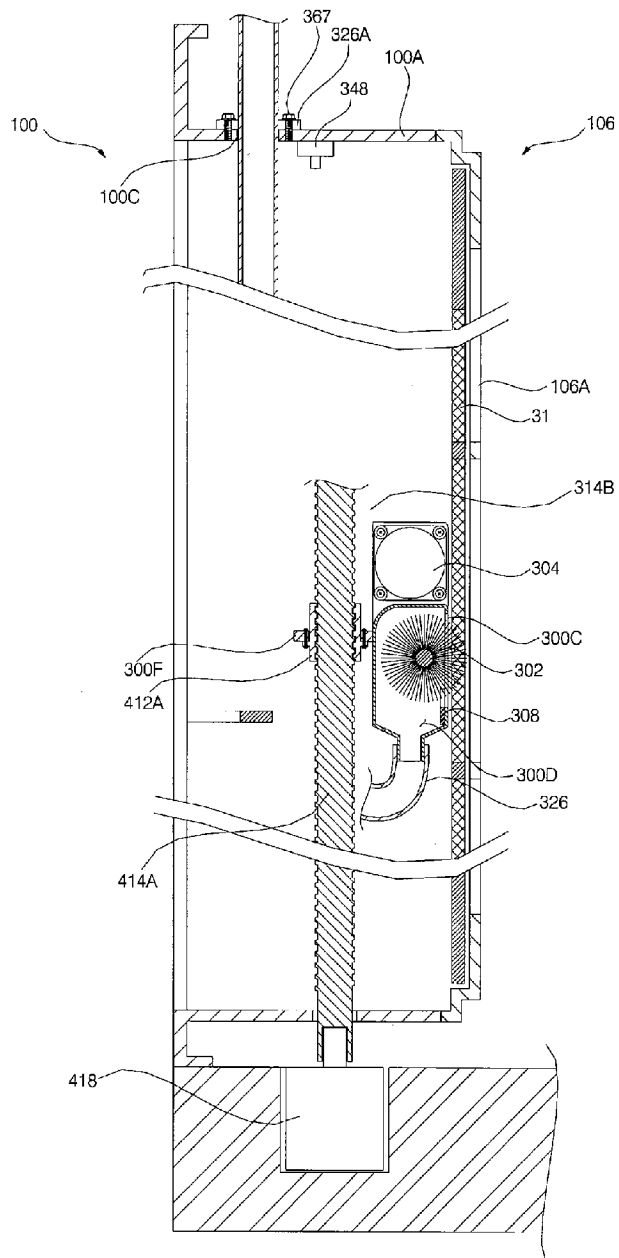
[Fig. 19]



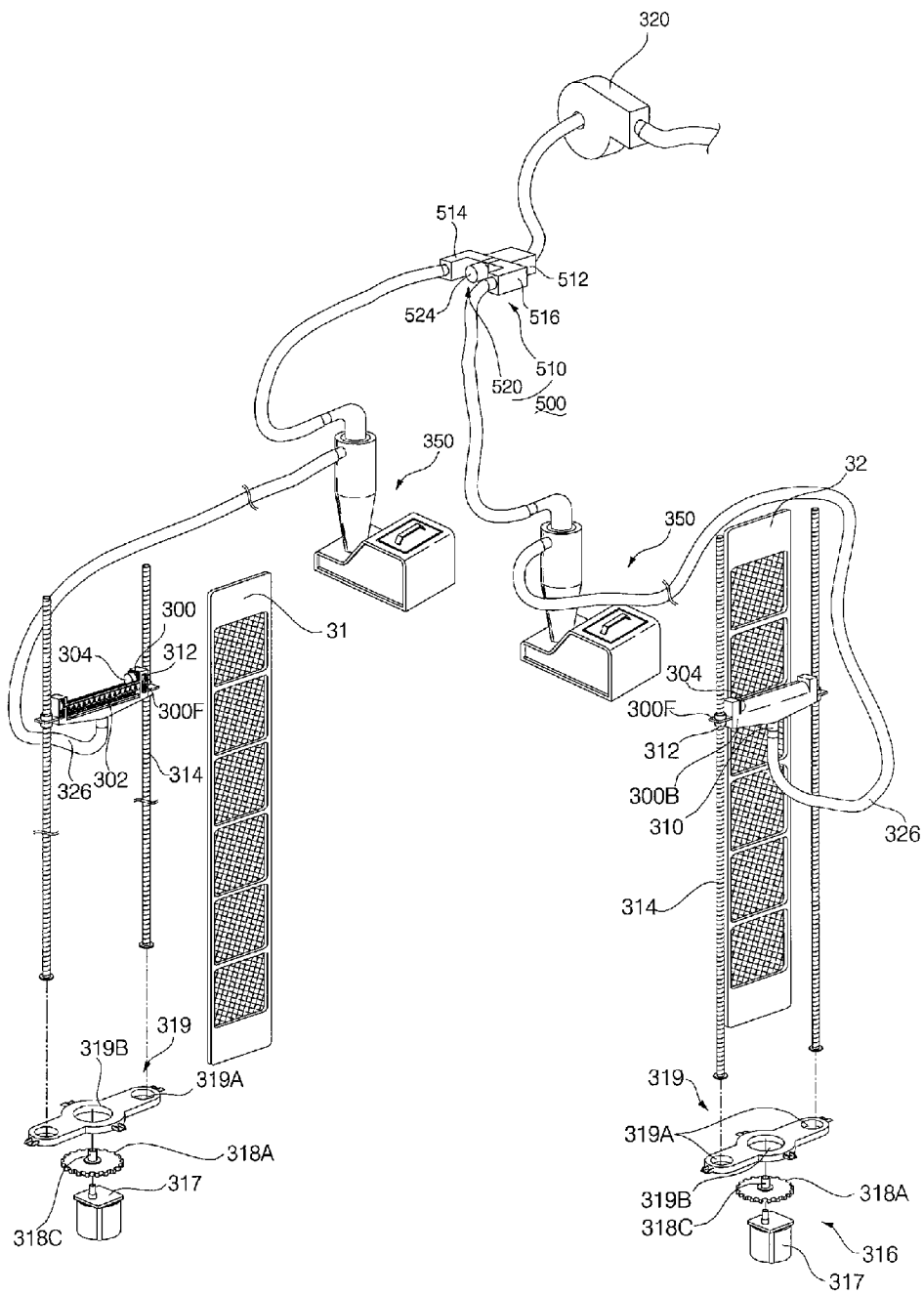
[Fig. 20]



