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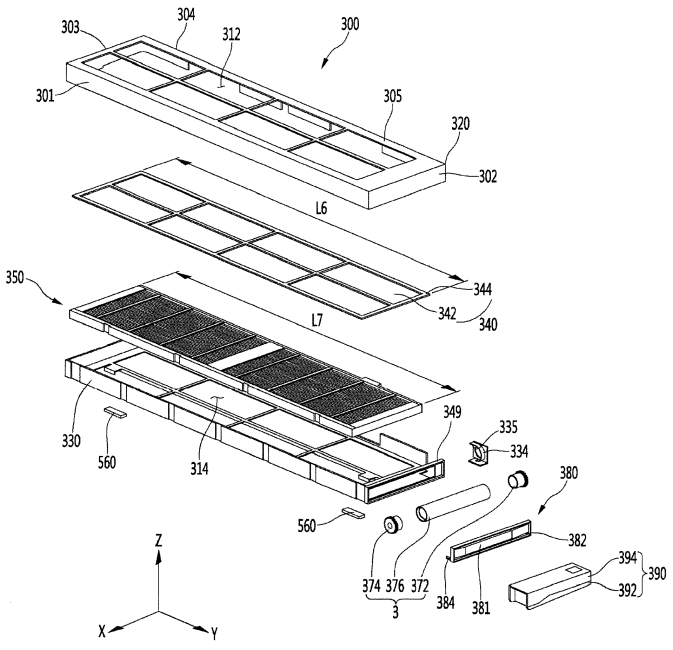
(54) AIR CONDITIONER

(57) Provided is an air conditioner. The air conditioner includes a prefilter (340) made of a flexible material, the prefilter (340) being disposed to face an air suction hole (312) through which air is suctioned, a roller (372) configured to support one side of the prefilter (340) in a longitudinal direction, the roller (372) being configured to allow the prefilter (340) to move in a left-right direction, a roller rotation mechanism configured to allow the roller (372) to rotate, and a brush unit (380) disposed to contact the prefilter (340) when the roller (372) rotates, the brush unit (380) being spaced apart from the roller rotation mechanism.

Fig.17



EP 3 690 333 A1

Description

BACKGROUND

[0001] The present disclosure relates to an air conditioner, and more particularly, to an air conditioner in which is a filter is capable of being cleaned.

[0002] Air conditioners are apparatuses that maintain air in a door space to the most proper state according to use and purpose thereof.

[0003] Such an air conditioner may be classified into an upright type, a wall-mounted type, or a ceiling type according to its installation position. The upright air conditioner may be understood as a type of air conditioner, which is installed to be erected in an indoor space, and the wall-mounted type air conditioner may be understood as a type of air conditioner, which is installed to be attached to a wall surface. Also, the ceiling type air conditioner may be understood as a type of air conditioner, which is installed on a ceiling.

[0004] The air conditioner may be a cooler for cooling a predetermined space, a heater for hating a predetermined space, an air conditioner for cooling or heating a predetermined space, and a cleaner for cleaning air within a predetermined space. The function of the air conditioner may be determined according to a type of an air conditioning unit installed in the air conditioner.

[0005] The air conditioner may include a compressor, a condenser, an expansion device, and an evaporator to drive a refrigerant cycle in which compression, condensation, expansion, and evaporation processes of a refrigerant are performed, thereby cooling or heating a predetermined space.

[0006] The air conditioner may include an electric heater, and current may be applied to the electric heater to heat the predetermined space.

[0007] The air conditioner may include a cleaning unit such as a filter unit and may purify air in the predetermined space.

[0008] A filter for filtering dust in the air may be disposed in the air conditioner, and also, a cleaning kit for cleaning the filter may be disposed.

[0009] An example of the air conditioner including the filter and the cleaning kit is disclosed in Korean Patent Publication No. 10-2009-0044786 A (Published on May 07, 2009). The air conditioner includes a movable cleaning kit disposed to be movable along the filter and sweep foreign substance on the filter and a cleaning moving mechanism connected to the cleaning movable kit to allow the movable cleaning kit to move a left-right direction. The movable cleaning kit includes a cleaning kit body movably connected by the moving mechanism and a brush protruding from the cleaning kit body toward the filter.

[0010] However, in the air conditioner including the above-described movable cleaning kit, since the brush and the movable cleaning kit move, dust separated from the brush or the filter may be scattered around the filter while the brush moves along the filter, and thus, the periphery of the filter may not be maintained in the clean state. Also, since the cleaning kit body for the movement of the brush requires a separate space, in which the movable cleaning kit is disposed, between an air suction hole and the filter, spatial utilization within the air conditioner may be low, and it may be difficult to realize a compact air conditioner.

[0011] Another example of the air conditioner including the filter and the cleaning kit as described above is disclosed in JP Patent Publication No. 2005-300154 A (Published on October 27, 2005). Here, the air conditioner may include a filter cleaning part in which the filter is reciprocally disposed within a main body cabinet by a slider and which is disposed to contact the filter along a moving path of the filter. Also, the filter cleaning part may include a lower cover, an upper cover, and a pair of brushes. Thus, foreign substance on the filter may be separated from the filter and then be stored in a space between the lower cover and the upper cover while the filter moving by the slider passes between the pair of brushes.

[0012] However, as described above, the filter moving by the slider may be partially withdrawn out of the air conditioner so that the whole thereof is cleaned, and a portion of the filter disposed outside the air conditioner may be damaged or contaminated.

[Prior Art Document]

[Patent Document]

[0013]

Korean Patent Publication No. 10-2009-0044786 A (Published on May 07, 2009)
JP Patent Publication No. 102005 -300154 A (Published on October 27, 2005)

SUMMARY

[0014] Embodiments provide an air conditioner in which contamination or damage of a filter is capable of being minimized when the filter is cleaned, and spatial utilization is high.

[0015] Embodiments also provide an air conditioner in which damage of other components due to a filter is capable of being minimized.

[0016] In one embodiment, an air conditioner includes a prefilter, a roller, a roller rotation mechanism, and a brush unit. The air conditioner may include a filter case.

[0017] The prefilter may be made of a flexible material and disposed to face an air suction hole through which air is suctioned. The prefilter may be engaged with the roller. When the roller rotates, the prefilter may move within the filter case along an outer circumference of the roller to contact the brush unit.

[0018] The roller may support one side of the prefilter in a longitudinal direction and allow the prefilter to move

in a left-right direction. The roller may be rotatably accommodated in the filter case.

[0019] The roller rotation mechanism may allow the roller to rotate.

[0020] The brush unit may be disposed in the filter case. The brush unit may be disposed to contact the prefilter when the roller rotates. The brush unit may be spaced apart from the roller rotation mechanism.

[0021] In the air conditioner, in the case in which the position of the prefilter is fixed, and the brush unit moves, the periphery of the prefilter may be maintained in the more cleaned state. Also, since it is unnecessary to provide the space for the movement of the brush unit, the inner spatial utilization may be high.

[0022] Also, when the prefilter is cleaned, since the prefilter moves within the filter case and is not withdrawn out of the filter case, the spatial utilization within the air conditioner may be high, the damage of the prefilter may be minimized, and the damage of other components disposed inside the air conditioner by the prefilter may be minimized.

[0023] The filter case, the roller, the prefilter, and the brush unit may constitute the filter assembly, and the roller, the prefilter, the brush unit together with the filter case may be withdrawn out of the air conditioner, and the user and the operator may easily manage the roller, the prefilter, and the brush unit.

[0024] The filter case may be provided with the outer inlet that is the air suction hole through which the air is suctioned, and the inner outlet that is the air discharge hole through which the air is discharged.

[0025] To allow the prefilter to move by the roller, the roller may include a driving gear, and the prefilter may include a driven gear engaged with the driving gear.

[0026] The brush unit may be disposed to contact the prefilter when the roller rotates. The brush unit may be disposed to be disposed next to the roller.

[0027] The air conditioner may further include an electrostatic dust filter disposed between the prefilter and the filter case and spaced apart from the roller. When the roller rotates, the roller may not interfere with the electrostatic dust filter to minimize the damage to the electrostatic dust filter.

[0028] The electrostatic dust filter may constitute the filter assembly together with the filter case, the roller, the prefilter, and the brush unit. The electrostatic dust filter may be withdrawn out of the air conditioner together with the roller, the prefilter, the brush unit, and the filter case, and the user or the operator may clean the electrostatic dust filter with the cleaning solution such as water.

[0029] The prefilter may move between the filter case and the electrostatic dust filter, and the outer surface of the electrostatic dust filter and the inner surface of the filter case may provide the passage through which the prefilter moves.

[0030] A thickness of the electrostatic dust filter in the air flow direction may be less than or equal to a diameter of the roller. When the thickness of the electrostatic dust filter is greater than the diameter of the roller, a portion of the prefilter disposed between the electrostatic dust filter and the filter case may be convex. On the other hand, as described above, when the thickness of the electrostatic dust filter is less than or equal to the diameter of the roller, a portion of the prefilter disposed between the electrostatic dust filter and the filter case may be unfolded as flat as possible.

[0031] The filter case may be provided with a guide body configured to guide the prefilter so that the prefilter moves between the electrostatic dust filter and the lower case. A portion of the prefilter moving along the outer circumference of the roller may be guided between the electrostatic dust filter and the lower case by the guide body, and the prefilter may move as smoothly and stably as possible.

[0032] The air conditioner may further include a filter guide configured to guide the prefilter so as to move along an outer circumference of the roller when the roller rotates, and the filter guide may have a guide surface contacting the prefilter.

[0033] At least a portion of the filter guide may have an arc shape, and a radius of the arc-shaped portion may be larger than a radius of the roller.

[0034] The filter guide may include a first guide and a second guide, which are spaced apart from each other by a diameter greater than a diameter of the roller and a third guide connecting the first guide to the second guide.

[0035] A portion of the prefilter disposed between the filter guide and the roller may be bent in an arc shape while being guided to each of the roller and the guide surface, and the prefilter may stably move while minimizing malfunction.

[0036] The air conditioner may further include a dust container disposed in the filter case and having a space in which dust separated from the prefilter is stored. The brush unit may be disposed between the roller and the dust container. The dust container may constitute the filter assembly together with the brush unit.

[0037] In this case, the user or the operator may clean the prefilter with the cleaning solution such as water by withdrawing the filter assembly out of an air conditioner, replace the brush unit or remove foreign substances remaining on the brush unit, and allows the dust container to be empty.

[0038] The filter case may include an upper cover in which the outer inlet is provided and a lower case in which the inner inlet is provided, and a dust container accommodation space may be defined between the lower case and the upper cover to accommodate the dust container.

[0039] The brush unit may include a brush body having a dust passage opened toward the roller and a brush disposed on a surface of the brush body facing the roller and contacting a portion of the prefilter that is bent along the roller.

[0040] An air conditioner according to this embodiment may include a main body including a suction hole and a discharge unit and a blower fan accommodated in the

main body. The filter assembly may be disposed to be withdrawn out of the main body, and a roller rotation mechanism to which the roller is separably connected may be mounted on the main body.

[0041] The air conditioner may further include a filter cleaning device to which the dust container is separably connected, wherein the filter cleaning device may be mounted on the main body, and the dust container may be connected to the filter cleaning device when the filter assembly is mounted on the main body.

[0042] According to the embodiment, since the prefilter is cleaned by the brush unit while moving inside the filter case along the outer circumference of the roller, the prefilter may be cleaned in the state that is not withdrawn out of the filter case, the inside of the air conditioner may be improved in spatial utilization.

[0043] In addition, since the prefilter does not contact or interfere with other components disposed outside the filter case, the contamination and damage of the prefilter or other components, which occur when the prefilter contacts or interferes with other components, may be minimized.

[0044] In addition, since the roller, the prefilter, and the brush unit are withdrawn out of the air conditioner together with the filter case, the user or the operator may easily manages the roller, the prefilter, and the brush unit.

[0045] In addition, since the electrostatic dust filter disposed inside the filter case is spaced apart from the roller disposed inside the filter case, the damage of the electrostatic dust filter by the roller may be minimized.

[0046] In addition, since the electrostatic dust filter is withdrawn out of the air conditioner together with the roller, the prefilter, the brush unit, and the filter case, the roller, the prefilter, the electrostatic dust filter, and the brush unit may be easily maintained compared to the case in which each of the filter case, the roller, the prefilter, the electrostatic dust filter, and the brush unit is separately withdrawn.

[0047] In addition, since the portion of the prefilter moving along the outer circumference of the roller is guided between the electrostatic dust filter and the lower case by the guide body, the prefilter may move as smoothly and stably as possible.

[0048] In addition, the portion of the prefilter disposed between the filter guide and the roller may be bent in the arc shape while being guided to each of the roller and the guide surface, and the prefilter may stably move while minimizing malfunction.

[0049] In addition, since the dust container in which the dust separated from the filter is stored, the user or the operator may clean the prefilter with the cleaning solution such as water by withdrawing the filter assembly out of an air conditioner, replace the brush unit or remove foreign substances remaining on the brush unit, and allows the dust container to be empty.

[0050] In addition, since the filter assembly is disposed to be withdrawn out of the main body, and the roller assembly is separably connected to the body, the user or operator may easily clean the whole of the roller rotation mechanism and the filter assembly by using the cleaning solution such as water.

[0051] The details of one or more embodiments are set forth in the accompanying drawings and the description below. Other features will be apparent from the description and drawings, and from the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0052]

FIG. 1 is a view illustrating a state in which an air conditioner is installed on a wall according to an embodiment.

FIG. 2 is a perspective view of the air conditioner when a case and a front panel are separated from a chassis.

FIG. 3 is an exploded perspective view of the air conditioner according to an embodiment.

FIG. 4 is a bottom view of a filter assembly according to an embodiment.

FIG. 5 is a perspective view when the front panel of FIG. 1 is disposed at a first position.

FIG. 6 is a perspective view when the front panel of FIG. 1 is disposed at a second position.

FIG. 7 is a perspective view when the front panel of FIG. 1 is disposed at a third position.

FIG. 8 is a plan view of the air conditioner according to an embodiment.

FIG. 9 is a cross-sectional view taken along line A-A' of FIG. 8.

FIG. 10 is a cross-sectional view taken along line B-B' of FIG. 8.

FIG. 11 is a bottom view illustrating the inside of a dielectric filter according to an embodiment.

FIG. 12 is a view of a filter assembly and a moving mechanism according to an embodiment.

FIG. 13 is a plan view when the filter assembly of FIG. 8 is withdrawn forward.

FIG. 14 is a perspective view when the filter assembly of FIG. 8 is withdrawn forward.

FIG. 15 is a perspective view illustrating the inside of the filter assembly according to an embodiment.

FIG. 16 is a bottom view when a dust container is separated from a filter case according to an embodiment.

FIG. 17 is an exploded perspective view of the filter assembly according to an embodiment.

FIG. 18 is a bottom view of a prefilter according to an embodiment.

FIG. 19 is an enlarged cross-sectional view when the filter assembly is connected to a filter cleaning device according to an embodiment.

FIG. 20 is a cross-sectional view taken along line C-C' of FIG. 8.

FIG. 21 is an enlarged cross-sectional view of the prefilter, a roller, and a brush when the prefilter is

not cleaned according to an embodiment.

FIG. 22 is a cross-sectional view when the prefilter of FIG. 21 is cleaned.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0053] Hereinafter, detailed embodiments will be described in detail with reference to the accompanying drawings.

[0054] FIG. 1 is a view illustrating a state in which an air conditioner is installed on a wall according to an embodiment, FIG. 2 is a perspective view of the air conditioner when a case and a front panel are separated from a chassis, FIG. 3 is an exploded perspective view of the air conditioner according to an embodiment, and FIG. 4 is a bottom view of a filter assembly according to an embodiment.

[0055] An air conditioner of this embodiment may be installed on a wall W.

[0056] The air conditioner may include a main body 10 having an inner space S1 therein. The main body 10 may define an outer appearance of the air conditioner, and the main body 10 may include a suction hole and a discharge hole. In addition, a blower fan 40 and an air conditioning unit may be accommodated in the main body 10.

