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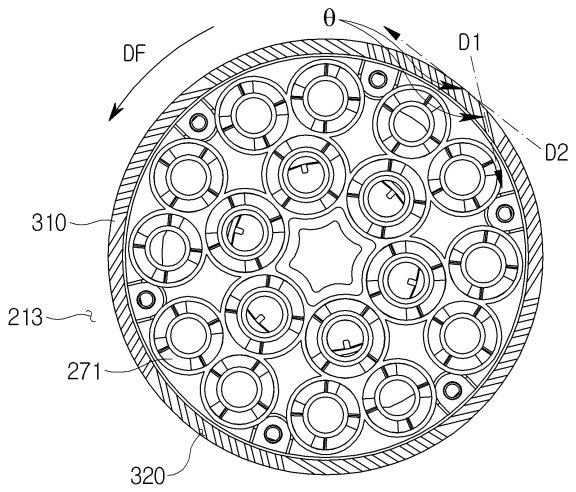
(54) CLEANER AND CLEANER SYSTEM

(57) The present disclosure relates to a cleaner and a cleaner system, the cleaner including a dust bin, a suction part configured to guide air into the dust bin, a suction motor configured to generate a suction force so that air is sucked through the suction part, a cyclone part configured to separate dust from air by generating a cyclone flow in the air sucked through the suction part, and a filter part configured to filter air discharged from the cyclone part, in which the filter part includes a filter body disposed in the dust bin and having an outer periphery along which the cyclone flow is generated, and filter holes configured to guide air into the filter body, and in which the air is introduced into the filter body through the filter holes in a state in which the air is inclined in a reverse direction to a flow direction of the cyclone flow generated at an inlet side of the filter hole, thereby preventing hairs from being caught by the filter holes.

[FIG. 19]



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Description

[Technical Field]

[0001] The present disclosure relates to a cleaner and a cleaner system, and more particularly, to a cleaner and a cleaner system that may prevent hairs from being trapped in holes of a mesh net of a dust bin.

[Background Art]

[0002] In general, a cleaner refers to an electrical appliance that draws in small garbage or dust by sucking air using electricity and fills a dust bin provided in a product with the garbage or dust. Such a cleaner is generally called a vacuum cleaner.

[0003] The cleaners may be classified into a manual cleaner which is moved directly by a user to perform a cleaning operation, and an automatic cleaner which performs a cleaning operation while autonomously traveling. Depending on the shape of the cleaner, the manual cleaners may be classified into a canister cleaner, an upright cleaner, a handy cleaner, a stick cleaner, and the like.

[0004] The canister cleaners were widely used in the past as household cleaners. However, recently, there is an increasing tendency to use the handy cleaner and the stick cleaner in which a dust bin and a cleaner main body are integrally provided to improve convenience of use.

[0005] In the case of the canister cleaner, a main body and a suction port are connected by a rubber hose or pipe, and in some instances, the canister cleaner may be used in a state in which a brush is fitted into the suction port.

[0006] The handy cleaner (hand vacuum cleaner) has maximized portability and is light in weight. However, because the handy cleaner has a short length, there may be a limitation to a cleaning region. Therefore, the handy cleaner is used to clean a local place such as a desk, a sofa, or an interior of a vehicle.

[0007] A user may use the stick cleaner while standing and thus may perform a cleaning operation without bending his/her waist. Therefore, the stick cleaner is advantageous for the user to clean a wide region while moving in the region. The handy cleaner may be used to clean a narrow space, whereas the stick cleaner may be used to clean a wide space and also used to a high place that the user's hand cannot reach. Recently, modularized stick cleaners are provided, such that types of cleaners are actively changed and used to clean various places.

[0008] FIG. 1 is a cross-sectional view illustrating a state in which cyclone flows occur in a dust bin of a cleaner in the related art.

[0009] With reference to FIG. 1, in the cleaner in the related art, sucked air generates cyclone flows in a first cyclone part 20 and is introduced into a second cyclone part 30 by a suction force of a suction motor. During this process, the air is introduced through filter holes 41 of a filter part 40 configured to surround the second cyclone part 30.