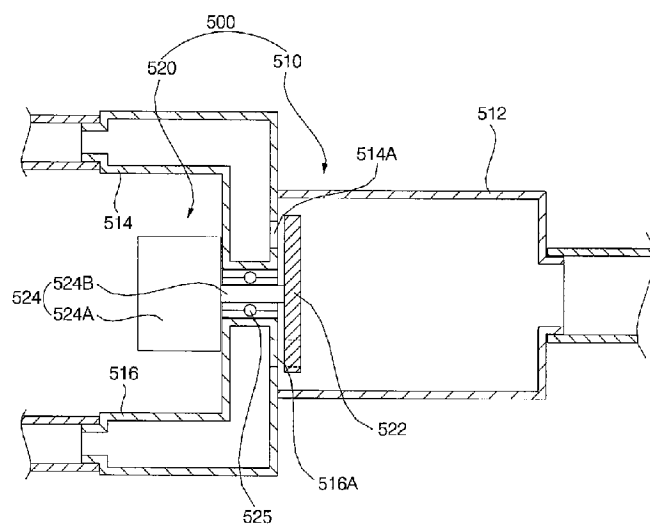
[Fig. 21]



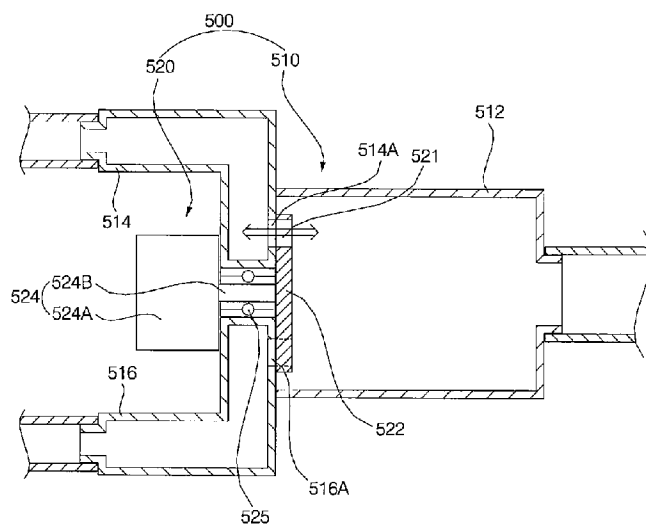
[Fig. 22]



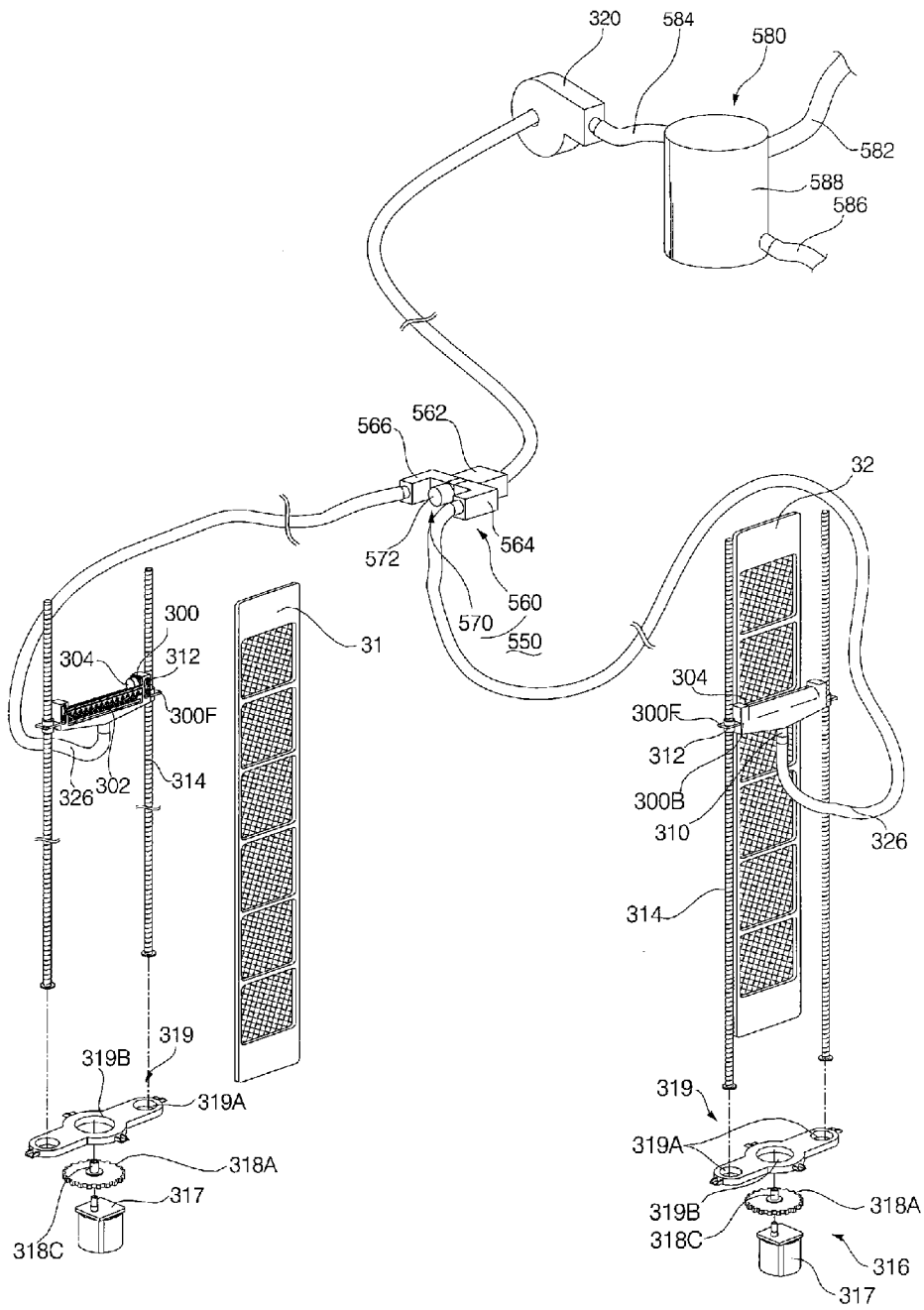
[Fig. 23]