[0057] When the blower fan 40 rotates, air outside the main body 10 may be suctioned into the inner space S1 through the suction hole, and the air introduced into the main body 10 may be air-conditioned by the air conditioning unit and then be discharged to the outside of the main body 10 through the discharge hole.

[0058] The main body 10 may be provided as an assembly of a plurality of members, and an example of the main body 10 may include a chassis 30 and a case 100.

[0059] The main body 10 may be installed on the wall W by an installation plate 20. The installation plate 20 may be a component for fixing the body 10 to the wall W. The installation plate 20 may be coupled to the wall W, and the chassis 30 may be mounted on the installation plate 20. The installation plate 20 may have a thin plate shape and include a central portion coupled to a rear surface of the chassis 30 and both side portions extending downward from both sides of the central portion to support a lower portion of the chassis 30.

[0060] The chassis 30 may include a plate coupling part 31 coupled to the installation plate 20 and a rear guide 33 extending downward to be rounded from the plate coupling part 31 so as to surround a portion of an outer circumferential surface of the blower fan 40.

[0061] The plate coupling part 31 may have a thin plate shape.

[0062] The rear guide 33 may function as a flow guide for guiding a flow of air discharged from the blower fan 40 toward the discharge hole.

[0063] The blower fan 40 may include a tangential fan. The tangential fan may suction air suctioned from an upper portion of the main body 10 in a circumferential direction to discharge the air in the circumferential direction. An axial direction of the blower fan 40 may be a horizontal direction of the main body 10.

[0064] The blower fan 40 may be rotatably supported at both sides of the chassis 30.

[0065] The chassis 30 may further include two fan support parts 35 supporting both ends of the blower fan 40. The two fan support parts 35 may protrude forward from both sides of the rear guide 33.

[0066] A fan motor 45 driving the blower fan 40 may be installed outside one of the two fan support parts 35. A shaft of the fan motor 45 may be coupled to the blower fan 40 by passing through the fan support parts 35.

[0067] A motor cover 47 may be coupled to the fan motor 45. The fan motor 45 may be accommodated in an inner space defined by the fan support part 35 and the motor cover 47.

[0068] The chassis 30 may be provided with a control module 50 controlling the main body 10. The control module 50 may be disposed at a side of the fan motor 45 and supported by the case 100. The control module 50 may include a control box 52 defining an outer appearance and a control component disposed in the control box 53 to allow the air conditioner to operate.

[0069] The air conditioner may further include a lower plate 55 defining a lower outer appearance of the main body 10. The lower plate 55 may be disposed below the chassis 30.

[0070] The case 100 may be coupled to the front of the chassis 30. Also, the blower fan 40 may be accommodated between the chassis 30 and the case 100. An inner space S1 may be defined between the chassis 30 and the case 100, and the blower fan 40 may be accommodated in the inner space S1.

[0071] The air conditioner may further include an air conditioning unit accommodated in the inner space S1. One example of the air conditioning unit may be a heat exchanger 60 through which a refrigerant passes. Another example of the air conditioning unit may be a thermoelectric element. Another example of the air conditioning unit may be an electric heater.

[0072] Hereinafter, the air conditioner will be described as an example in which the heat exchanger 60 is accommodated in the inner space S1. However, the present disclosure is not limited to the heat exchanger 60 accommodated in the inner space S1, and thus, it may be possible that various air conditioning units, such as thermoelectric elements, electric heaters, humidifiers, and purification units, are selectively accommodated in the inner space S1.

[0073] The heat exchanger 60 may be accommodated in the inner space S1 defined by the chassis 30 and the case 100. The heat exchanger 60 may be supported by at least one of the chassis 30 or a discharge grill assembly 80 based on the flow of air.

[0074] The heat exchanger 60 may have a bent shape. In detail, the heat exchanger 60 includes a first heat exchange part 61 extending vertically in a direction corresponding to the front surface of the main body 10, a sec-

ond heat exchange part 63 extending to be inclined upward from the first heat exchange part 61, and a third heat exchange part 65 extending to be inclined downward from the second heat exchange part 63. The first to third heat exchange parts 61, 63, and 65 may be disposed outside the blower fan 40 and be understood as being disposed at a suction region of air suctioned into the blower fan 40.

[0075] A heat exchanger holder 67 is coupled to the heat exchanger 60. The heat exchanger holder 67 may be coupled to a side of the heat exchanger 60 and may be supported on an inner surface of the case 100.

[0076] A refrigerant tube 70 is coupled to the heat exchanger 60. The refrigerant tube 70 may introduce a refrigerant into the heat exchanger 60 or guide a flow of the refrigerant discharged from the heat exchanger 60. The refrigerant tube 70 is coupled to the side of the heat exchanger 60 so that a tube cover 75 surrounds the outside of the refrigerant tube 70.

[0077] A case 100 is provided at the front of the chassis 30. An air passage is provided in the case 100.

[0078] The air conditioner may include a filter assembly 300. The filter assembly 300 may be disposed to be withdrawn out of the body 10.

[0079] The air conditioner may include a pair of side parts 111 and 112 defining an outer appearance of the side surface thereof. Also, the air conditioner may further include a top surface part 113 defining an outer appearance of the top surface of the air conditioner.

[0080] The air conditioner may further include an upper housing 114 in which the filter assembly 300 is inserted and accommodated. The upper housing 114 may be provided in the main body 10, and the filter case of the filter assembly 300 may be separably mounted in the upper housing 114.

[0081] The pair of side parts 111 and 112 and the top surface part 113 may be provided by at least one of the chassis 30 or the case 100.

[0082] The upper housing 114 may have a shape recessed from the top surface part 113. The upper housing 114 may be a filter assembly accommodation body covering at least one surface of the filter assembly 300 or a filter casing housing covering at least one surface of the filter case 310 defining an appearance of the filter assembly 300.

[0083] When the filter assembly 300 is inserted into the upper housing 114, the filter assembly 300 may define an outer appearance of the top surface of the air conditioner. When the filter assembly 300 is inserted into the upper housing 114, the filter assembly 300 may be disposed on an upper portion of at least one of the chassis 30 or the case 100, and the air outside the air conditioner may be introduced between the chassis 30 and the case 100 after being purified while passing through the filter assembly 300.

[0084] When the filter assembly 300 is inserted into the upper housing 114, the top surface of the filter assembly 300 may be exposed to the outside, and the top surface of the filter assembly 300 may define the outer appearance of the top surface of the air conditioner. The filter assembly 300 may be withdrawn upward from the air conditioner in a state of being accommodated in the upper housing 114.

[0085] A discharge hole is defined in a lower portion of the case 100. The discharge hole may include a lower discharge hole 126. The lower discharge hole 126 may be provided in a lower portion of the case. The lower discharge hole 126 may be configured to discharge the air in a downward direction.

[0086] The case 100 may be provided as one member or an assembly of a plurality of members 110 and 120. When the case 100 is provided as the assembly of the plurality of members, the case 100 may include a case body 110 coupled to the chassis 30 and a grill frame 120 disposed in front of the case body 110.

[0087] The air conditioner may further include a discharge grill assembly 80.

[0088] The discharge grill assembly 80 may be disposed in a lower portion of the case 100. The discharge grill assembly 80 may include a discharge grill body 81 spaced apart from the chassis 30. The discharge grill assembly 80 may include a horizontal vane 82 controlling a direction of the discharge air flow. The horizontal vane 82 may rotate in a left-right direction based on a vertical line to control the discharge air flow in the left-right direction. The horizontal vane 83 may be provided in plurality and connected to one link bar. The plurality of horizontal vanes 83 may rotate together as a link moves. The discharge grill assembly 80 may include a horizontal vane motor 86 that allows the horizontal vane 82 to rotate. The horizontal vane motor 86 may be installed in the discharge grill body 81.

[0089] A vertical vane 88 controlling the discharge air flow in the vertical direction is provided in a lower portion of the case 100. The link 89 may be connected to a side of the vertical vane 88, and a vertical vane motor 90 for driving the vertical vane 88 may be connected to the link 89. The vertical vane motor 90 may be installed on at least one of the chassis 30, the lower plate 55, or the discharge grill body 81.

[0090] A front panel 150 may be disposed on the case 100. The front panel 150 may be disposed in front of the case 100 to define an outer appearance of the front surface of the main body 10.

[0091] The front panel 150 may be provided with a display unit 152 that is capable of confirming operation information of the main body 10. The front panel 150 may have a display hole 154 in which the display unit 152 is disposed.

[0092] The air conditioner may further include a driving mechanism 170 (see FIG. 3) connected to the front panel 150 to allow the front panel 150 to operate to a plurality of positions. The driving mechanism 170 may be installed in the case 100 or the chassis 30. The driving mechanism 170 may be connected to the front panel 150 and a power transmission member such as a gear.

[0093] For example, the front panel 150 may be provided with a long rack in the vertical direction. In addition, the driving mechanism 170 may include a motor 172 and may further include a pinion 174 rotating by the motor 172 and engaged with the rack.

[0094] The air conditioner may further include a high voltage power supply 180 (see FIG. 2) applying a high voltage to the filter assembly 300.

[0095] The high voltage power supply 180 may apply the high voltage to the filter assembly 300 and a charging module 360 (see FIG. 9) to be described later. The charging module 360 may ionize foreign substances such as dust in the air, and the foreign substances ionized by the charging module 360 may be collected inside the filter assembly 300.

[0096] The filter assembly 300 may include a filter case 310 and at least one filter accommodated in the filter case 310. The filter assembly 300 may include a prefilter 340 (see FIG. 3) accommodated in the filter case 310.

[0097] The prefilter 340 may be a filter for filtering the foreign substances introduced into the air conditioner, in particular, the filter assembly 300. The prefilter 340 may have a mesh shape. The prefilter 340 may be disposed in the front of the air conditioning unit (for example, the heat exchanger 60) in the air flow direction.

[0098] The filter assembly 300 may include a plurality of filters. In this case, the filter assembly 300 may further include a dust collection filter 350 (see FIG. 4).

[0099] When the filter assembly 300 includes the prefilter 340 and the dust collection filter 350, the prefilter 340 may be disposed in the front of the dust collection filter 350 in the air flow direction.

[0100] An example of the dust collection filter 350 may be a high performance filter such as a HEPA filter which is capable of filtering fine dust.

[0101] Another example of the dust collection filter 350 may be an electric dust collection filter which collects dust using electricity. In the state in which the dust collection filter 350 is accommodated in the filter case 310, the electrostatic dust filter 350 may be electrically connected to the high voltage power supply 180 through a wire and a terminal. The dust collection filter 350 may be an electrostatic dust filter that collects the foreign substances by using static electricity of the foreign substances ionized by the charging module 360.

[0102] Hereinafter, an example in which the dust collection filter 350 is an electrostatic dust filter will be described, and the electrostatic dust filter will be described using the same reference numeral as the dust collection filter 350. However, the present disclosure is not limited to that the dust collection filter 350 is the electrostatic dust filter.

[0103] The prefilter 340 may filter large dust in the air flowing toward the electrostatic dust filter 350 in a state of being disposed above the electrostatic dust filter 350.

[0104] The electrostatic dust filter 350 may be disposed between the prefilter 340 and the filter case 310. The electrostatic dust filter 350 may be spaced apart from the roller 372. A thickness of the electrostatic dust filter 350 in the air flow direction may be less than or equal to a diameter of the roller 372.

[0105] The air conditioner further includes a brush unit 380 (see FIG. 4) separating foreign substances (hereinafter, referred to as 'dust') such as dust attached to the filter (for example, the prefilter 340) from the filter. Also, the air conditioner may further include a dust container 390 (see FIG. 4) in which dust separated from the filter is contained.

[0106] The brush unit 380 may be disposed at a position at which the filter, in particular, the prefilter 340 contacts the brush unit 380.

[0107] The dust attached to the prefilter 340 may contact the brush unit 380 and be separated from the prefilter 340, and the dust separated from the prefilter 340 may be introduced into the dust container 390 and then stored in the dust container 390.

[0108] The dust container 390 may be disposed to be withdrawn out of the air conditioner, and the dust stored therein may be discarded by the user.

[0109] The air conditioner may further include a filter cleaning device 400 (see FIG. 2) separating the dust accumulated in the filter, in particular, the prefilter 340.

[0110] The filter cleaning device 400 may communicate with the dust container 390 when the dust container 390 is mounted in the air conditioner. The filter cleaning device 400 may be separated from the dust container 390 when the dust container 390 is withdrawn to the outside. The filter cleaning device 400 may be a suction unit connected to the dust container 390 to suction air from the dust container 390. The filter cleaning device 400 may include a fan motor unit that suctions and blows air from the dust container 390. The filter cleaning device 400 may be a fan motor unit in which the dust container 390 separably contacts the filter cleaning device 400.

[0111] An electric wire may be connected to the filter cleaning device 400, and the filter cleaning device 400 may be mounted in the main body 10.

[0112] The filter cleaning device 400 may be accommodated between the case 100 and the chassis 30. The filter cleaning device 400 may be disposed inside the case 100. The filter cleaning device 400 may be disposed to be disposed above the control module 50.

[0113] When the filter cleaning device 400 is driven, suction force of the filter cleaning device 400 may be applied to the filter (particularly, the prefilter 340) through the dust container 390 and the brush unit 380, and the dust attached to the filter of the filter assembly 300 may be introduced into the dust container 390 and be temporarily stored in the dust container 390.

[0114] As illustrated in FIG. 4, the brush unit 380 and the dust container 390 may be disposed in the filter case 310 so as to be withdrawn out of the air conditioner together with the filter case 310.

[0115] In this case, the brush unit 380 and the dust container 390 may constitute a portion of the filter assembly 300, and the dust container 390 may be connect-

ed to or separated from the filter cleaning device 400 to be described later.

[0116] On the other hand, the brush unit 380 and the dust container 390 may be disposed in the chassis 30 or the case 100, but not disposed in the filter case 310. In this case, the brush unit 380 and the dust container 390 may be maintained in the state of being connected to the filter cleaning device 400. When the filter assembly 30 is mounted, the brush unit 380 and the dust container 390 may be connected to the filter assembly 30.

[0117] The brush unit 380 and the dust container 390 need to be cleaned by the user or a service provider and be preferably disposed to be easily withdrawn or mounted.

[0118] When the brush unit 380 and the dust container 390 are disposed in the filter case 310 together with the prefilter 340 and the electrostatic dust filter 350, the user or the operator may withdraw the prefilter 340 and the electrostatic dust filter 350 together with each other and the brush unit 380 and the dust container 390 together with each other through the simple operation of withdrawing the filter assembly 300 to the outside and also may clean the prefilter 340, the electrostatic dust filter 350, and the brush unit 380. Then, the dust container 390 may be emptied.

[0119] FIG. 5 is a perspective view when the front panel of FIG. 1 is disposed at a first position, FIG. 6 is a perspective view when the front panel of FIG. 1 is disposed at a second position, and FIG. 7 is a perspective view when the front panel of FIG. 1 is disposed at a third position.

[0120] The driving mechanism 170 (see FIG. 2) may allow the front panel 150 to ascend or descend as illustrated in FIGS. 5 to 7. The driving mechanism 170 may be a front panel elevation mechanism that elevates the front panel 150.

[0121] As illustrated in FIG. 7, the discharge hole provided in the case 100 may further include a front discharge hole 129. The front discharge hole 129 may be provided by opening a portion of a front lower portion of the case 100 in the front-rear direction.

[0122] The driving mechanism 170 may allow the front panel 150 to move to a plurality of positions.

[0123] The plurality of positions may include a first position P1 and a second position P2.

[0124] The first position P1 may be a position at which the front panel 150 covers the front surface 301 of the filter assembly 300.

[0125] The second position P2 may be a position relatively lower than the first position P1. The second position P1 may be a position at which the front panel 150 exposes the front surface 301 of the filter assembly 300. The first position P1 and the second position P2 may be positions at which the front panel 150 covers the front discharge hole 129.

[0126] When the front panel 150 is disposed at the first position P1, as illustrated in FIG. 5, the front panel 150 may cover the front surface 301 and the front discharge hole 129 of the filter assembly 300.