[0010] However, because a direction D10 in which the air is introduced into the second cyclone part 30 through the filter hole 41 and a direction D20 in which the cyclone flow propagates from an inlet side of the filter hole 41 are orthogonal to each other, hairs, which move around an outer side of the filter part 40 along the cyclone flow, are frequently caught by the filter hole 41.

[0011] For this reason, there is a problem in that the filter hole 41 is clogged by hairs, which decreases a suction force of the cleaner.

[0012] In addition, because hairs are caught by the filter hole 41 without being withdrawn from the filter hole 41, there is an inconvenience of a user having to separate the cleaner and remove the hairs all the time.

[0013] In addition, because hairs are caught by the filter hole 41, hygiene issues may occur, and an offensive odor is caused by residues caught by the hairs.

[0014] As a patent document in the related art, International Patent Publication No. 2012-113782 discloses "Filter Unit for Vacuum Cleaner".

[0015] In the patent document in the related art, corrugations are formed in a longitudinal direction of a filter main body in order to increase a contact area between the filter main body and dust-containing air.

[0016] However, in the patent document in the related art, the corrugations formed in the longitudinal direction of the filter main body are configured to improve the efficiency of a filter part by increasing the contact area between the filter main body and the dust-containing air, but there is no effect of preventing a decrease in suction force of the cleaner by removing hairs caught by the filter unit.

[Disclosure]

[Technical Problem]

[0017] The present disclosure has been made in an effort to solve the above-mentioned problem, and an object of the present disclosure is to prevent hair from being caught by a filter hole.

[0018] Another object of the present disclosure is to prevent a decrease in suction force of a cleaner by preventing hair from being caught by a filter hole.

[0019] Still another object of the present disclosure is to eliminate an inconvenience of a user having to separate a cleaner and remove hair all the time.

[0020] Yet another object of the present disclosure is to maintain a clean, hygienic state in a dust bin.

[0021] Still yet another object of the present disclosure is to prevent the occurrence of an offensive odor caused by the decay of residues tangled in hairs in a dust bin.

[Technical Solution]

[0022] In order to achieve the above-mentioned object,

the present disclosure provides a cleaner including: a dust bin; a suction part configured to guide air into the dust bin; a suction motor configured to generate a suction force so that air is sucked through the suction part; a cyclone part configured to separate dust from air by generating a cyclone flow in the air sucked through the suction part; and a filter part configured to filter air discharged from the cyclone part, in which the filter part includes: a filter body disposed in the dust bin and having an outer periphery along which the cyclone flow is generated; and filter holes configured to guide air into the filter body, and in which the air is introduced into the filter body through the filter holes in a state in which the air is inclined in a reverse direction to a flow direction of the cyclone flow generated at an inlet side of the filter hole.

[0023] An angle between a direction in which the air is introduced into the filter body through the filter hole and the flow direction of the cyclone flow generated at the inlet side of the filter hole may be an obtuse angle.

[0024] An angle between a first direction, which is an inward direction of a central axis of the filter hole, and a second direction, which is a tangential direction of the cyclone flow intersecting the central axis, may be an obtuse angle.

[0025] The angle may be 110 to 150 degrees.

[0026] An inner surface of the filter hole may be inclined in a reverse direction to the flow direction of the cyclone flow generated at the inlet side of the filter hole.

[0027] A first intersection line region, in which the inner surface of the filter hole and an outer surface of the filter body intersect each other, may be disposed to be biased in the flow direction of the cyclone flow in comparison with a second intersection line region in which the inner surface of the filter hole and an inner surface of the filter body intersect each other.

[0028] A first through-line, which penetrates the first intersection line region in a direction perpendicular to the flow direction of the cyclone flow, and a second through-line, which penetrates the second intersection line region in the direction perpendicular to the flow direction of the cyclone flow, may penetrate the filter body.

[0029] The filter body may be made of at least any one material selected from plastic and metal.

[0030] The filter holes may be provided as a plurality of filter holes formed in a longitudinal direction along the outer periphery of the filter body.

[0031] Central axes of at least some of the plurality of filter holes may be parallel to one another.

[0032] Angles of some of the plurality of filter holes may be different from angles of some of the other filter holes.

[0033] The cyclone flow may include at least one bent point at which the flow direction changes from a direction in which the cyclone flow flows along an outer side of the filter body to a direction in which the cyclone flow is introduced into the filter body through the filter hole.