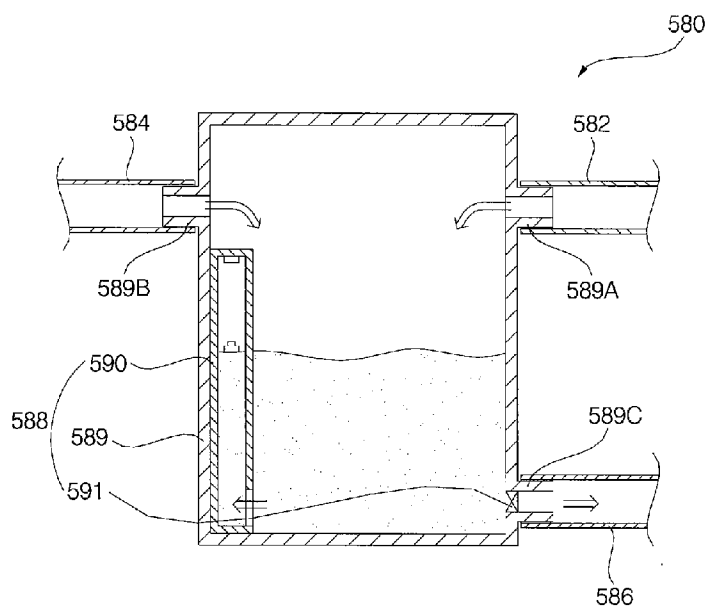
[Fig. 24]



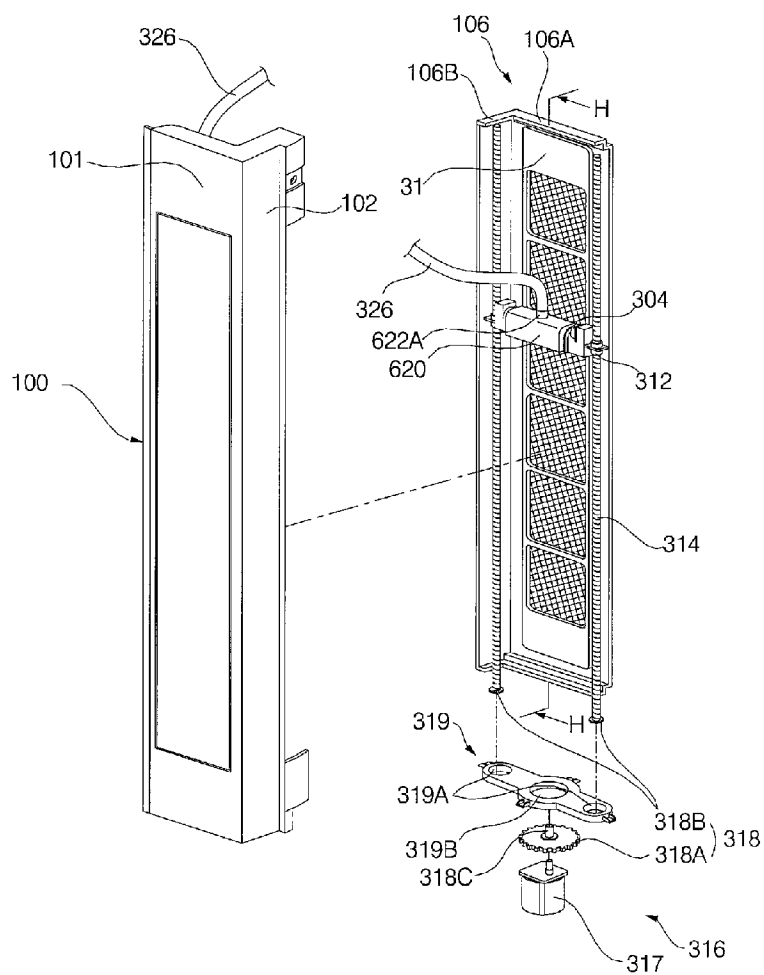
[Fig. 25]



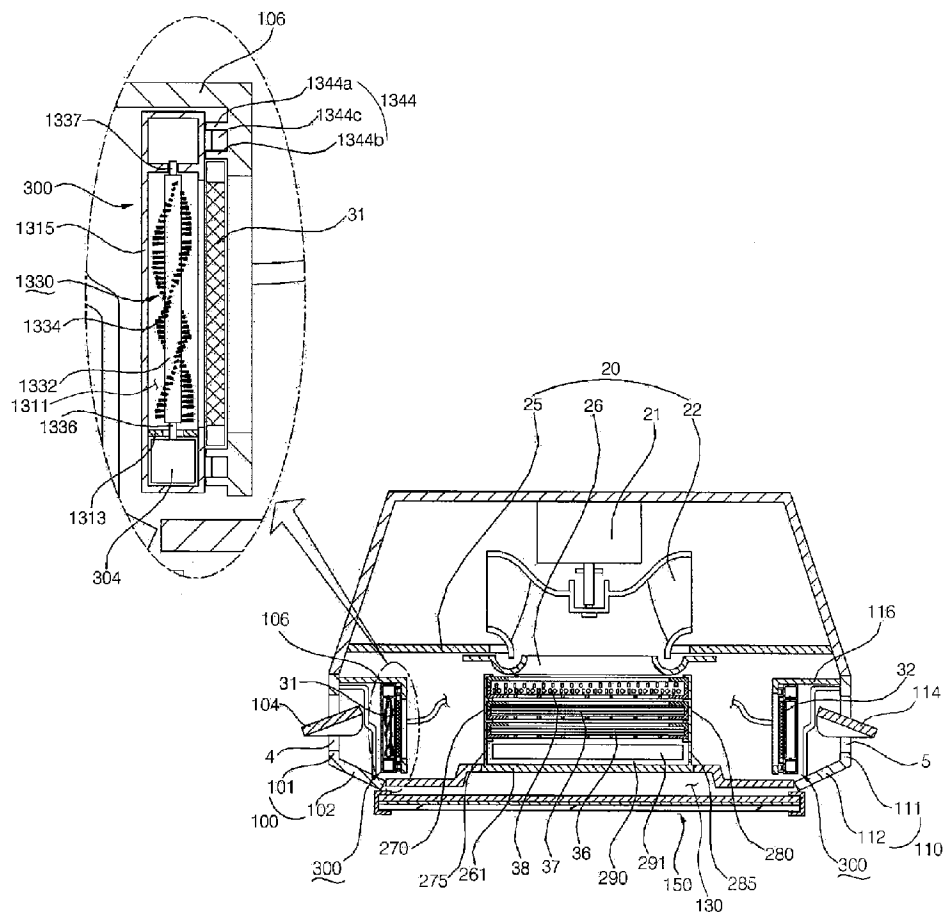
[Fig. 26]