[0127] When the front panel 150 is disposed at the second position, as illustrated in FIG. 6, the front panel 150 may expose the front surface 301 of the filter assembly 300 but cover the front discharge hole 129. When the front panel 150 is disposed at the second position P2, an upper end of the front panel 150 may be disposed below the front of the filter assembly 300, and the filter assembly 300 may be movable forward over the upper end of the front panel 150.

[0128] A user or the air conditioner may allow the filter assembly 300 to move forward when the front panel 150 is disposed at the second position P2, and the user may easily withdraw the filter assembly 300 forward without separating the front panel 150 or the case 100.

[0129] The user may simply clean the filter assembly 300 withdrawn to the front of the upper housing 114 by using a cleaning solution such as water. After the user cleans the filter assembly 300, the user may insert the filter assembly 300 into the upper housing 114 while seated in the upper housing 114, and the filter assembly 300 may be inserted into and accommodated in the upper housing 114.

[0130] The plurality of positions may further include a third position P3. The third position P3 may be a position relatively higher than the first position P1. As shown in FIG. 7, the third position P3 may be a position at which the front panel 150 opens the front discharge hole 129 and may be a position at which the front panel 150 covers the front surface 301 of the filter assembly 300. When the front panel 150 is disposed at the third position, air flowing toward the filter assembly 300 may be guided to the rear surface of the front panel 150 and then suctioned into the filter assembly 300.

[0131] The air conditioner may selectively perform a downward airflow mode in which the air-conditioned air is discharged to a lower side of the case 100 through the lower discharge hole 126 (see FIG. 1) and a upward airflow mode in which the air-conditioned air is discharged to a front side of the case 100 through the front discharge hole 129 (see FIG. 6).

[0132] When the front panel 150 is disposed at the first position P1 or the second position P2, the air conditioner may discharge the air-conditioned air through the lower discharge hole 126.

[0133] When the front panel 150 is disposed at the third position P3, the air conditioner may discharge the air-conditioned air through the front discharge hole 129 and the lower discharge hole 126.

[0134] FIG. 8 is a plan view of the air conditioner according to an embodiment, FIG. 9 is a cross-sectional view taken along line A-A' of FIG. 8, FIG. 10 is a cross-sectional view taken along line B-B' of FIG. 8, FIG. 11 is a bottom view illustrating the inside of a dielectric filter according to an embodiment, and FIG. 12 is a view of the filter assembly and the moving mechanism according to an embodiment.

[0135] The air conditioner may further include a charg-

ing module 360 (or an ionization module, see FIGS. 8 and 9).

[0136] The charging module 360 may be an ionization module or ionizing module that ionizes foreign substances in the air. The charging module 360 may be installed so that the foreign substances in the air are ionized before introducing the electrostatic dust filter 350.

[0137] The charging module 360 may ionize the foreign substances in the air flowing toward the electrostatic dust filter 350 and may include a discharge electrode 361 that ionizes the foreign substances in the air when a high voltage is applied.

[0138] The discharge electrode 361 may include a carbon fiber or a fiber bundle of carbon fibers. The discharge electrode 361 may be electrically connected to the high voltage power supply 170 shown in FIG. 2.

[0139] The discharge electrode 361 may be embedded in the filter assembly 300 to attach the ionized foreign substances to the electrostatic dust filter 350. However, when the discharge electrode 361 is disposed inside the filter assembly 300, the filter assembly 300 may increase in thickness due to a thickness of the discharge electrode 361 and a distance between the discharge electrode 361 and the electrostatic dust filter 350. In addition, when the user separates the filter assembly 300 from the chassis 30 or the case 100 so as to clean the filter assembly 300, the discharge electrode 361 has to be electrically connected to the high voltage power supply 170. When the filter assembly 300 is cleaned, the discharge electrode 361 may be more likely to be damaged.

[0140] The discharge electrode 361 may be disposed outside the filter assembly 300, and even though the filter assembly 300 is withdrawn to clean the filter assembly 300, the discharge electrode 361 may not be withdrawn together with the filter assembly 300.

[0141] The discharge electrode 361 may be disposed in the chassis 30 or the case 100, for example, may be disposed to face the outside of the air conditioner. In this case, the discharge electrode 361 may ionize the foreign substances of the air outside the air conditioner, particularly outside the filter assembly 300.

[0142] The foreign substances in the air outside the air conditioner may be ionized outside the filter assembly 300. The foreign substances ionized by the discharge electrode 361 may be suctioned into the filter assembly 300 and then collected into the electrostatic dust filter 350 while passing through the filter assembly 300.

[0143] The discharge electrode 361 may ionize the foreign substances in the air around the filter assembly 300. For this, the discharge electrode 361 may be disposed close to the upper housing 114, for example, disposed to face an upper side of the upper housing 114.

[0144] When the blower fan 40 is driven, external air of the air conditioner may flow to upper sides of the upper housing 114 and the filter assembly 300 and then be suctioned into the filter assembly 300. Here, the foreign substances of the air flowing to the upper sides of the upper housing 114 and the filter assembly 300 may be ionized by the discharge electrode 361.

[0145] The discharge electrode 361 facing the upper side of the upper housing 114 may minimize a power loss for ionizing the foreign substances in the air.

[0146] The charging module 360 may further include a module mounter 364 disposed on an upper portion of at least one of the chassis 30 and the case 100.

[0147] A space S5 in which the discharge electrode 361 is accommodated may be defined in the module mounter 364. The space S5 may be larger than the discharge electrode 361.

[0148] An upper end of the discharge electrode 361 may be disposed lower than an upper end of the module mounter 364. In this case, the discharge electrode 361 may be protected by the module mounter 364, and safety accidents occurring when the user touches the discharge electrode 361 or damage of the discharge electrode 361 may be minimized.

[0149] A wire through-hole 365 through which a wire 362 connected to the discharge electrode 361 may pass may be defined in the module mounter 364. The wire 362 may be fitted into the wire through-hole 365 so as to be fixed, and the wire 362 connected to the discharge electrode 361 may extend into the high voltage power supply 180 illustrated in FIG. 2.

[0150] The charging module 360 may be provided in a pair within air conditioner. The pair of charging modules 360A and 360B may be spaced apart in a longitudinal direction Y of the filter assembly 300.

[0151] The filter assembly 300 may have a long polygonal shape in which the longitudinal direction Y (i.e., a left-right direction) is longer than a width direction X (i.e., a front-rear direction), and a length L2 of the filter assembly 300 may be defined as a length in the left-right direction Y of the filter assembly 300.

[0152] A distance L1 between the pair of charging modules 360A and 360B may be greater than or equal to the length L2 of the filter assembly 300.

[0153] The pair of charging modules 360A and 360B may be symmetrically disposed with the filter assembly 300 therebetween.

[0154] The pair of charging modules 360A and 360B may include a left charging module 360A installed at a left side of the filter assembly 300 and a right charging module 360B installed at a right side of the filter assembly 300.

[0155] Hereinafter, a common configuration of the left charging module 360A and the right charging module 360B will be described as a charging module 360, and when it is necessary to distinguish the left charging module 360A from the right charging module 360B, the left charging module 360A and the right charging module 360B will be described to be distinguished from each other.

[0156] A distance L3 between the discharge electrode 361 of the left charging module 360A and the discharge electrode 361 of the right charging module 360B may be greater than the length L2 of the filter assembly 300.

[0157] Extension lines E1 and E2 extending from the discharge electrodes 361 of each of the pair of charging modules 360A and 360B may cross each other the outside of the air conditioner. The extension lines E1 and E2 may cross each other above the filter assembly 300.

[0158] When the blower fan 40 rotates, the foreign substances in the air flowing upward of the filter assembly 300 may be ionized while passing around the discharge electrode 361. The foreign substances passing through the prefilter 340 among the foreign substances ionized by the discharge electrode 361 may be adsorbed and collected onto the electrostatic dust filter 350.

[0159] Hereinafter, the filter assembly 300 will be described in detail.

[0160] A space S3 in which at least one filter is accommodated may be defined in the filter case 310.

[0161] The filter case 310 may be configured to allow air to pass therethrough. An outer inlet 312 through which external air is suctioned into the filter case 310 may be provided in the filter case 310. An inner outlet 314 through which the air passing through the space S3 of the filter case 310 is discharged to flow into the inner space S1 may be provided in the filter case 310.

[0162] The outer inlet 312 may be an air suction hole through which external air of the air conditioner is suctioned into the air conditioner. An air suction hole may be defined in the filter case 310, and the space S3 in which the prefilter 340 is accommodated may be defined in the filter case 310.

[0163] The inner outlet 314 may be an air discharge hole through which air suctioned into the filter assembly 300 is discharged to the outside of the filter assembly 300, and an air discharge hole may be defined in the filter case 310.

[0164] The outer inlet 312 may face an upper side when the filter assembly 300 is inserted into the upper housing 114, and the outer inlet 312 may be exposed to the outside of the air conditioner.

[0165] The inner outlet 314 may face a lower side when the filter assembly 300 is inserted into the upper housing 114, and the inner outlet 314 may face the inside of the air conditioner.

[0166] The filter case 310 may be provided as an assembly of a plurality of members.

[0167] The filter case 310 includes an upper cover 320 having the outer inlet 312 through which external air is suctioned and a lower case having the inner outlet 314 (the air discharge hole) through which the air passing through the filter flows to the through-hole 115.

[0168] The upper cover 320 may be separably coupled to the lower case 330 by a hook part such as a hook or a coupling member such as a screw, and when the upper cover 320 is separated from the lower case 330, the inside of the filter case 310 may be opened.

[0169] The upper cover 320 may be an outer cover defining the outer appearance the top surface of the air conditioner when the filter assembly 300 is mounted in the air conditioner.

[0170] The lower case 330 may be an inner case in which a bottom surface of the filter assembly 300 may face the inside of the air conditioner, particularly the inner space S1, when the filter assembly 300 is mounted.

[0171] The prefilter 340 may be made of a flexible material that is capable of being curved or bent. A length of the prefilter 340 in the left-right direction may be greater than a length of the prefilter 340 in the front-rear direction.

[0172] As illustrated in FIG. 10, the prefilter 340 may include a filter net 342 having a through-hole through which air passes. The prefilter 340 may include a filter body 344 that supports the filter net 342.

[0173] The prefilter 340 may be accommodated between the electrostatic dust filter 350 and the upper cover 320.

[0174] The electrostatic dust filter 350 may be a collection module in which the foreign substances ionized by the charging module 360 are collected. The electrostatic dust filter 350 may be accommodated to be disposed after the prefilter 340 in the air flow direction.

[0175] The electrostatic dust filter 350 may be a dielectric filter in which an electrode is surrounded by a dielectric, and the electrostatic dust filter 350 may be cleaned by a cleaning solution such as water.

[0176] The electrostatic dust filter 350 may include a first filter body 351 surrounding a first electrode 351A by a first dielectric 351B and a second filter body 352 surrounding a second electrode 352A by a second dielectric 352B.

[0177] The first dielectric 351B and the second dielectric 351B may be coating members which prevent the foreign substances from being exposed to the first electrode 351A and the second electrode 352A and may be an adsorption body that is adsorbed by electric fields generated between the second electrode 352A and the second electrode 352A.

[0178] As illustrated in FIG. 11, the first filter body 351 and the second filter body 352 may be spaced apart from each other in a direction X that is perpendicular to an air suction direction Z. The first filter body 351 and the second filter body 352 may be alternately disposed in a direction X that is perpendicular to the air suction direction Z.

[0179] An electrode terminal may be disposed on the electrostatic dust filter 350. A pair of electrode terminals may be provided to the electrostatic dust filter 350, and the pair of electrode terminals may include a positive electrode terminal 353 and a ground terminal 354, as illustrated in FIG. 11.

[0180] The positive electrode terminal 353 and the ground terminal 354 may be spaced apart in the longitudinal direction Y of the filter assembly 300.

[0181] The positive electrode terminal 353 may be electrically connected to the first electrode 351A and may be spaced apart from the second filter body 352.

[0182] A portion of the first electrode 351A may be connected to the positive electrode terminal 353 of the first filter body 351.

[0183] Each of the positive electrode terminal 353 and the ground terminal 354 may be disposed to pass through the filter frame of the electrostatic dust filter 350, and a part of each of the positive electrode terminal 353 and the ground terminal 354 may be disposed outside the filter frame of the electrostatic dust filter 350.

[0184] The ground terminal 354 may be electrically connected to the second electrode 352A and may be spaced apart from the first filter body 351.

[0185] A portion of the second electrode 352A may be connected to the ground terminal 354 of the second filter body 352.

[0186] Hereinafter, a common configuration of the positive electrode terminal 353 and the ground terminal 354 will be described as the electrode terminals 353 and 354, and when it is necessary to distinguish the positive electrode terminal 353 from the ground terminal 354, the positive electrode terminal 353 and the ground terminal 354 will be described to be distinguished from each other.

[0187] The electrostatic dust filter 350 may include a filter frame having a space S4 therein. The filter frame may be provided as an assembly of a plurality of members 356 and 357. The assembly 356 and 367 may include an upper frame 356 and a lower frame 357, and the upper frame 356 and the lower frame 357 may be separably coupled to each other by a hook part 358 such as the hook.

[0188] The main body 10 may further include a moving mechanism 500 allowing a position of the filter assembly 300 to move. The moving mechanism 500 may be a filter assembly backward movement mechanism that allows the filter assembly 300 to move backward.

[0189] The moving mechanism 500 may include a driving source such as a motor and at least one power transmission member connected to the driving source. One example of the moving mechanism 500 may include a motor 510 and a pinion 520 rotating by the motor 512.

[0190] The motor 510 may be installed to be fixed within the air conditioner. The air conditioner may further include a bracket 540 installed on at least one of the chassis 30 and the case 100. The motor 510 may be mounted to the bracket 540 by a coupling member such as a screw.

[0191] The pinion 520 may be directly connected to a rotation shaft of the motor 510 or may be connected to the rotation shaft of the motor 510 through a separate intermediate gear.

[0192] The moving mechanism 500 may include a rack 530 engaged with the pinion 520. The rack 530 may be provided in the filter assembly 300. The rack 530 may be provided in the filter case 310 as illustrated in FIG. 12. The rack 530 may be disposed on a lower portion of the filter case 310 to protrude. The rack 530 may be lengthily disposed on the lower case 330 in the front-rear direction.

[0193] The moving mechanism 500 may be controlled by a control module 50. When the control module 50 controls the motor 510 in a forward movement mode, the motor 510 may allow the rotation shaft to rotate in any one of a clockwise direction and a counterclockwise direction to allow the rack 530 to move forward, and the filter assembly 300 may move forward in a state of being placed on the upper housing 114.

[0194] The control module 50 may transmit a signal of the forward movement mode to the motor 510 when the user inputs a command for withdrawing the filter assembly 300 through an input unit of a remote controller or the like, or when the air conditioner is under a filter assembly withdrawal condition.

[0195] An example of the filter assembly withdrawal condition may be a case in which the air conditioner operates for a set time.

[0196] When the control module 50 controls the motor 510 in the backward movement mode, the motor 510 may allow the rotation shaft of the motor 510 to rotate in a direction opposite to that in the forward movement mode to allow the rack 530 to move backward. The filter assembly 300 may be deeply inserted into the upper housing 114 in a state of being placed in the upper housing 114.

[0197] In the state in which the user inserts the filter assembly 300 into the upper housing 114, the remote controller or the like may input the command for mounting the filter assembly 300 through the input unit. In this case, the control module 50 may transmit the single of the backward movement mode to the motor 510.

[0198] The air conditioner may include a sensing unit 550 capable of sensing a position of the filter assembly 300. The sensing unit 550 may be installed to sense a correct position (i.e., a normal mounting position) of the filter assembly 300. The sensing unit 550 may be installed to sense a maximum withdrawal position of the filter assembly 300 (i.e., a position at which the moving mechanism 500 allows the filter assembly 300 to maximally move forward).

[0199] The air conditioner may further include a magnet 560 installed on the filter case 310 and a magnet sensor 570 installed on the moving mechanism 500 to sense the magnet 560. The magnet 560 and the magnet sensor 570 may constitute the sensing unit 550.

[0200] A magnet mounting part 337 on which the magnet 560 is seated may be accommodated in the lower case 330, and the magnet 560 may be mounted on the magnet mounting part 337 to move forward and backward together with the filter assembly 300.