[0034] The air may pass through the filter hole in a state in which the air is inclined in the reverse direction to the flow direction of the cyclone flow generated at the inlet side of the filter hole.

[0035] In order to achieve the above-mentioned object, the present disclosure provides a cleaner system including: a cleaner including a dust bin, and a suction part configured to guide air into the dust bin; and a cleaner station including a housing in which a coupling part onto which the cleaner is seated and coupled is disposed, a dust collecting part accommodated in the housing and configured to capture dust in the dust bin, a flow path part configured to connect the dust collecting part and a dust passage hole formed in the coupling part, and a dust collecting motor disposed below the dust collecting part and configured to generate a suction force so that the dust is introduced into the dust collecting part through the flow path part, in which the cleaner includes: a cyclone part configured to separate dust from air sucked by the suction part by means of a cyclone flow generated by a suction force of the dust collecting motor; and a filter part configured to filter air discharged from the cyclone part, in which the filter part includes: a filter body disposed in the dust bin and having an outer periphery along which the cyclone flow is generated; and filter holes configured to guide air into the filter body, and in which the air is introduced into the filter body through the filter hole in a state in which the air is inclined in a reverse direction to a flow direction of the cyclone flow generated at an inlet side of the filter hole.

[0036] An angle between a direction in which the air is introduced into the filter body through the filter hole and the flow direction of the cyclone flow generated at the inlet side of the filter hole may be an obtuse angle.

[0037] An angle between a first direction, which is an inward direction of a central axis of the filter hole, and a second direction, which is a tangential direction of the cyclone flow intersecting the central axis, may be an obtuse angle.

[0038] The angle may be 110 to 150 degrees.

[Advantageous Effects]

[0039] According to the cleaner and the cleaner system according to the present disclosure described above, it is possible to prevent hairs, which move around the outer side of the filter part along the cyclone flow, from being caught by the filter hole.

[0040] In addition, it is possible to prevent hairs caught by the filter hole from decreasing the suction force of the cleaner.

[0041] In addition, it is possible to prevent hairs from being deeply caught by the filter hole, such that it is possible to remove the hairs caught by the filter hole by using the suction force of the cleaner station when the cleaner is coupled to the cleaner station.

[0042] In addition, in case that the suction motor of the cleaner or the dust collecting motor of the cleaner station operates, it is possible to easily remove hairs caught by the filter hole.

[0043] In addition, hairs are not caught by the filter hole,

such that a clean, hygienic state may be maintained in the dust bin.

[0044] In addition, hairs do not remain in the dust bin, such that it is possible to prevent the occurrence of an offensive odor caused by the decay of residues tangled in hairs.

[Description of Drawings]

[0045]

FIG. 1 is a cross-sectional view illustrating a state in which cyclone flows occur in a dust bin of a cleaner in the related art.

FIG. 2 is a perspective view of a cleaner system including a cleaner station and a cleaner according to an embodiment of the present disclosure.

FIG. 3 is a schematic view illustrating a configuration of the cleaner system according to the embodiment of the present disclosure.

FIGS. 4 and 5 are views for explaining the cleaner of the cleaner system according to the embodiment of the present disclosure.

FIG. 6 is a view for explaining a lower side of a dust bin of the cleaner according to the embodiment of the present disclosure.

FIG. 7 is a side view of the cleaner according to the embodiment of the present disclosure.

FIG. 8 is a cross-sectional view taken along line A-A' in FIG. 7.

FIG. 9 is a cross-sectional view taken along line B-B' in FIG. 8.

FIG. 10 is an exploded view of the cleaner according to the embodiment of the present disclosure.

FIG. 11 is a view for explaining a coupling part of the cleaner station according to the embodiment of the present disclosure.

FIG. 12 is an exploded perspective view for explaining a fixing unit of the cleaner station according to the embodiment of the present disclosure.

FIGS. 13 and 14 are views for explaining a relationship between the cleaner and a door unit in the cleaner station according to the embodiment of the present disclosure.

FIG. 15 is a view for explaining a relationship between the cleaner and a cover opening unit in the cleaner station according to the embodiment of the present disclosure.

FIG. 16 is a block diagram for explaining a control configuration of the cleaner system according to the embodiment of the present disclosure.