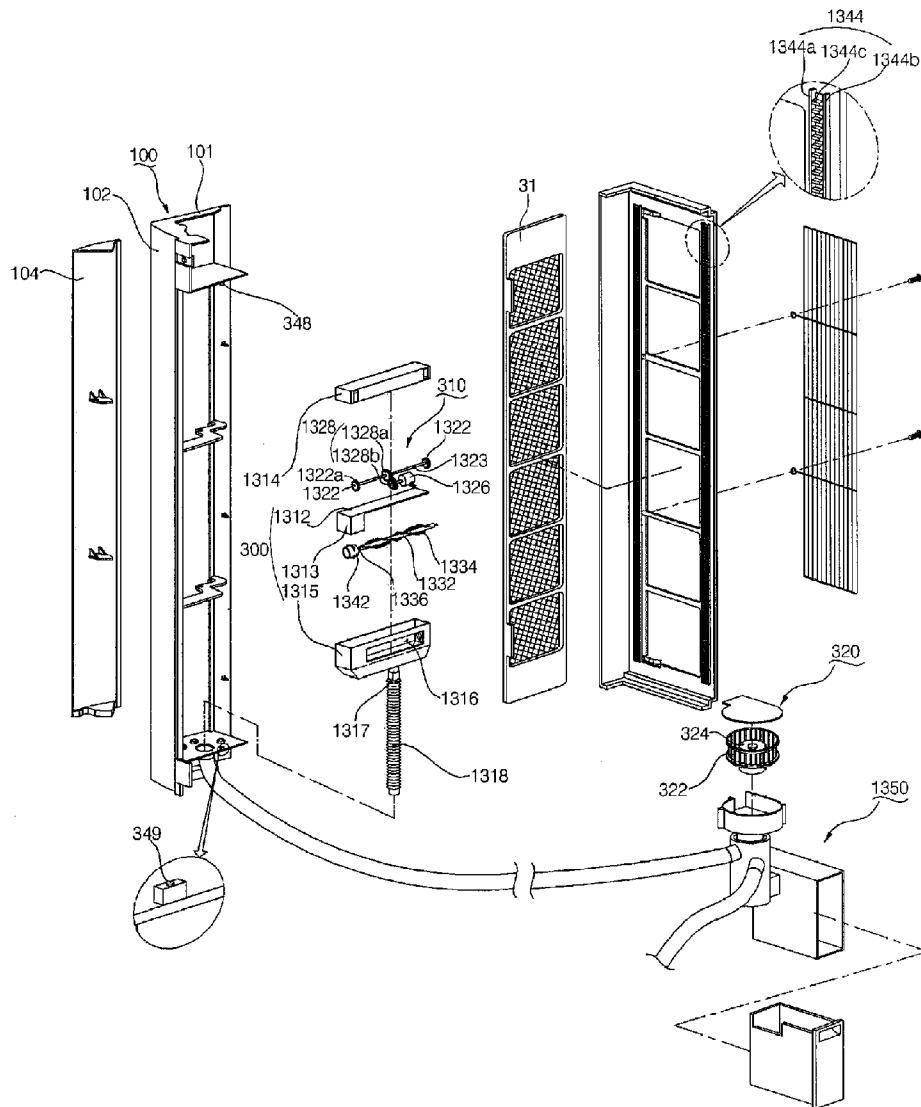
[Fig. 27]



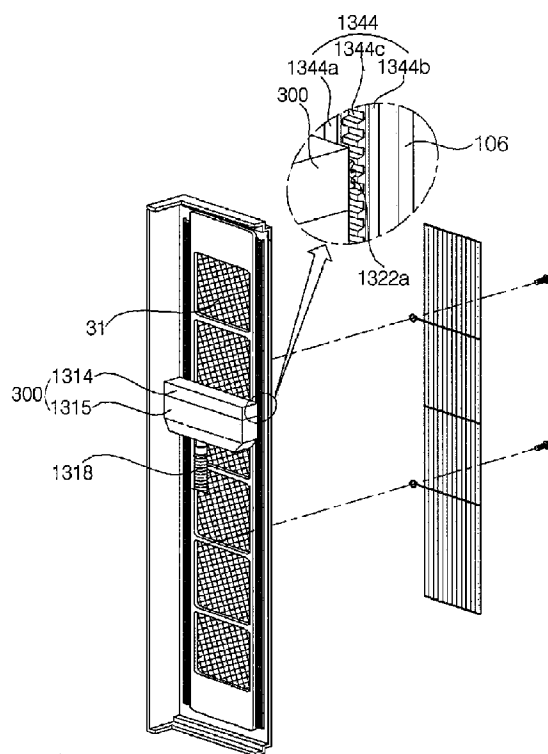
[Fig. 29]