[0201] The magnet sensor 570 may be installed in the moving mechanism 500, in particular, the bracket 540. The bracket 540 may be provided with a magnet sensor accommodation part 544 in which the magnet sensor 570 is inserted and accommodated.

[0202] The magnet sensor 570 may sense the magnet 560 while the motor 510 is driven in the backward movement mode. Also, when the magnet 560 is sensed by the magnet sensor 570, the control module 50 may stop the backward movement mode of the motor 510.

[0203] The position at which the magnet sensor 570 senses the magnet 560 may be a position at which electrode terminals 353 and 354, which will be described lat-

er, of the electrostatic dust filter 350 contacts the supply terminals 121 and 122 disposed in the upper housing 114 or maintains the contact with the supply terminals 121 and 122. Thus, the control module 50 may reliably apply the high voltage to the electrostatic dust filter 350.

[0204] FIG. 13 is a plan view when the filter assembly of FIG. 8 is withdrawn forward, and FIG. 14 is a perspective view when the filter assembly of FIG. 8 is withdrawn forward.

[0205] The upper housing 114 may be configured to accommodate the filter assembly 300 to be inserted. The top surface of the upper housing 114 and the front surface of the upper housing 114 may be opened.

[0206] The upper housing 114 may have a three-dimensional shape, and an upper space S2 in which the filter assembly 300 is accommodated may be defined inside the upper housing 114.

[0207] A through-hole 115 communicating with each of the upper space S2 and the inner space S1 may be defined in a lower portion of the upper housing 114.

[0208] The upper housing 114 is a pair of side bodies 116 and 117 spaced apart in the left-right directions toward the side surfaces 302 and 303 of the filter case 310 and the pair of side bodies 116. It may include a rear body 118 connecting the 117 and toward the rear surface 304 of the filter case 310.

[0209] Each of the pair of side bodies 116 and 117 and the rear body 118 may have a predetermined length in the vertical direction Z, and the length of each of the pair of side bodies 116 and 117 and the rear body 118 may be greater than or equal to a thickness of the filter assembly 300 (i.e., the vertical length of the filter assembly 300).

[0210] The upper housing 114 may further include a lower body 119 on which the filter assembly 300 is mounted, and the lower body 119 may be provided under the pair of side walls 116 and 117.

[0211] The lower body 119 may have a stepped portion with respect to an upper end of each of the pair of side bodies 116 and 117 and the rear body 118.

[0212] The pair of side bodies 116 and 117 and the lower body 119 may have a width in the front-rear direction X, and the width may be greater than or equal to a width of the front-rear directions X of the filter assembly 300.

[0213] When the filter assembly 300 is accommodated in the upper housing 114, the top surface 305 of the filter assembly 300 may match the top surface part 113 of the air conditioner, and the front surface 301 of the filter assembly may match the front surface of the case 100.

[0214] The supply terminals 121 and 122 contacting the electrode terminals 353 and 354 may be disposed in the upper housing 114.

[0215] The supply terminals 121 and 122 may be fixed terminals that are fixed to the chassis 30 or the case 100. The supply terminals. 121 and 122 may one-to-one correspond to the electrode terminals 353 and 354. The supply terminals 121 and 122 may include a positive electrode fixed terminal 121 with/from the positive electrode terminal 353 is in contact or separated and a ground fixed terminal 122 with/from the ground terminal 354 is in contact or separated.

[0216] The positive electrode fixed terminal 121 and the ground fixed terminal 122 may be spaced apart from each other in the longitudinal direction Y of the filter assembly 300. Hereinafter, a common configuration will be described as the supply terminals 121 and 122. When it is necessary to distinguish the positive electrode fixed terminal 121 and the ground fixed terminal 122, the positive electrode fixed terminal 121 and the ground fixed terminal 122 will be described to be distinguished from each other.

[0217] The positive electrode fixed terminal 121 may be connected to the high voltage power supply 180 illustrated in FIG. 2, and a wire or a bus bar connected to the positive electrode fixed terminal 121 may extend to the high voltage power supply 180.

[0218] The ground stationary terminal 122 may be connected to the high voltage power supply 180 illustrated in FIG. 2, like the positive electrode fixed terminal 121, and a wire or a bus bar connected to the ground stationary terminal 122 may extend to the high voltage power supply 180.

[0219] A terminal hole 338 (see FIG. 15) through which at least one of the electrode terminals 353 and 354 and the supply terminals 121 and 122 passes may be defined in the filter case 310. For example, the terminal hole 338 may be defined in the lower case 330.

[0220] FIG. 15 is a perspective view illustrating the inside of the filter assembly according to an embodiment, FIG. 16 is a bottom view when the dust container is separated from the filter case according to an embodiment, FIG. 17 is an exploded perspective view of the filter assembly according to an embodiment, FIG. 18 is a bottom view of the prefilter according to an embodiment, FIG. 19 is an enlarged cross-sectional view when the filter assembly is connected to the filter cleaning device according to an embodiment, and FIG. 20 is a cross-sectional view taken along line C-C' of FIG. 8.

[0221] The filter case 310 may have a substantially hexahedral shape and may be lengthily disposed in the left-right direction Y.

[0222] The air conditioner may include a roller 370 rotatably disposed in the filter case 310. As illustrated in FIG. 19, the roller 370 may be disposed to be spaced apart from the electrostatic dust filter 350 in the filter case 310. The roller 370 may be disposed in the filter case 310 so as to be disposed next to the electrostatic dust filter 350.

[0223] The roller 370 may support one side of the prefilter 340 in the longitudinal direction. The roller 370 may allow the prefilter 340 to move in the left-right direction.

[0224] The roller 370 may include a driving gear that allows the prefilter 340 to move. The driving gear may include a pair of pinions 372 and 374. The pair of pinions 372 and 374 may be spaced apart from each other in a

direction that is perpendicular to the air flow direction Z and the longitudinal direction Y of the prefilter 340.

[0225] The roller 370 may include a rotation shaft 376 connecting the pair of pinions 372 and 374 to each other. The pair of pinions 372 and 374 and the rotation shaft 376 may integrally rotate.

[0226] The prefilter 340 may have a driven gear engaged with the driving gear of the roller 370. The driven gear may be a pair of racks 346 and 348 provided in the prefilter 340 as illustrated in FIG. 18.

[0227] The pair of racks 346 and 348 may be engaged with the pair of pinions 372 and 374 constituting the driving gear. The pair of racks 346 and 348 may be integrated with the filter body 344. The pair of racks 346 and 348 may protrude from the bottom surface of the filter body 344. Each of the pair of racks 346 and 348 may be lengthily disposed in the longitudinal direction Y of the prefilter 340, and the pair of racks 346 and 348 may be spaced apart from each other in the direction X that is perpendicular to the longitudinal direction of each of the prefilters 346 and 348.

[0228] When the prefilter 340 rotates, as illustrated in FIGS. 21 and 22, the prefilter 340 may move inside the filter case 310 along an outer circumference of the roller 370.

[0229] The prefilter 340 may be a flexible filter that is bendable.

[0230] A portion of the prefilter 340, which is connected to the roller 370, may be bent in an arc shape along the outer circumference of the roller 370, and a portion of the prefilter 340, which is not connected to the roller 370, may be spread in a substantially flat shape along the longitudinal direction of the filter case 310.

[0231] As illustrated in FIG. 21, the prefilter 340 may filter the foreign substances such as dust inside the filter case 310. As illustrated in FIG. 22, the foreign substances such as the dust, which are filtered by the prefilter 340, may be separated inside the filter case 310 while moving along the outer circumference of the roller 370.

[0232] The driving gear of the prefilter 340 may be engaged with the roller 370 regardless of the position of the prefilter 340, and the electrostatic dust filter 350 may be disposed next to the roller 370 so as to be spaced apart from the roller 370.

[0233] A length L6 of the prefilter 340 may be greater than a length L7 of the electrostatic dust filter 350, and a portion of the prefilter 340 may be disposed to face a portion between the electrostatic dust filter 350 and the roller 370. The prefilter 340 may minimize the introduction of the foreign substances such as the dust into a gap between the electrostatic dust filter 350 and the roller 370.

[0234] The air conditioner may include a roller rotation mechanism that allows the roller 370 to rotate. The roller rotation mechanism may be mounted in the filter assembly 300 or the body 10.

[0235] For example, the roller rotation mechanism may be mounted in the filter assembly 300, and in this case, the roller rotation mechanism may be mounted in the filter case 310. When the roller rotation mechanism is mounted in the filter case 310, the roller rotation mechanism may be withdrawn out of the main body 10 together with the filter assembly 300.

[0236] For another example, the roller rotation mechanism may be mounted in the main body 10. In this case, the roller rotation mechanism may be mounted in the main body 10. When the roller rotation mechanism is mounted in the main body 10, the roller rotation mechanism may be separated from the filter assembly 300 when the roller rotation mechanism is withdrawn. That is, when the roller rotation mechanism is mounted in the main body 10, the roller 370 may be separably connected to the roller rotation mechanism.

[0237] When the filter assembly 300 is mounted, the roller 370 may be connected to the roller rotation mechanism. When the filter assembly 300 is withdrawn, the roller may be separated from the roller rotation mechanism, and the entire filter assembly 300 may be simply cleaned by the cleaning solution such as water.

[0238] When the roller rotation mechanism is mounted in the main body 10, the roller rotation mechanism may be installed on the chassis 30 or the case 100.

[0239] The roller rotation mechanism may be disposed on the rear body 118. When the filter case 310 is mounted in the upper housing 114, the roller rotation mechanism may be disposed behind the filter case 310.

[0240] The roller rotation mechanism includes a connector 377 that is separably connected to any one of the pair of pinions 372 and 374 and a roller rotation motor 378 that allows the connector 377 to rotate.

[0241] The roller rotation motor 378 may include a rotation shaft connected to the connector 377.

[0242] The brush unit 380 may be disposed in the filter case 310. When the roller 370 rotates, the prefilter 340 may contact the brush unit 380.

[0243] A brush unit accommodating part 349 into which the brush unit 380 is inserted may be provided in the filter case 310. The brush unit accommodating part 349 may be provided in at least one of the upper cover 320 or the lower case 330. The brush unit 380 may be inserted into the brush unit accommodating part 349. After the brush unit 380 is inserted into a dust container accommodation space S7 that will be described later, the brush unit 380 may be inserted into the brush unit accommodation part 349 in the dust container accommodating space S7.

[0244] When the brush unit 380 is disposed in the filter case 310, the brush unit 380 may be disposed in the filter case 310 to be disposed next to the roller 370, and the brush unit may be disposed between the roller 370 and the dust container 390 as illustrated in FIG. 19. The brush unit 380 may be spaced apart from the roller rotation mechanism.

[0245] The brush unit 380 may contact the bent portion of the prefilter 340 along the roller 370.

[0246] The brush unit 380 may include a brush body 382 inserted into the brush unit accommodation part 349 and a brush 384 disposed on the brush body 382 to con-

tact the prefilter 340.

[0247] A dust passage 381 through which air and dust pass may be provided in the brush body 382. The dust passage 381 may face the roller 370, and the dust separated from the portion of the prefilter 340, which is disposed between the roller 370 and the brush body 382, may be suction into the dust container 390 through the dust passage.

[0248] The brush 384 may be disposed on one surface of the brush body 382, which faces the roller 370, and may contact the bent portion of the prefilter 340 along the roller 370.

[0249] The dust container 390 may be disposed in the filter case 310. The dust container 390 may be disposed next to the brush unit accommodation part 349 and be connected to the brush unit 380.

[0250] A length L4 of the upper cover 320 may be greater than a length L5 of the lower case 330 as illustrated in FIG. 16. A dust container accommodation space S7 in which the dust container 390 is accommodated may be defined between the lower case 330 and the upper cover 320.

[0251] When the brush unit accommodation part 349 is provided in the lower case 330, the upper cover 320 may face the brush unit accommodation part 349 and include one side wall 329 that is spaced apart from the brush unit accommodation part 349. Also, the dust container accommodation space S7 may be defined as an empty space defined between the brush unit accommodation part 349 and the one side wall 329 of the upper cover 320.

[0252] A space (S6) in which the dust separated from the prefilter 340 is stored may be defined in the dust container 390. The dust container 390 may be provided as an assembly of a plurality of members each of which has an openable inside. The dust container 390 may include a lower box 392 and a box cover 394 that opens and closes a space of the lower box 392. A space S6 in which the dust is stored may be defined between the lower box 392 and the box cover 394.

[0253] The dust container 390 may further include a dust filter 396 accommodated in the space S6. The dust filter 396 may be a dust collection filter through which the dust moving from the prefilter 340 is filtered, and air passes.

[0254] FIG. 21 is an enlarged cross-sectional view of the prefilter, the roller, and the brush when the prefilter is not cleaned according to an embodiment, and FIG. 22 is a cross-sectional view when the prefilter of FIG. 21 is cleaned.

[0255] A guide that guides the movement of the prefilter 340 may be provided in the filter case 310.

[0256] The guide may include a filter guide 334 that guides the prefilter 340 to move along the outer circumference of the roller 370 when the roller 370 rotates.

[0257] The filter guide 334 may have a guide surface 335 contacting the prefilter 340. The filter guide 334 may be disposed in the filter case 310, and the filter assembly 300 may further include the filter guide 334.

[0258] The filter guide 334 may have a shape surrounding the outer circumferential surface of the roller 370, and the guide surface 335 may be defined as an inner circumferential surface that faces the outer circumferential surface of the roller 370 of the filter guide 334.

[0259] At least a portion of the filter guide 334 may have an arc shape. A radius of the arc-shaped portion of the filter guide 334 may be greater than a radius of the roller 370.

[0260] The filter guide 334 includes a first guide 336 and a second guide 337, which are spaced an interval greater than the diameter of the roller 370, and a third guide 339 connecting the first guide 336 to the second guide 337.

[0261] The guide may further include a guide body 324 that guides the prefilter 340 to move to a rear side of the electrostatic dust filter 350 in the air flow direction.

[0262] The guide body 324 may guide the prefilter 340 to move between the electrostatic dust filter 350 and the lower case 330.

[0263] The guide body 324 may be integrated with the filter case 310. The guide body 323 may protrude from an inner surface of the filter case 310 or may be disposed on a lower portion of the lower case 330. The guide body 323 may be a portion of a lower plate of the lower case 330.

[0264] The guide body 324 may guide a portion of the prefilter 340, which moves along the outer circumference of the roller 370, to move between the electrostatic dust filter 350 and the lower case 330.

[0265] The roller 372 may allow the prefilter 340 to move to a front side of the correction filter 250 in the air flow direction or move to the rear side of the electrostatic dust filter 250 in the air flow direction.

[0266] The above-disclosed subject matter is to be considered illustrative, and not restrictive, and the appended claims are intended to cover all such modifications, enhancements, and other embodiments, which fall within the scope of the present disclosure.

[0267] Thus, the embodiment of the present disclosure is to be considered illustrative, and not restrictive, and the technical scope of the present disclosure is not limited to the foregoing embodiment.

[0268] Therefore, the scope of the present disclosure is defined not by the detailed description of the invention but by the appended claims, and all differences within the scope will be construed as being included in the present disclosure.

Claims

1. An air conditioner comprising:

a prefilter (340) made of a flexible material, the prefilter (340) being disposed to face an air suction hole (312) through which air is suctioned;

a roller (372) configured to support one side of the prefilter (340) in a longitudinal direction, the roller (372) being configured to allow the prefilter (340) to move in a left-right direction;
a roller rotation mechanism configured to allow the roller (372) to rotate; and
a brush unit (380) disposed to contact the prefilter (340) when the roller (372) rotates, the brush unit (380) being spaced apart from the roller rotation mechanism.

2. The air conditioner according to claim 1, further comprising a filter case (310) in which the air suction hole (312) is defined and which has a space (S3) in which the prefilter (340) is accommodated.

3. The air conditioner according to claim 2, further comprising an electrostatic dust filter (350) disposed between the prefilter (340) and the filter case (310) and spaced apart from the roller (372).

4. The air conditioner according to claim 3, wherein a thickness of the electrostatic dust filter (350) in an air flow direction is less than or equal to a diameter of the roller (372).