FIG. 17 is a perspective view for explaining a filter part of the cleaner according to the embodiment of the present disclosure.

FIG. 18 is a cross-sectional perspective view for explaining filter holes of the cleaner according to the embodiment of the present disclosure.

FIG. 19 is a cross-sectional front view for explaining the filter holes of the cleaner according to the embodiment of the present disclosure.

FIG. 20 is an enlarged view for explaining an angle between a central axis of the filter hole and a tangent line of a cyclone flow in the cleaner according to the embodiment of the present disclosure.

FIG. 21 is a view for explaining angles defined between a plurality of filter holes in the cleaner according to the embodiment of the present disclosure.

FIGS. 22 and 23 are enlarged views for explaining the filter holes of the cleaner according to the embodiment of the present disclosure.

FIG. 24 is a perspective view for explaining a filter part of a cleaner according to another embodiment of the present disclosure.

[Mode for Invention]

[0046] Hereinafter, exemplary embodiments of the present disclosure will be described in detail with reference to the accompanying drawings.

[0047] The present disclosure may be variously modified and may have various embodiments, and particular embodiments illustrated in the drawings will be specifically described below. The description of the embodiments is not intended to limit the present disclosure to the particular embodiments, but it should be interpreted that the present disclosure is to cover all modifications, equivalents and alternatives falling within the spirit and technical scope of the present disclosure.

[0048] The terminology used herein is used for the purpose of describing particular embodiments only and is not intended to limit the present disclosure. Singular expressions may include plural expressions unless clearly described as different meanings in the context.

[0049] Unless otherwise defined, all terms used herein, including technical or scientific terms, may have the same meaning as commonly understood by those skilled in the art to which the present disclosure pertains. The terms such as those defined in a commonly used dictionary may be interpreted as having meanings consistent with meanings in the context of related technologies and may not be interpreted as ideal or excessively formal meanings unless explicitly defined in the present application.

[0050] FIG. 2 is a perspective view illustrating a cleaner system including a cleaner station and a cleaner according to an embodiment of the present disclosure, and FIGS. 3 to 5 are schematic views illustrating configurations of the cleaner system according to various embodiments of the present disclosure.

[0051] With reference to FIGS. 2 and 3, a cleaner system 10 according to an embodiment of the present disclosure may include a cleaner station 100 and a cleaner 200.

[0052] The cleaner system 10 may include the cleaner station 100. The cleaner 200 may be coupled to the cleaner station 100. Specifically, a main body of the

cleaner 200 may be coupled to a lateral surface of the cleaner station 100. The cleaner station 100 may remove dust from a dust bin 220 of the cleaner 200.

[0053] Meanwhile, FIGS. 4 and 5 are views for explaining the cleaner of the cleaner system according to the embodiment of the present disclosure, FIG. 6 is a view for explaining a lower side of the dust bin of the cleaner according to the embodiment of the present disclosure, FIG. 7 is a side view of the cleaner according to the embodiment of the present disclosure, FIG. 8 is a cross-sectional view taken along line A-A' in FIG. 7, FIG. 9 is a cross-sectional view taken along line B-B' in FIG. 8, and FIG. 10 is an exploded view of the cleaner according to the embodiment of the present disclosure.

[0054] A structure of the cleaner 200 will be described below with reference to FIGS. 4 to 10.

[0055] The cleaner 200 may mean a cleaner configured to be manually operated by the user. For example, the cleaner 200 may mean a handy cleaner or a stick cleaner.

[0056] The cleaner 200 may be mounted on the cleaner station 100. The cleaner 200 may be supported by the cleaner station 100. The cleaner 200 may be coupled to the cleaner station 100.

[0057] Meanwhile, in the embodiment of the present disclosure, directions of the cleaner 200 may be defined on the basis of when a bottom surface (lower surface) of the dust bin 220 and a bottom surface (lower surface) of a battery housing 230 are placed on the ground surface.

[0058] In this case, a forward direction may mean a direction in which a suction part 212 is disposed based on a suction motor 214, and a rearward direction may mean a direction in which a handle 216 is disposed based on the suction motor 214. Further, based on a state in which the suction part 212 is viewed from the suction motor 214, a rightward direction may refer to a direction in which a component is disposed at the right, and a left direction may refer to a direction in which a component is disposed at the left. In addition, in the embodiment of the present disclosure, upper and lower sides may be defined in a direction perpendicular to the ground surface based on the state in which the bottom surface (lower surface) of the dust bin 220 and the bottom surface (lower surface) of the battery housing 230 are placed on the ground surface.