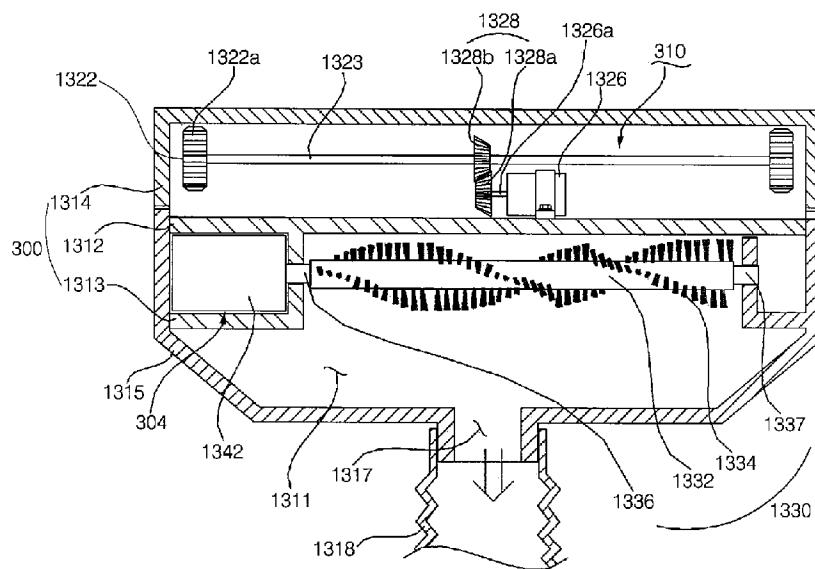
[Fig. 30]



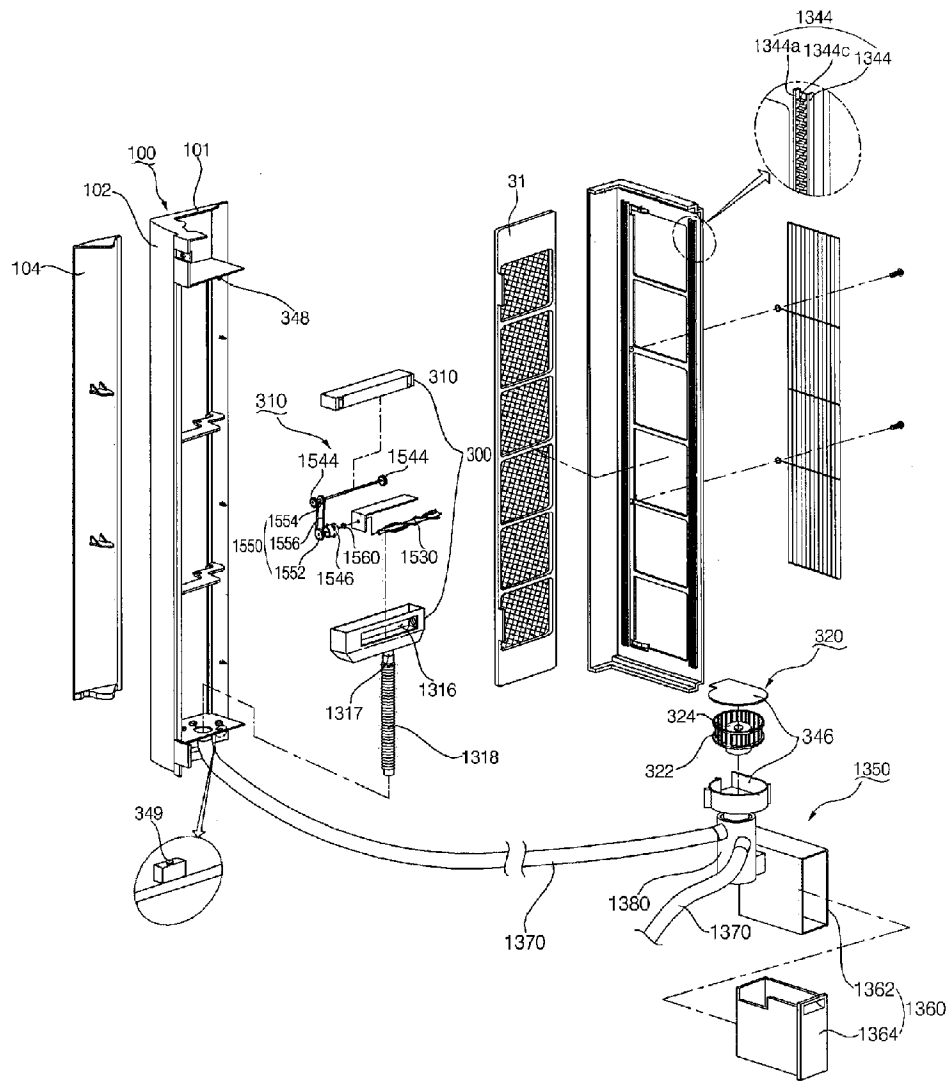
[Fig. 31]



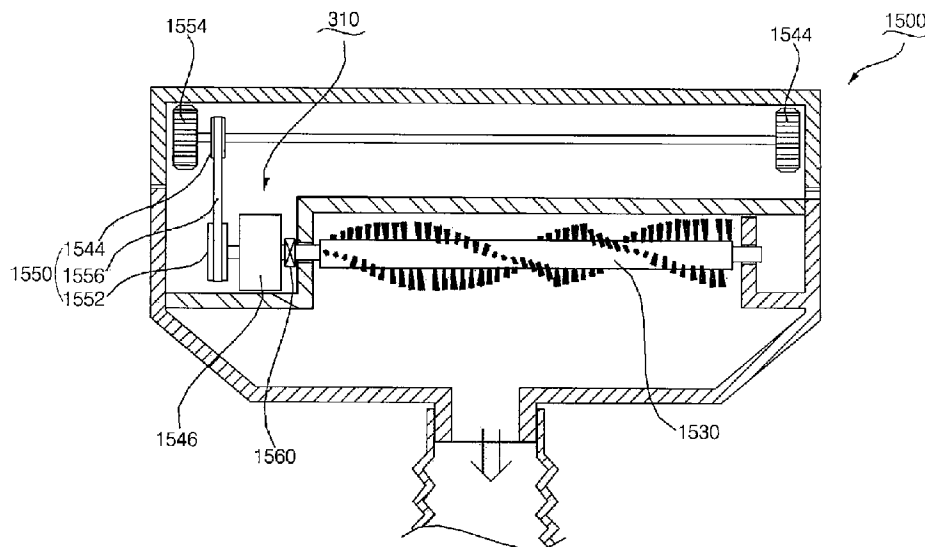
[Fig. 32]