5. The air conditioner according to claim 3 or 4, wherein a guide body (324) configured to guide the prefilter (340) so as to move in rear of the electrostatic dust filter (350) in the air flow direction is disposed on the filter case (310).

6. The air conditioner according to any one of claims 3 to 5, wherein the roller (372) is configured to allow the prefilter (340) to move in front of the electrostatic dust filter (350) in the air flow direction or to allow the prefilter (340) to move in rear of the electrostatic dust filter (350) in the air flow direction.

7. The air conditioner according to any one of claims 2 to 6, further comprising a dust container (390) disposed in the filter case (310) to define a space (S6) adapted to store dust separated from the prefilter (340).

8. The air conditioner according to claim 7, wherein the filter case (310) comprises:

an upper cover (320) having the air suction hole (312); and
a lower case (330) coupled to the upper cover (320), the lower case (330) having an air discharge hole (314),
wherein a dust container accommodation space (S7), into which the dust container (390) is inserted and accommodated, is defined between the lower case (330) and the upper cover (320).

9. The air conditioner according to claim 8, wherein the upper cover (320) has a length (L4) greater than a length (L5) of the lower case (330).

10. The air conditioner according to any one of claims 2 to 9, further comprising:

a main body (10) provided with an upper housing (114) on which the filter case (310) is separably mounted;
a blower fan (40) accommodated in the main body (10),
wherein the roller rotation mechanism is disposed in the main body (10).

11. The air conditioner according to claim 10, wherein the upper housing (114) comprises:

a pair of side bodies (116, 117) disposed to face a side surface of the filter case (310); and
a rear body (118) configured to connect the pair of side bodies (116, 117) to each other, the rear body (118) being disposed to face a rear surface (304) of the filter case (310),
wherein the roller rotation mechanism is disposed on the rear body (118) behind the filter case (310).

12. The air conditioner according to claim 10 or 11, further comprising:
a filter cleaning device (400) which is mounted on the main body (10) and to which the duct container (390) is separably connected, the filter cleaning device (400) being configured to apply suction force to the dust container (390).

13. The air conditioner according to any one of claims 8 to 12, wherein a brush unit accommodation part (349) into which the brush unit (380) is inserted and accommodated is provided in the filter case (310), and
the dust container accommodation space (S7) is defined between the brush unit accommodation part (349) and one wall (329) of the upper cover (320).

14. The air conditioner according to any one of claim 1 to 13, wherein the brush unit (380) comprises:

a brush body (382) provided with a dust passage (381) that is opened toward the roller (372); and
a brush (384) disposed on one surface of the brush body (382) to face the roller (372), the brush (384) being in contact with a portion of the prefilter (340), which is bent along the roller (372).

Fig.1

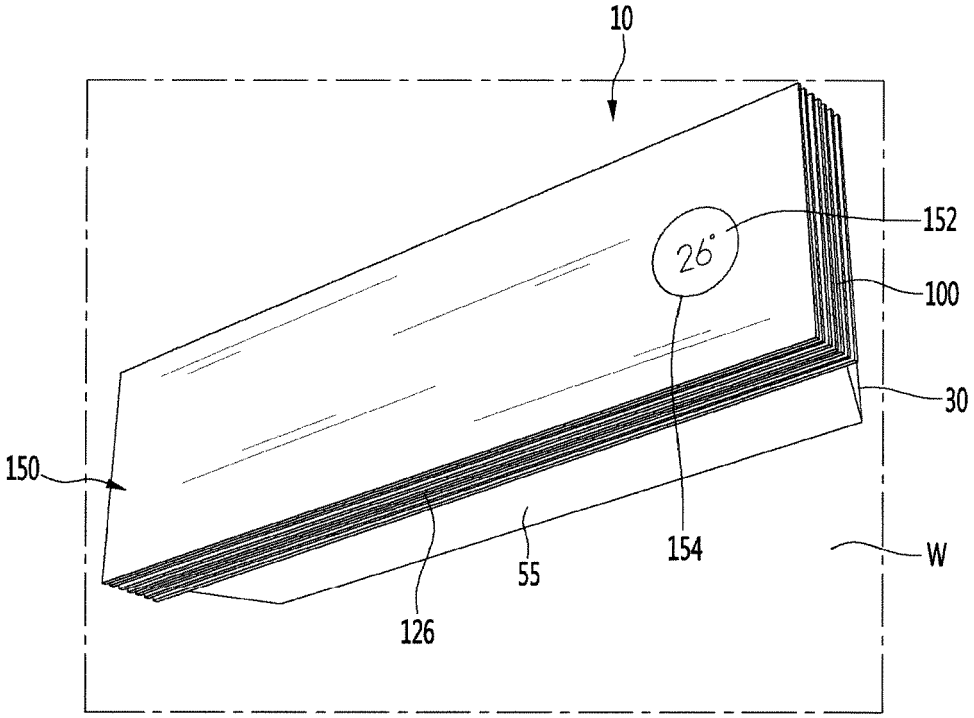


Fig.2

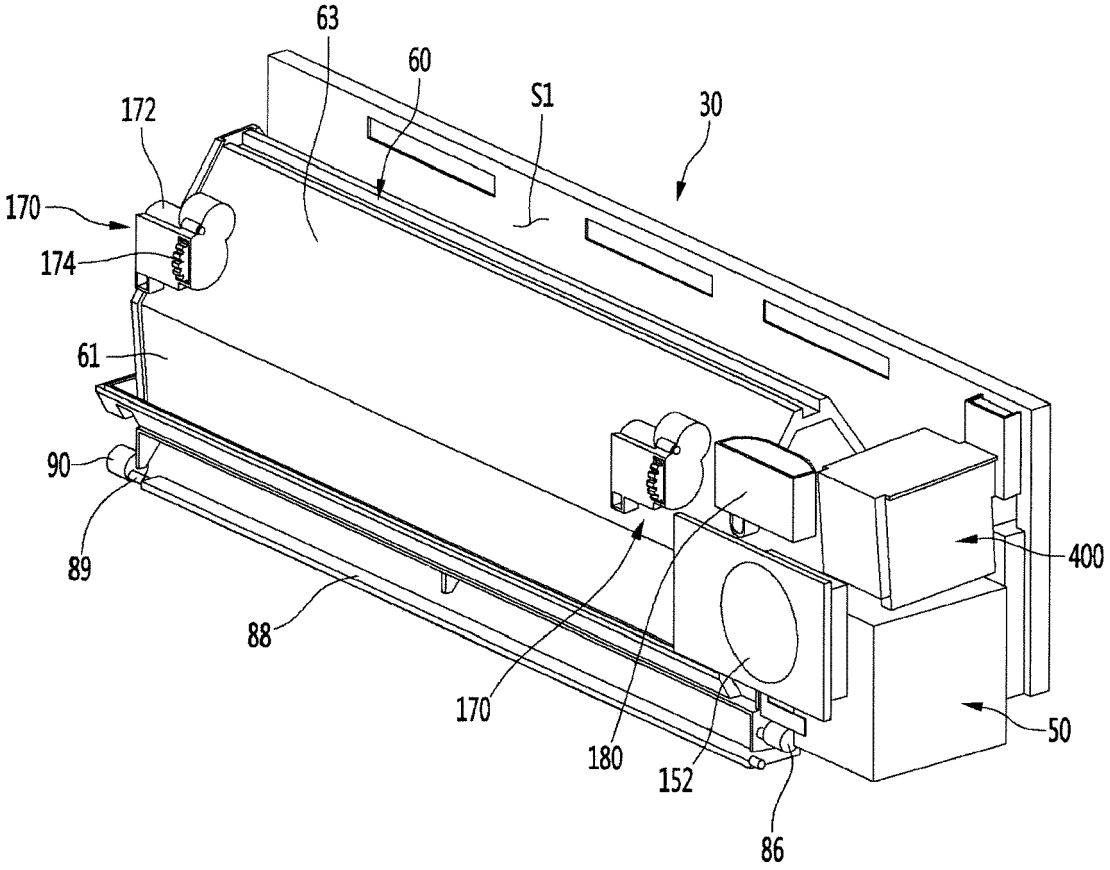


Fig.3

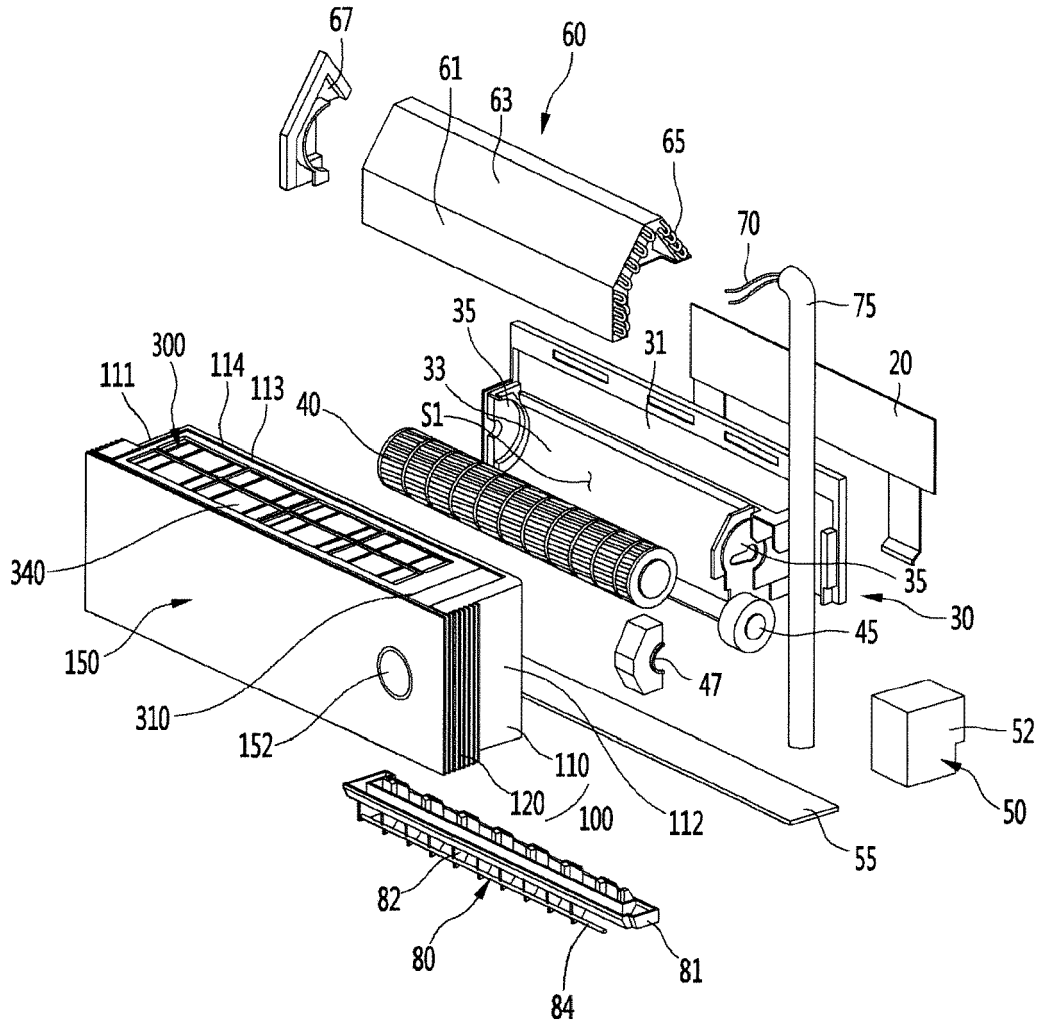

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Fig.4

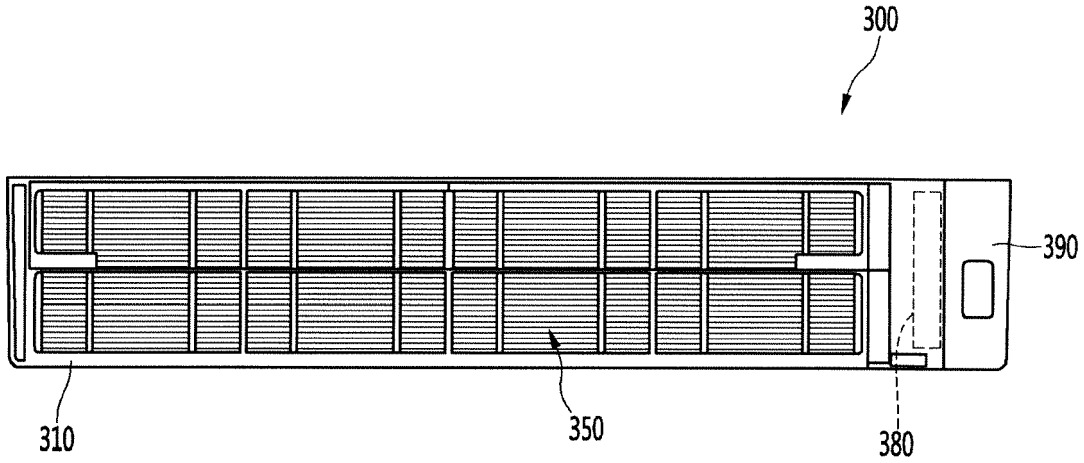
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Fig.5

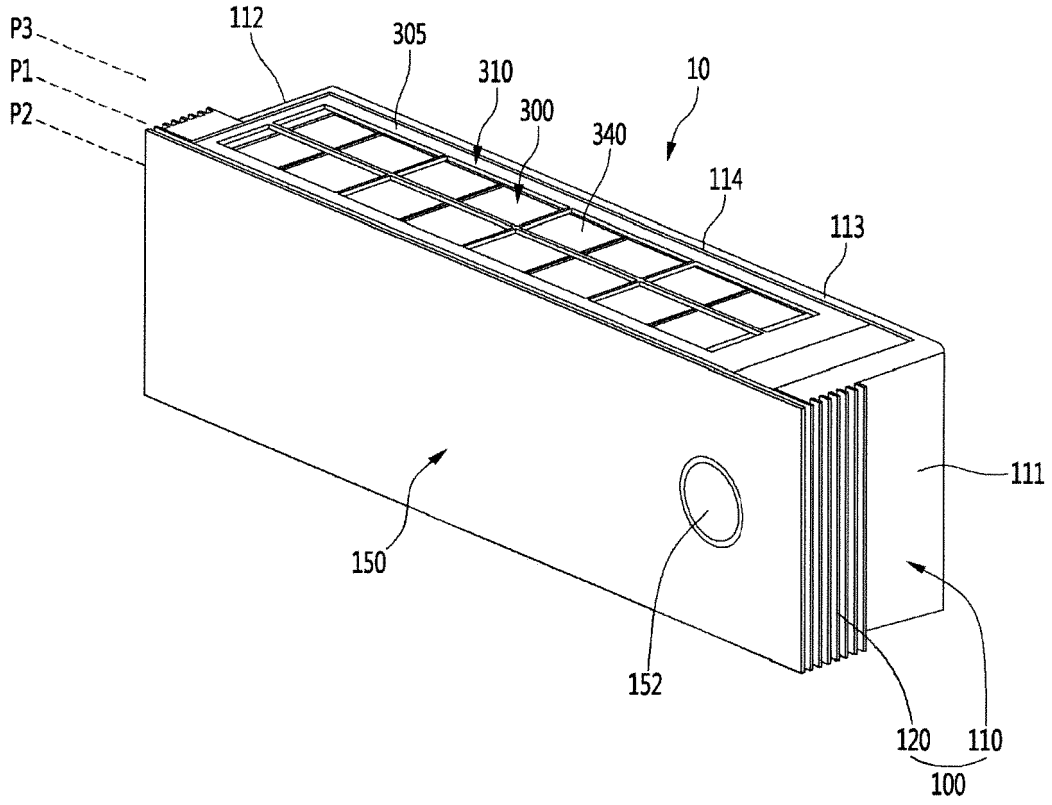
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Fig.6