[0059] The cleaner 200 may include a main body 210. The main body 210 may include a main body housing 211, the suction part 212, a cyclone part 213, the suction motor 214, an air discharge cover 215, the handle 216, and an operating part 218.

[0060] The main body housing 211 may define an external appearance of the cleaner 200. The main body housing 211 may provide a space that may accommodate the suction motor 214 and a filter (not illustrated) therein. The main body housing 211 may be formed in a shape similar to a cylindrical shape.

[0061] The suction part 212 may protrude outward from the main body housing 211. For example, the suction part 212 may be formed in a cylindrical shape with an opened inside. The suction part 212 may be coupled to an extension tube 250. The suction part 212 may provide a suction flow path 212a in which air containing dust may flow.

[0062] Meanwhile, in the present embodiment, an imaginary line may be defined to penetrate the inside of the suction part 212 having a cylindrical shape. In this case, the imaginary line may mean a longitudinal axis a1 of the suction flow path.

[0063] The cyclone part 213 may communicate with the suction part 212. The cyclone part 213 may separate dust sucked into the cyclone part 213 through the suction part 212. A space in the cyclone part 213 may communicate with a space in the dust bin 220.

[0064] The cyclone part 213 may be provided as at least one cyclone part capable of separating dust by using a cyclone flow. The cyclone part 213 may communicate with the suction part 212. The cyclone part 30 adopts a principle of a dust collector using a centrifugal force to separate the dust sucked into the main body 210 through the suction part 212. That is, the cyclone part 213 may mean a partial region of the space in the dust bin 220.

[0065] For example, the cyclone flow generated by the cyclone part 213 may be generated by a suction force generated by the suction motor 214.

[0066] As another example, the cyclone flow generated by the cyclone part 213 may be generated by a suction force generated by a dust collecting motor 191.

[0067] That is, the cyclone flow generated by the cyclone part 213 may be generated by a suction force of the suction motor 214 in case that the cleaner 200 is used singly. Alternatively, the cyclone flow generated by the cyclone part 213 may be generated by a suction force of the dust collecting motor 191 in case that the cleaner 200 is coupled to the cleaner station 100.

[0068] Meanwhile, the cyclone flow may be generated between an inner side of the dust bin 220 and an outer side of a filter body 310. The cyclone flow may be generated between an inner peripheral surface of the cyclone part 213 and an outer peripheral surface of the filter body 310.

[0069] A space in the cyclone part 213 may communicate with the suction part 212. The air and dust sucked through the suction part 212 may flow along the inner peripheral surface of the cyclone part 213, such that the cyclone flow may be generated in the internal space of the cyclone part 213.

[0070] For example, the cyclone flow generated by the cyclone part 213 may be generated in a circular shape and surround an outer periphery of the filter body 310. That is, the air sucked through the suction part 212 may flow in a circular shape along the outer peripheral surface of the filter body 310 based on a central axis a5 of the filter body 310, such that the cyclone flow may be generated in the internal space of the cyclone part 213.

[0071] Specifically, in case that an axis a4 of the cyclone flow is disposed perpendicularly to a gravitational

lower side, the air sucked through the suction part 212 may flow in a circular shape along the outer peripheral surface of the filter body 310 based on the central axis a5 of the filter body 310. Alternatively, in case that the axis a4 of the cyclone flow is disposed in parallel with the ground surface, the air sucked through the suction part 212 may flow in a circular shape along the outer peripheral surface of the filter body 310 based on the central axis a5 of the filter body 310.

[0072] As another example, the cyclone flow generated by the cyclone part 213 may be generated in a spiral shape along the outer periphery of the filter body 310. That is, the air sucked through the suction part 212 may flow spirally along the outer periphery of the filter body 310, such that the cyclone flow may be generated in the internal space of the cyclone part 213. Therefore, the cyclone flow may be generated in the internal space of the cyclone part 213.