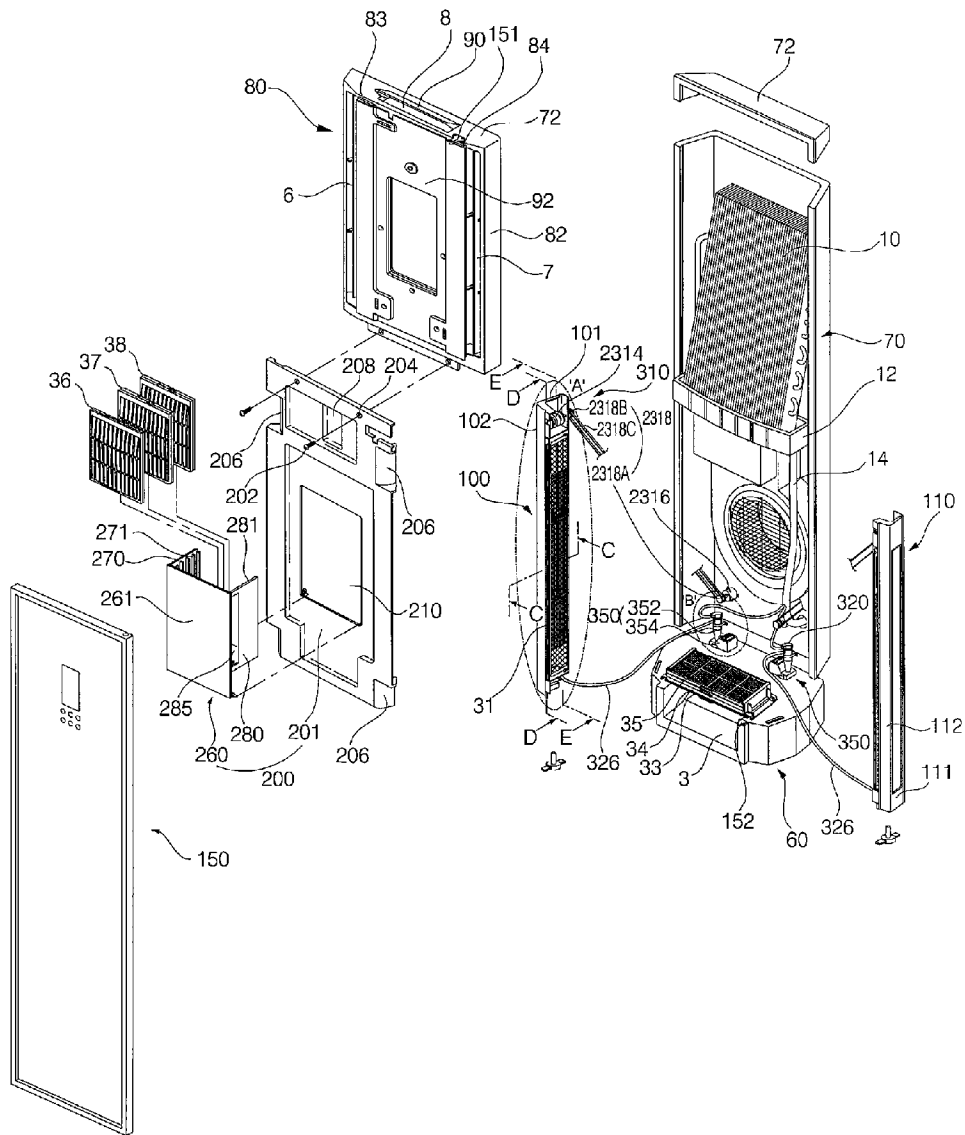
[Fig. 33]



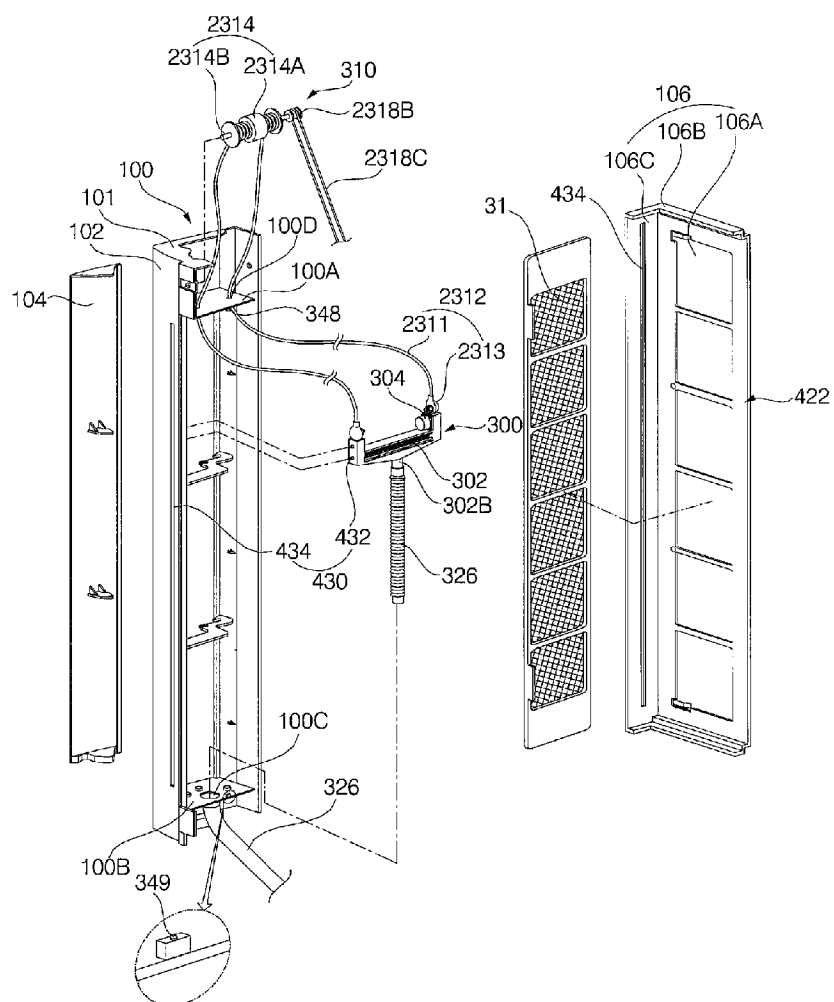
[Fig. 34]