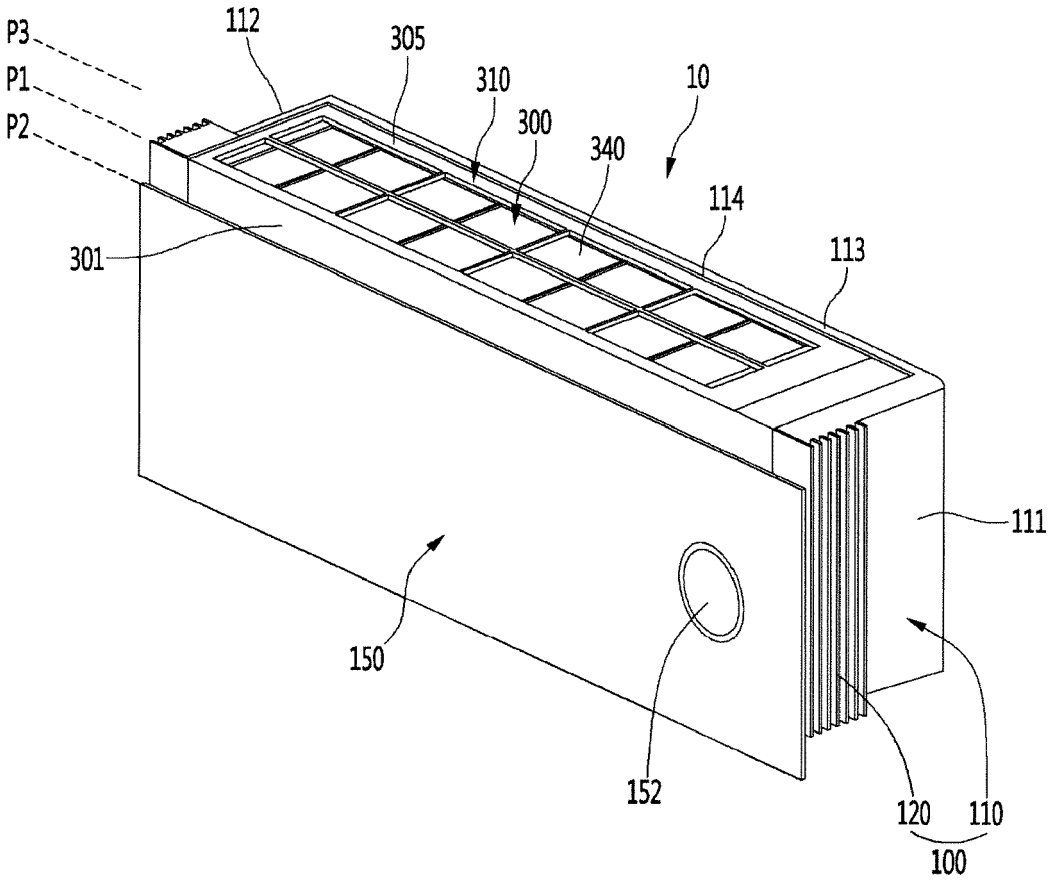
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Fig.7

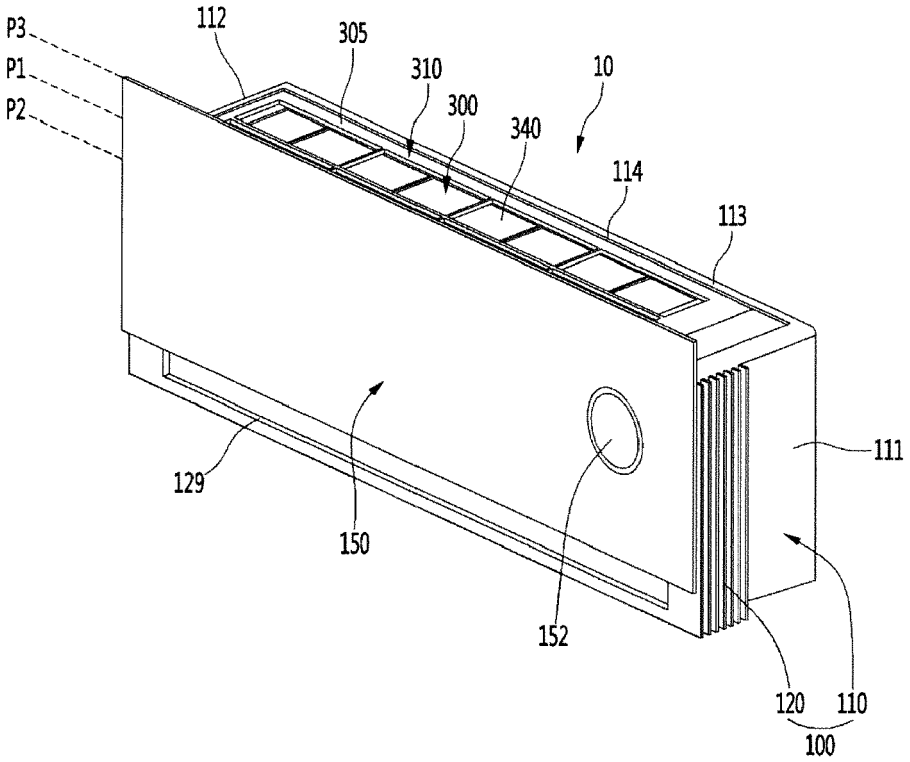
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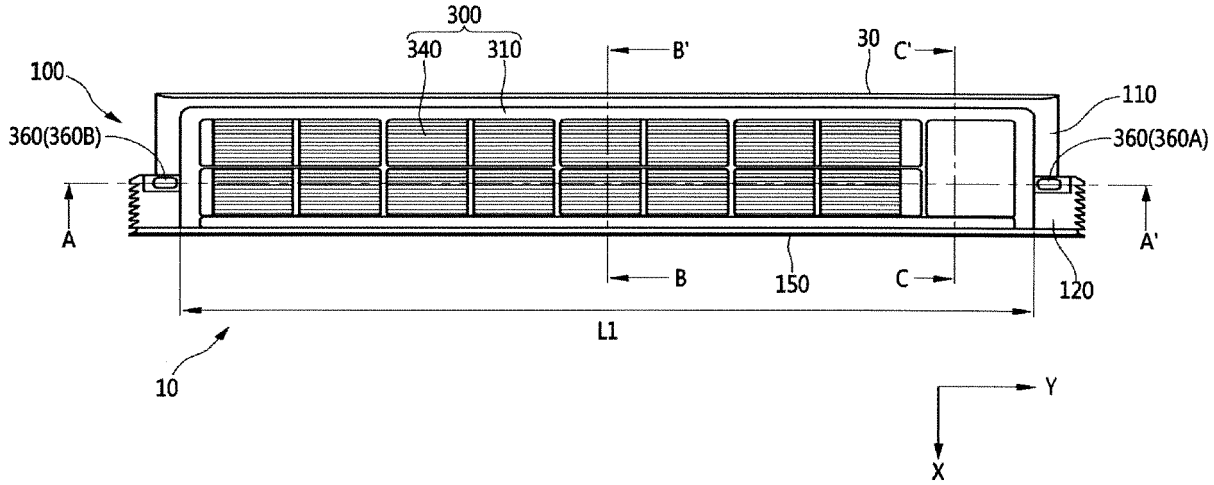
Fig.8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X

Fig.9

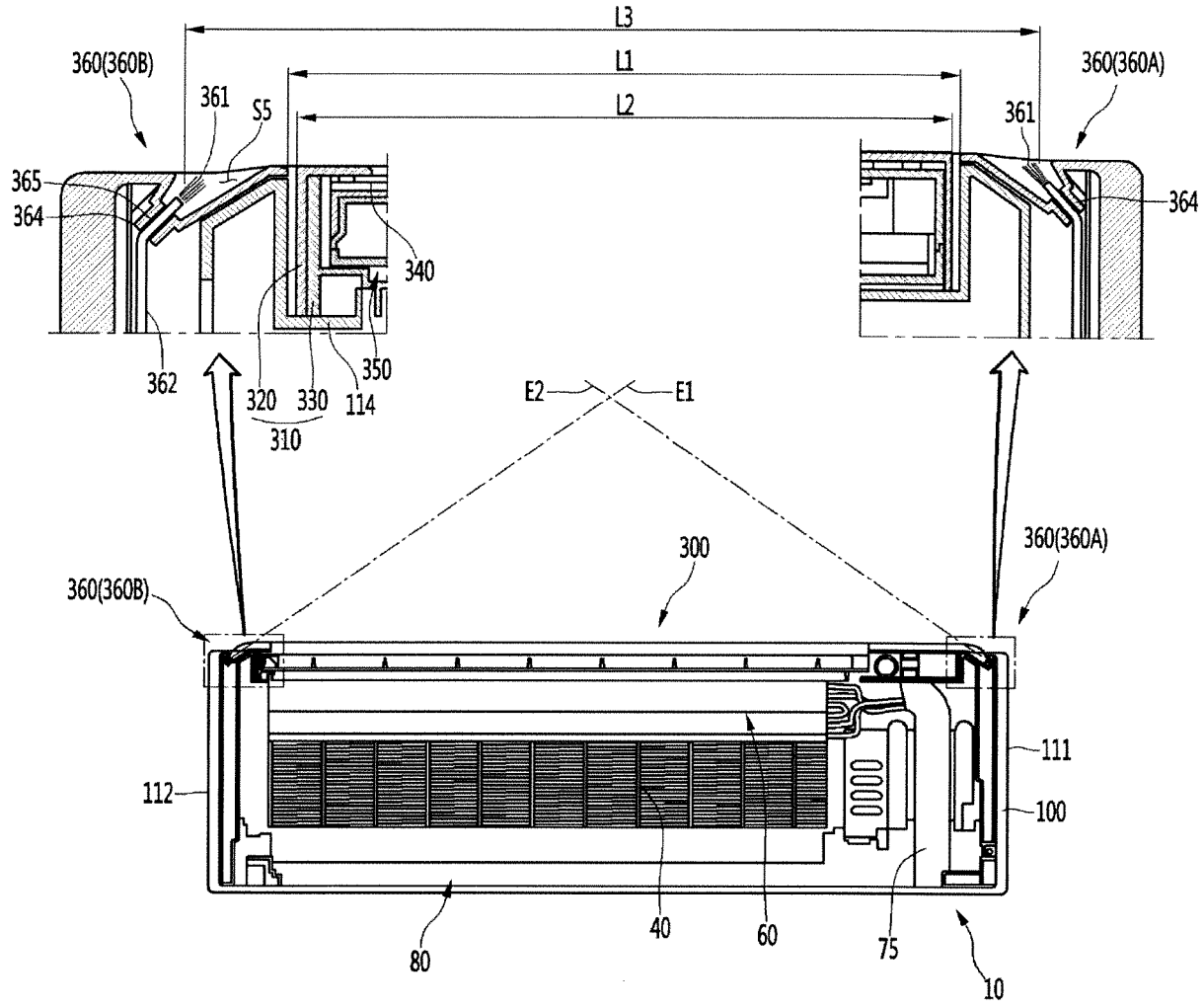
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Fig.10

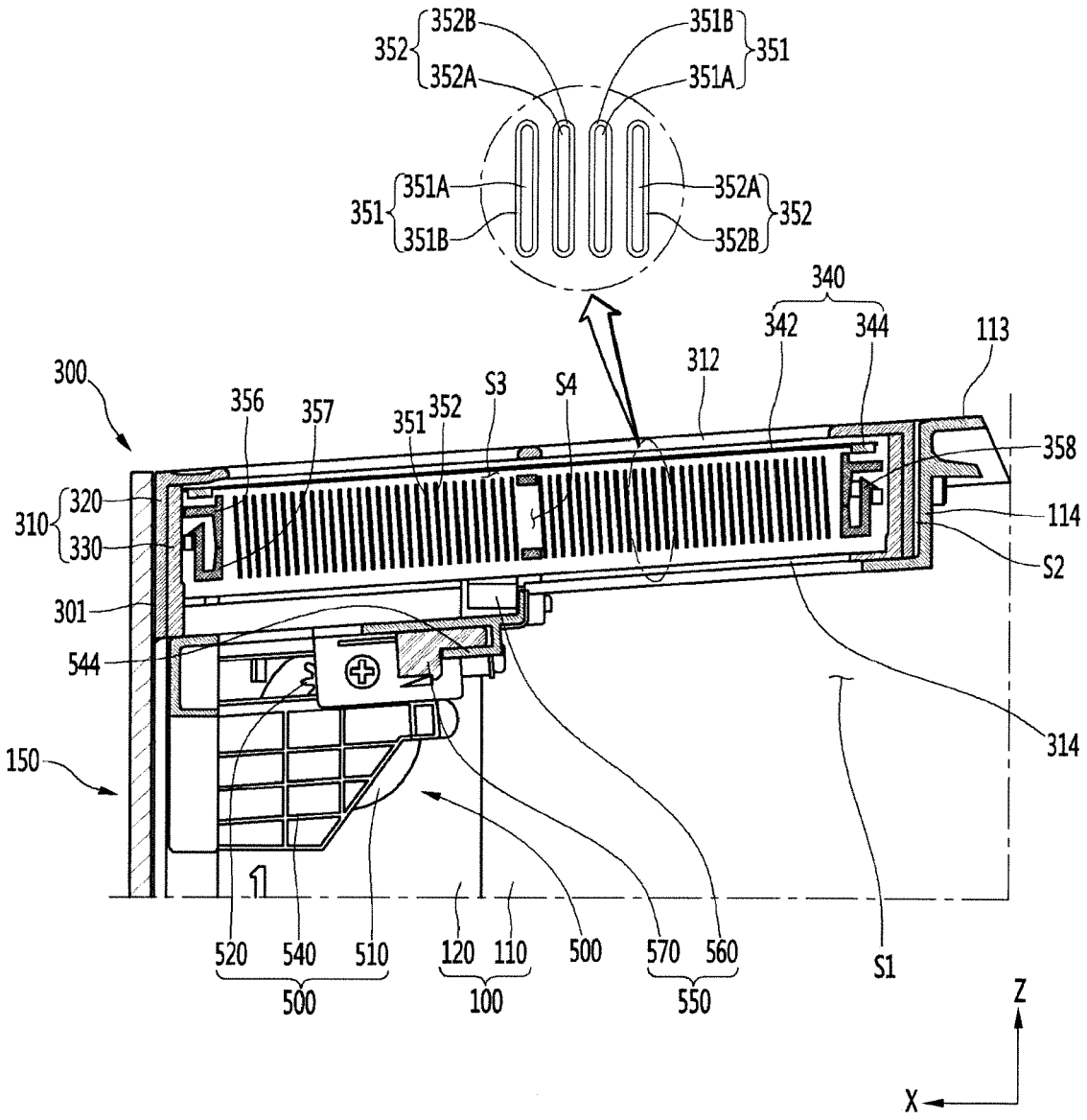
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Fig.11