[0073] Specifically, in case that the axis a4 of the cyclone flow is disposed to be inclined with respect to the ground surface, the air sucked through the suction part 212 may flow in a spiral shape along the outer periphery of the filter body 310. Alternatively, in case that the cleaner 200 is coupled to the cleaner station 100 and the dust bin and a hole 121a are opened, the air sucked through the suction part 212 may flow in a spiral shape along the outer periphery of the filter body 310 by the suction force of the dust collecting motor 191.

[0074] Meanwhile, the cleaner 200 may include a cyclone module 270 configured to separate dust again from the air discharged from the cyclone part 213. In this case, the cyclone module 270 may be positioned in the cyclone part 213 so that a size of the cleaner 200 is minimized. Specifically, the cyclone module 270 may be disposed in a filter part 300. That is, the cyclone part 213 and the cyclone module 270 may be disposed in the dust bin 220 with the filter part 300 interposed therebetween.

[0075] The cyclone module 270 may include a plurality of cyclone bodies 271 disposed in parallel. Therefore, the air discharged from the cyclone part 213 may pass through the filter part 300 and be separated and pass through the plurality of cyclone bodies 271.

[0076] As another example, the cyclone module 270 may include a single cyclone body 271. Even in this case, the axis of the cyclone flow in the cyclone module 270 may extend in an upward/downward direction.

[0077] In addition, the axis of the cyclone flow in the cyclone module 270 may also extend in the upward/-downward direction. The axis of the cyclone flow in the cyclone part 213 and the axis of the cyclone flow in the cyclone module 270 may be disposed coaxially in the upward/downward direction and collectively called the axis a4 of the cyclone flow in the cyclone part 213.

[0078] A storage unit 280 may be disposed in the dust bin 220 and store dust separated by the cyclone module 270. The storage unit 280 may be coupled to a lower side of the cyclone module 270 and provided to be in contact with an upper surface of a discharge cover 222. A lower side of the storage unit 280 may be opened.

[0079] The storage unit 280 may divide the space in the dust bin 220 into a first dust storage portion 220a configured to store dust separated by the cyclone part 213, and a second dust storage portion 280a configured to store dust separated by the cyclone module 270.

[0080] Therefore, a lower internal space of the storage unit 280 may be defined as the second dust storage portion 280a, and a space between the storage unit 280 and the dust bin 220 may be defined as the first dust storage portion 220a.

[0081] The discharge cover 222 may open or close both the first dust storage portion 220a and the second dust storage portion 280a. That is, the first dust storage portion 220a and the second dust storage portion 280a may be exposed to the outside together.

[0082] The suction motor 214 may generate a suction force for sucking air. The suction motor 214 may be accommodated in the main body housing 211. The suction motor 214 may generate the suction force while rotating. For example, the suction motor 214 may be formed in a shape similar to a cylindrical shape.

[0083] In this case, the cyclone flow may be generated by the suction force of the suction motor 214.

[0084] Specifically, in case that the suction motor 214 operates, the air sucked through the suction part 212 by the suction force of the suction motor 214 may generate the cyclone flow in the cyclone part 213.

[0085] Meanwhile, in the present embodiment, an imaginary rotation axis a2 of the suction motor may be formed by extending a rotation axis of the suction motor 214.

[0086] The suction part 212 may be coupled to the main body 210 so that an approximately central portion of the suction part 212 is positioned on a boundary portion between the dust bin 220 and the main body housing 211.

[0087] The suction motor 214 may be positioned in the main body housing 211. Further, at least a part of the suction motor 214 may be positioned above the cyclone part 213. Therefore, the suction motor 214 may be positioned above the dust bin 220.

[0088] The suction motor 214 may communicate with a discharge port of the cyclone module 270.

[0089] To this end, in the main body housing 211, a discharge guide 291b may be connected to the cyclone module 270, and a flow guide 291a may communicate with the discharge guide 291b.

[0090] For example, the discharge guide 291b may be positioned above the cyclone module 270, and the flow guide 291a may be positioned above the discharge guide 291b.

[0091] Further, at least a part of the suction motor 214 is positioned in the flow guide 291a.

[0092] Therefore, the axis a4 of the cyclone flow in the cyclone part 213 may penetrate the suction motor 214.

[0093] In the embodiment of the present disclosure, when the suction motor 214 is positioned above the cyclone module 270, the air discharged from the cyclone

module 270 may flow immediately toward the suction motor 214, such that a flow path between the cyclone part 213 and the suction motor 214 may be minimized.