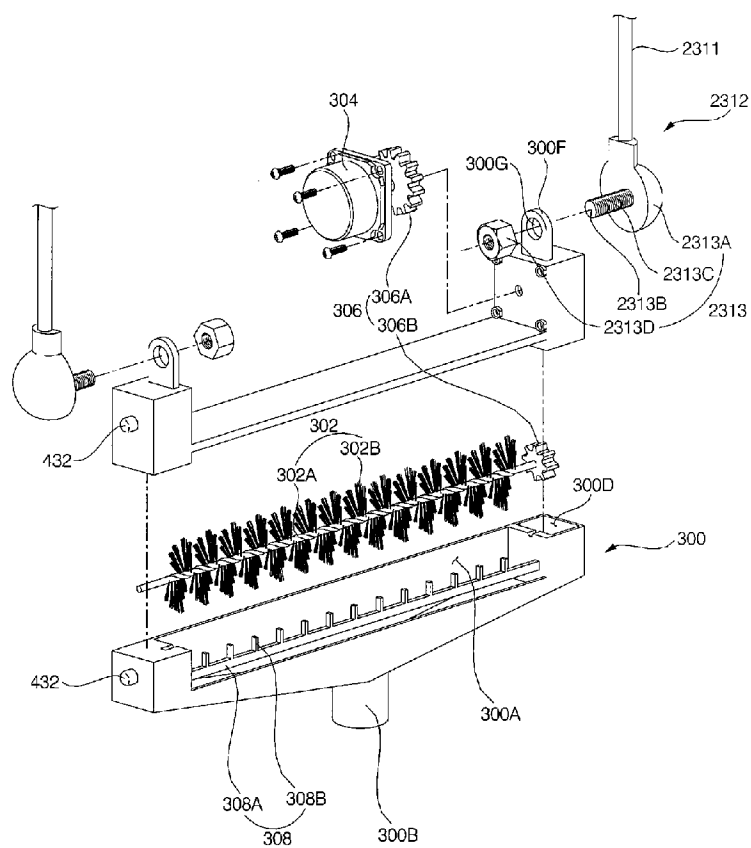
[Fig. 35]



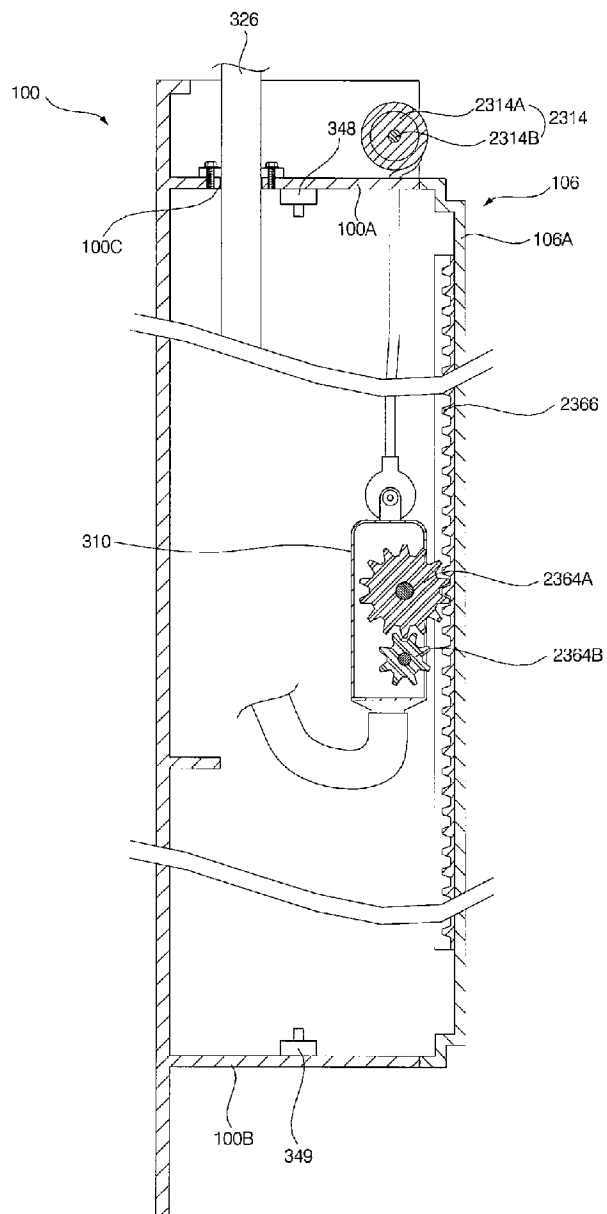
[Fig. 37]