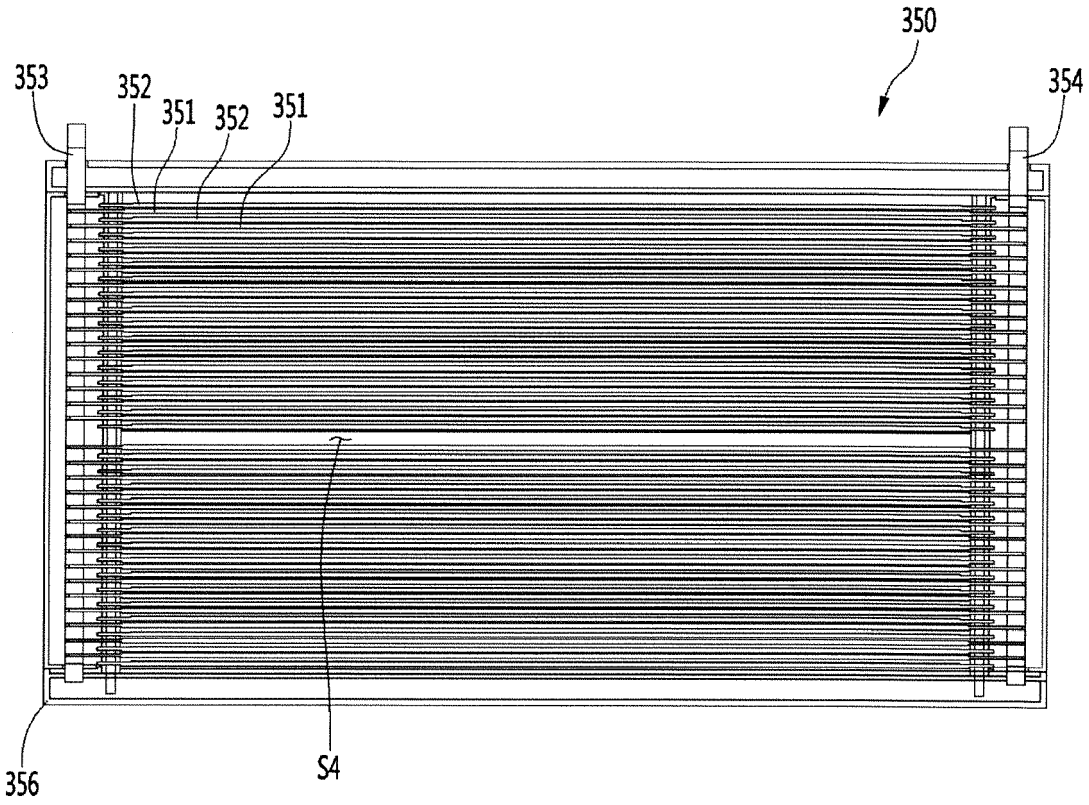

Fig.12

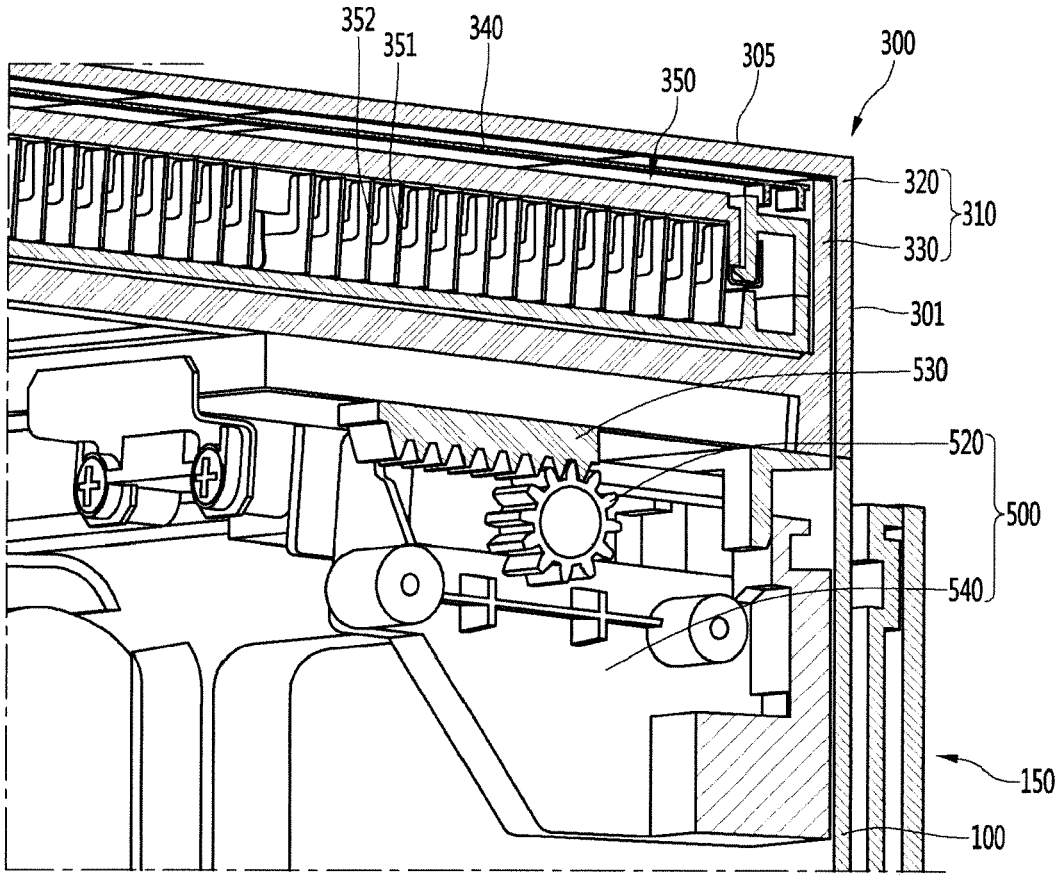

Fig.13

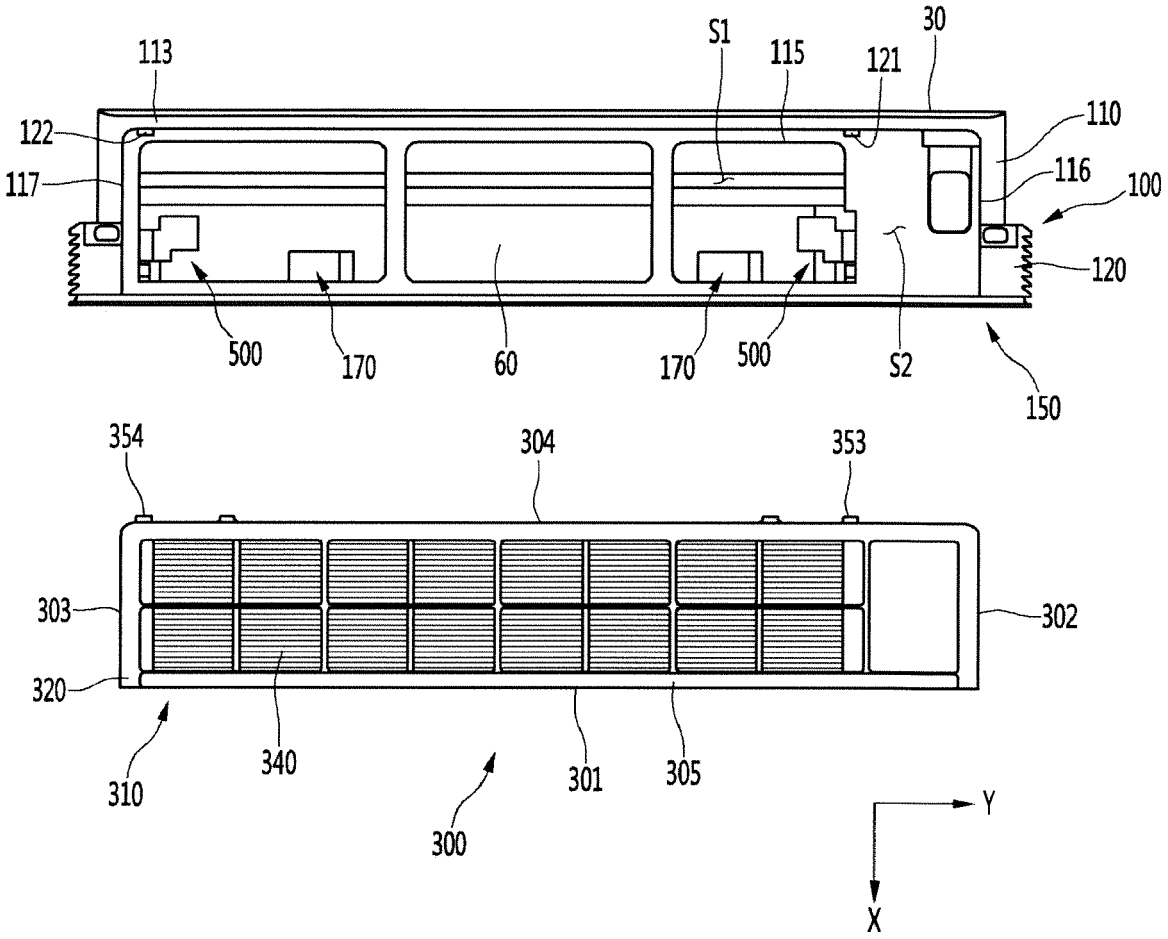
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Fig.14

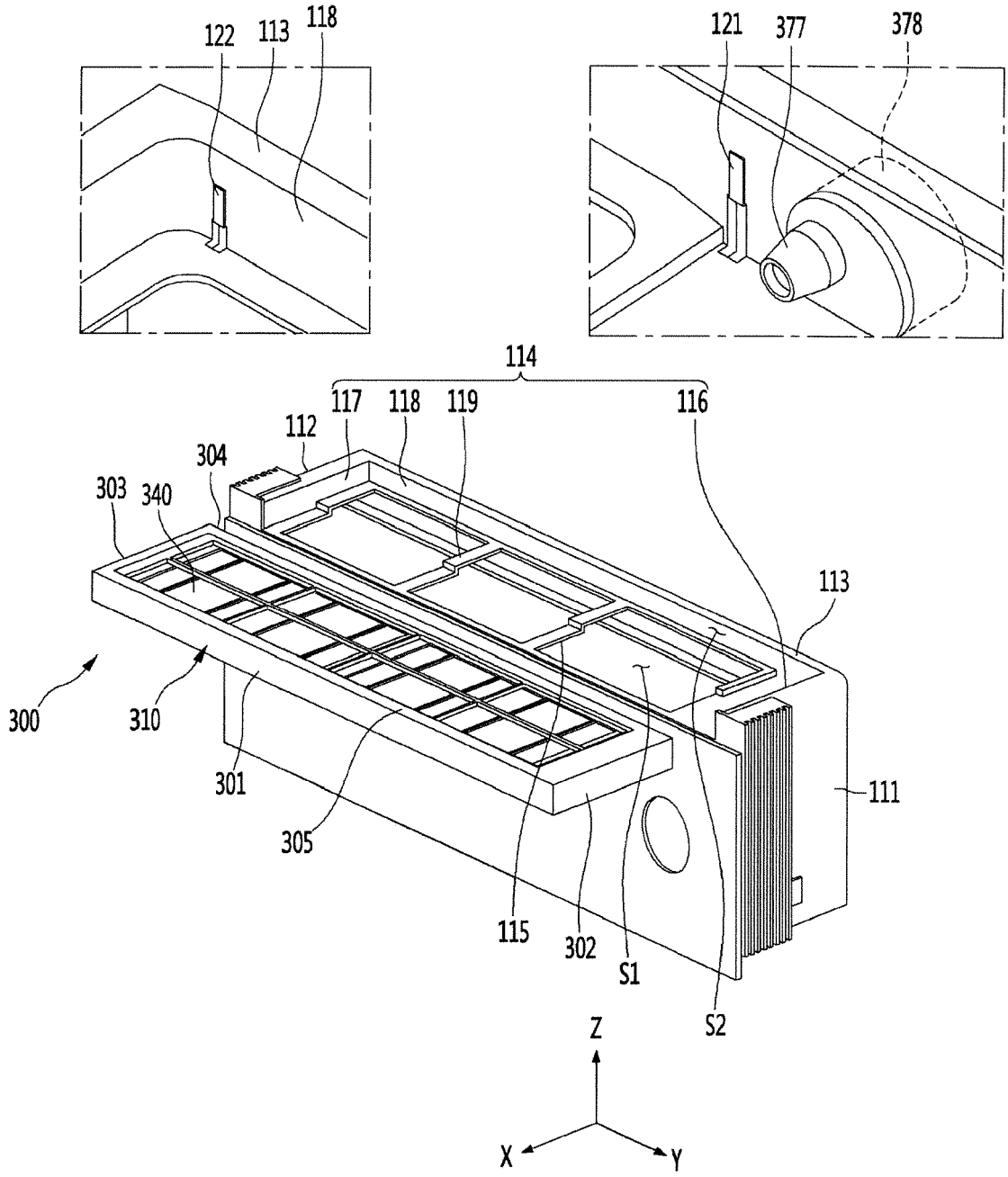
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Fig.15

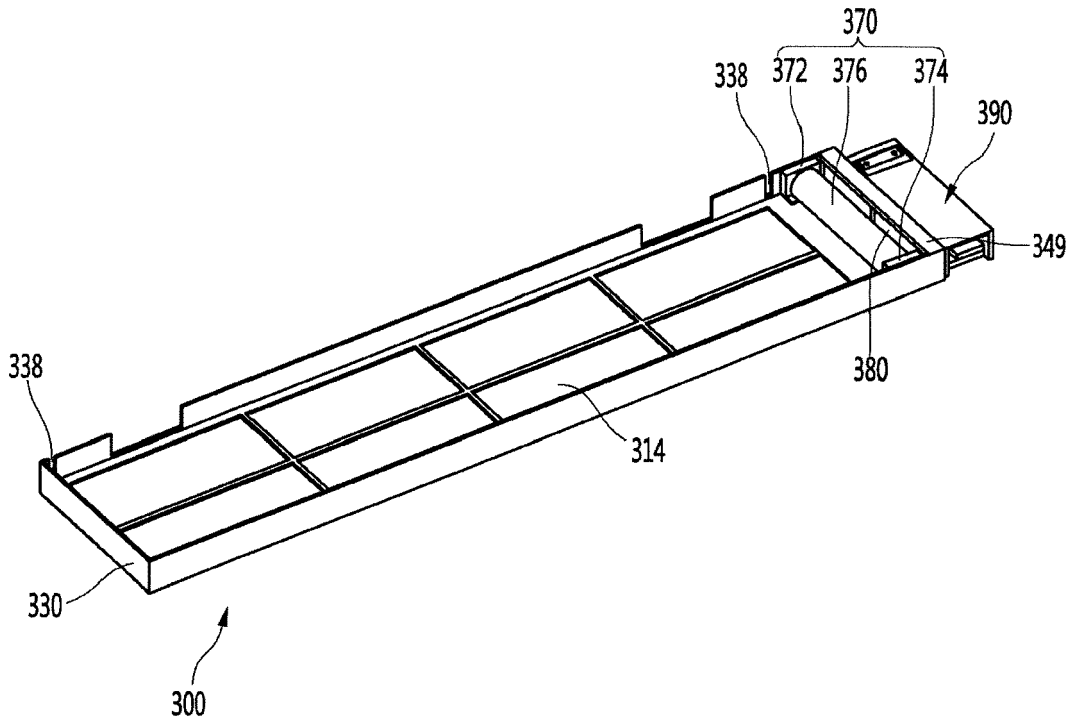

Fig.16

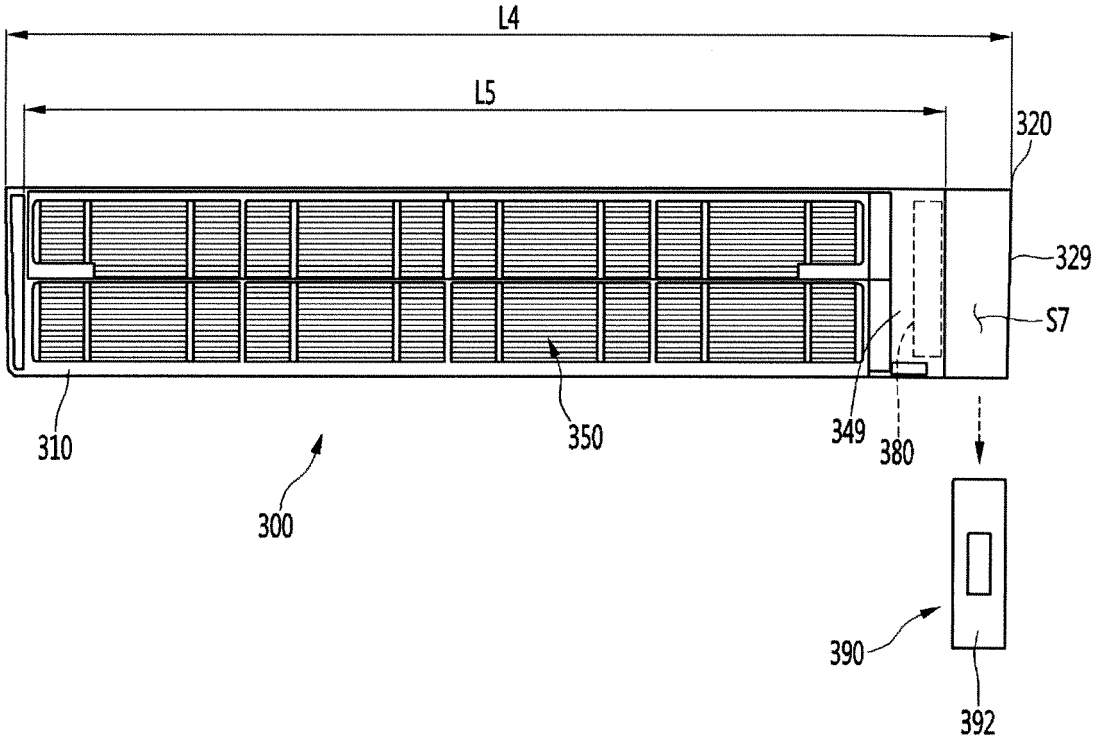

Fig.17

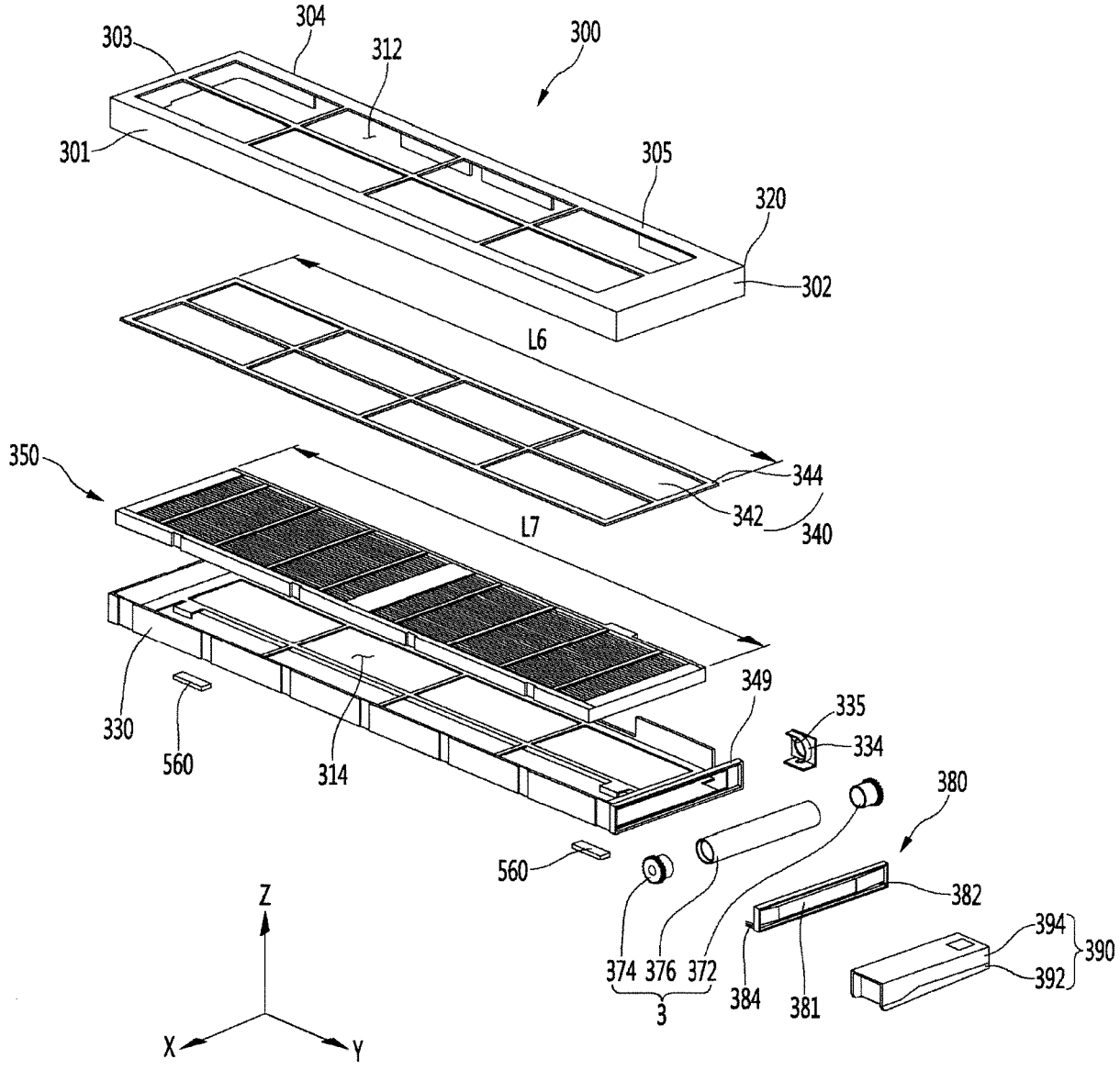
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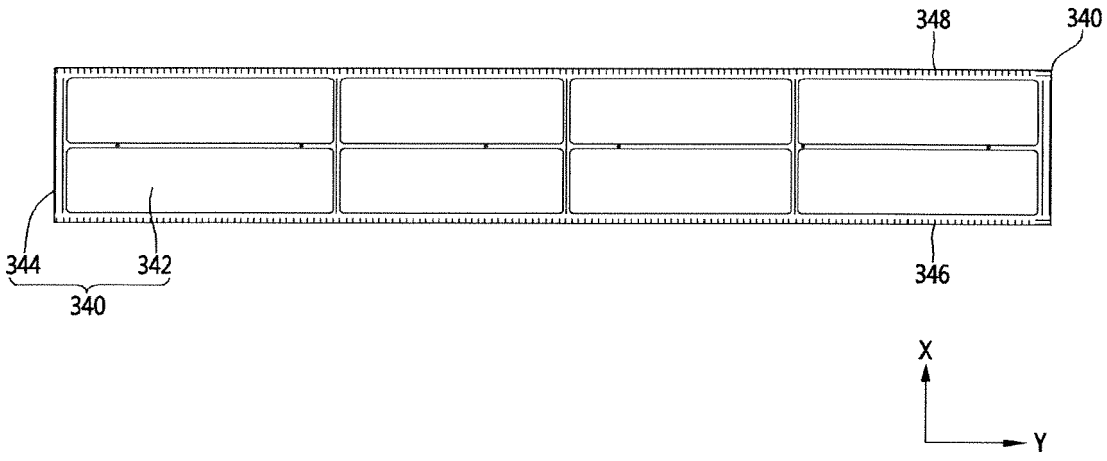
Fig.18



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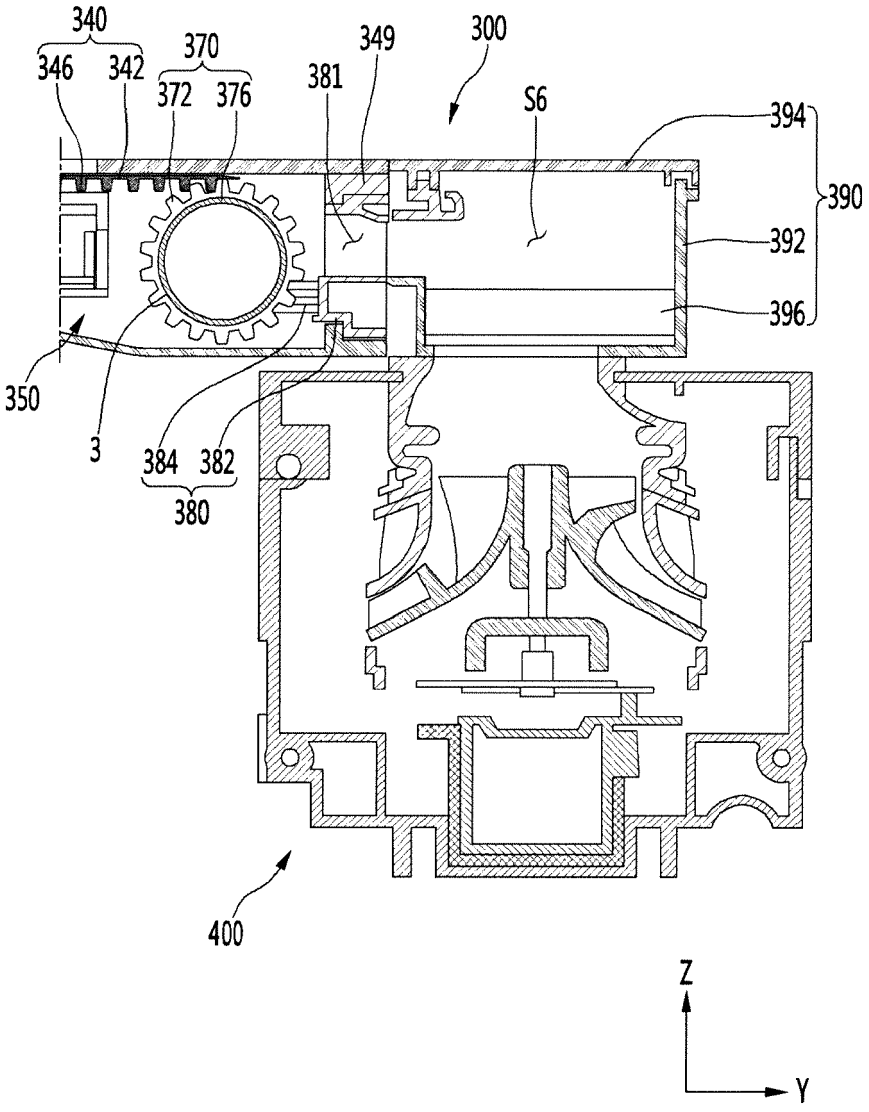
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Fig.20

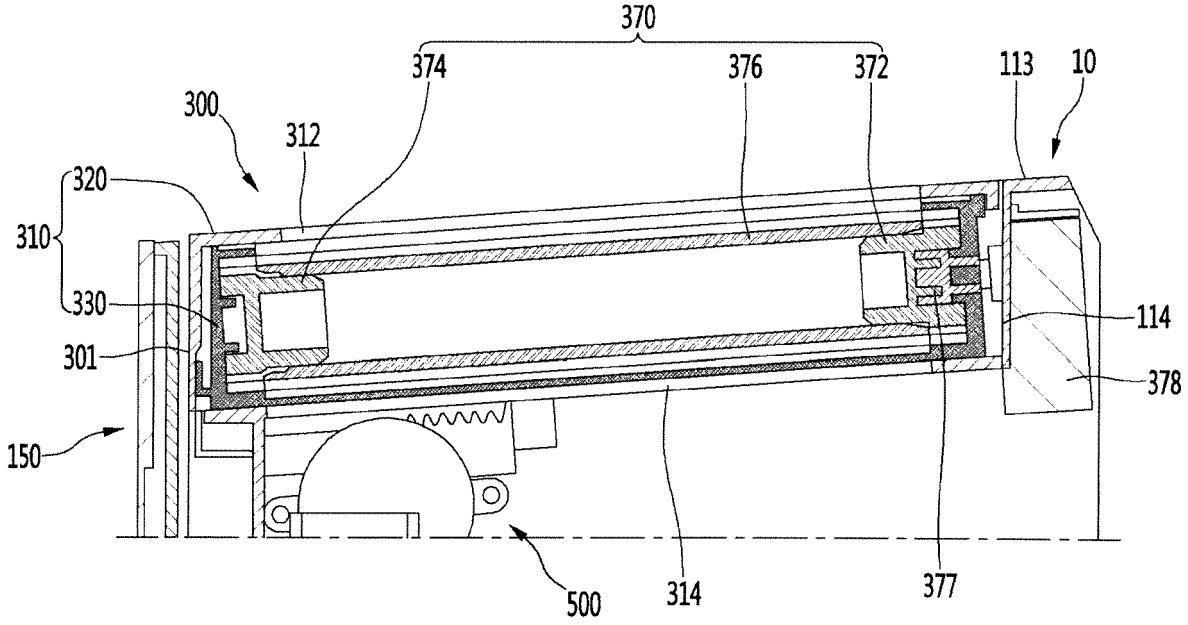
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Fig.21

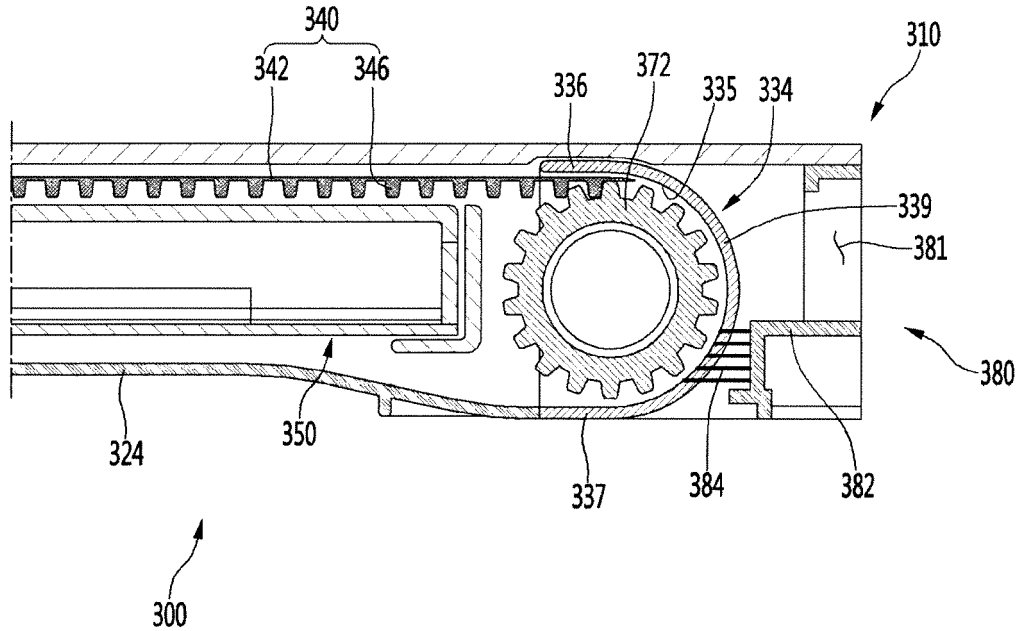
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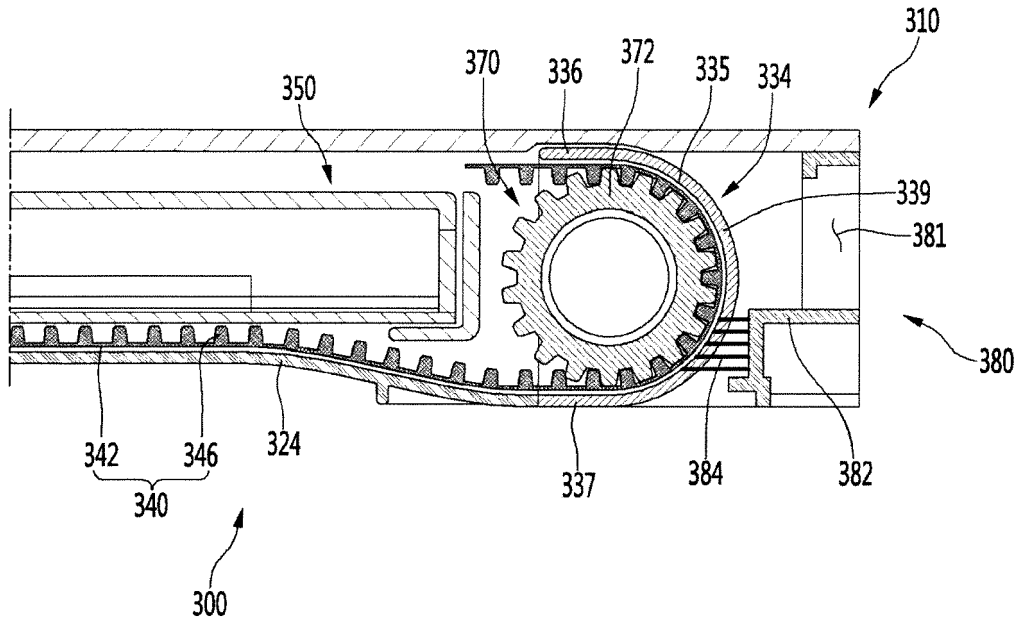
Fig.22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EUROPEAN SEARCH REPORT

Application Number
EP 20 15 3814

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X	EP 2 251 616 A1 (DAIKIN IND LTD [JP]) 17 November 2010 (2010-11-17) * paragraph [0005] - paragraph [0090] * * figures *	1	
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	3 June 2020	Mattias Grenbäck

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