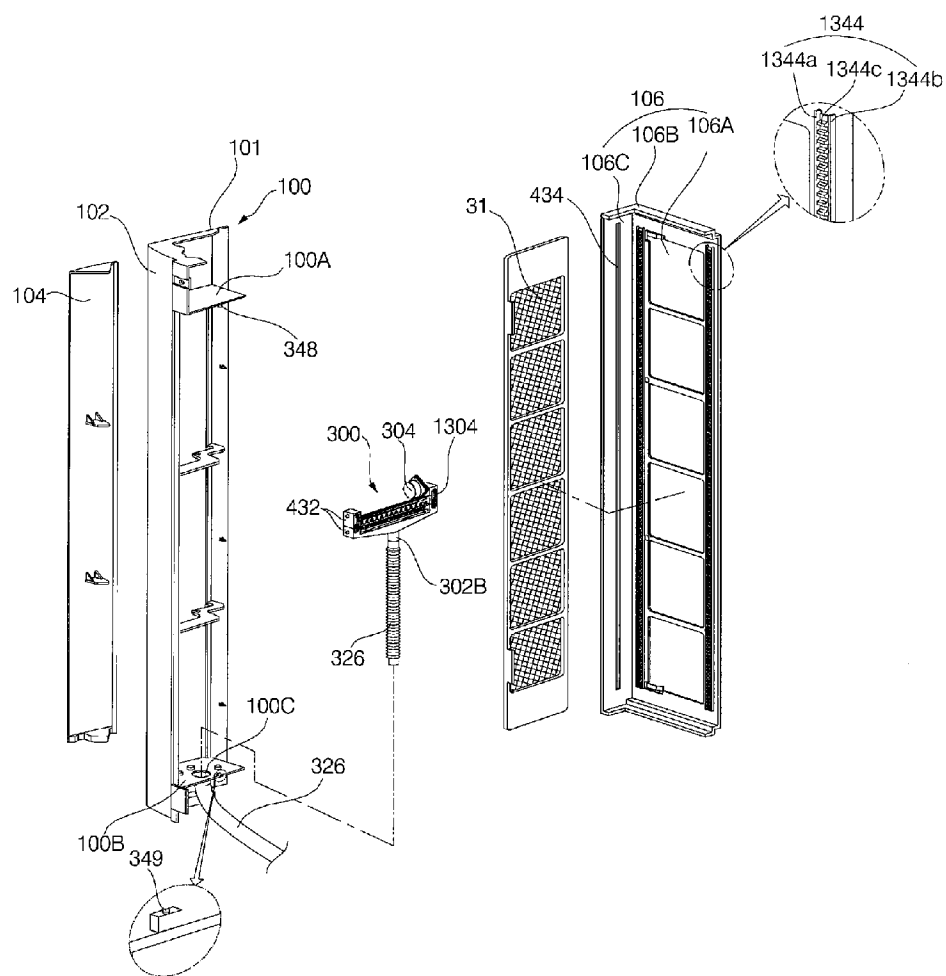
[Fig. 38]



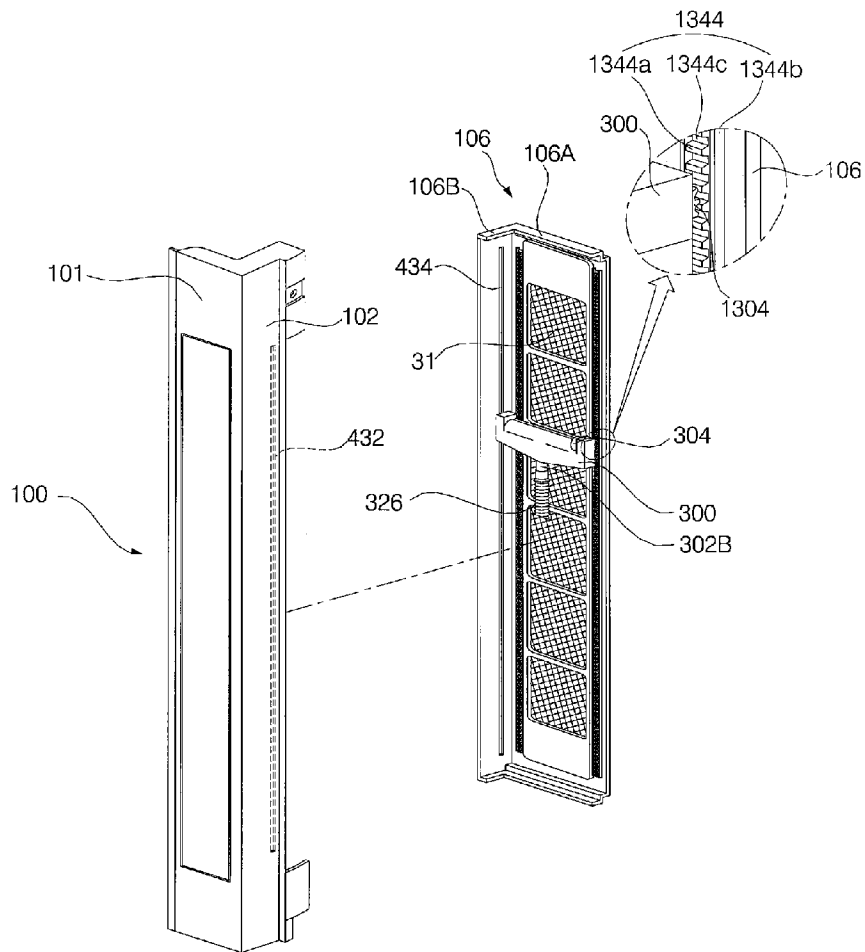
[Fig. 39]



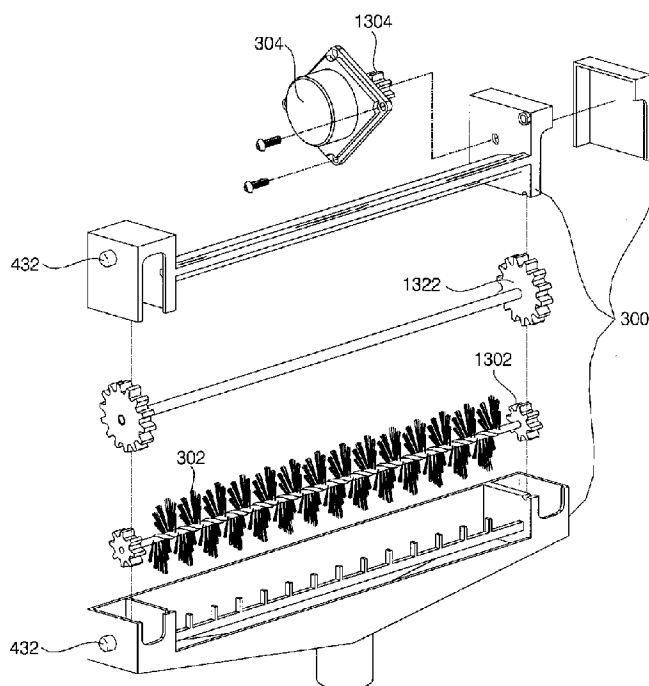
[Fig. 40]



[Fig. 41]



[Fig. 42]



[Fig. 43]