[0094] The suction motor 214 may include an impeller 214a configured to perform a rotational operation. The impeller 214a may be connected to a shaft 214b. The shaft 214b is disposed to extend in the upward/downward direction.

[0095] In addition, the impeller 214a may be disposed above the suction motor 214. In this case, the impeller 214a may allow the air to flow from above to below based on the suction motor 214.

[0096] The rotation axis of the impeller 214a and the axis a4 of the cyclone flow generated by the cyclone part 213 may be disposed on the same line.

[0097] According to the embodiment of the present disclosure, a route along which the air discharged from the cyclone part 213, i.e., the air discharged upward from the cyclone module 270 flows toward the suction motor 214 may be reduced, and the change in direction of the air may be reduced, such that a flow loss of air may be reduced.

[0098] In case that the flow loss of air is reduced, the suction force may be increased, the suction efficiency may be improved, and the amount of time of use of a battery 9 for supplying power to the suction motor 214 may be increased.

[0099] The cleaner 200 may further include motor housings 292 configured to support the suction motor 214.

[0100] The motor housings 292a and 292b may include an upper motor housing 292a configured to cover a part of an upper side of the suction motor 214, and a lower motor housing 292b configured to cover a part of a lower side of the suction motor 214. The suction motor 214 may be accommodated in the motor housings 292a and 292b, and the flow guide 291a may be disposed to surround the motor housings 292a and 292b.

[0101] At least a part of the flow guide 291a may be spaced apart from the motor housings 292a and 292b. In addition, at least a part of the flow guide 291a is spaced apart from the main body housing 211.

[0102] Therefore, an inner peripheral surface of the flow guide 291a and an outer peripheral surface of the upper motor housing 292a may define a first air flow path 211a, and an outer peripheral surface of the flow guide 291a and an inner peripheral surface of the main body housing 211 may define a second air flow path 211b.

[0103] According to the embodiment of the present disclosure, the single flow guide 291a may define the plurality of air flow paths, i.e., the first air flow path 211a and the second air flow path 211b, and the number of components for defining the air flow paths may be reduced, such that the structure may be simplified.

[0104] The air discharged from the cyclone module 270 may flow to the suction motor 214 along the first air flow path 211a, and the air discharged from the suction motor 214 may flow along the second air flow path 211b and then be discharged to the outside. Therefore, the first air flow path 211a serves as a suction flow path, and the second air flow path 211b serves as a discharge flow path.

[0105] The air discharge cover 215 may be disposed at one side of the main body housing 211 based on an axial direction. The air discharge cover 215 may accommodate the filter for filtering air. For example, an HEPA filter may be accommodated in the air discharge cover 215.

[0106] The air discharge cover 215 may have an air discharge port for discharging the air introduced by the suction force of the suction motor 214. The flow guide 291a and the discharge guide 291b may guide a flow of the air to be discharged through the air discharge port.

[0107] The handle 216 may be gripped by the user. The handle 216 may be disposed rearward of the suction motor 214. For example, the handle 216 may be formed in a shape similar to a cylindrical shape. Alternatively, the handle 216 may be formed in a curved cylindrical shape. The handle 216 may be disposed at a predetermined angle with respect to the main body housing 211, the suction motor 214, or the cyclone part 213.

[0108] The handle 216 may include a grip portion formed in a column shape so that the user may grasp the grip portion, a first extension portion connected to one end of the grip portion based on the longitudinal direction (axial direction) of the grip portion and extending toward the suction motor 214, and a second extension portion connected to the other end of the grip portion based on the longitudinal direction (axial direction) of the grip portion and extending toward the dust bin 220.

[0109] Meanwhile, in the present embodiment, an imaginary grip portion through axis a3 may be formed to extend in the longitudinal direction of the grip portion (the axial direction of the column) and penetrate the grip portion.

[0110] For example, the grip portion through axis a3 may be an imaginary line formed in the handle 216 having a cylindrical shape, that is, an imaginary line formed in parallel with at least a part of an outer surface (outer circumferential surface) of the grip portion.

[0111] An upper side of the handle 216 may define an external appearance of a part of an upper side of the cleaner 200. Therefore, it is possible to prevent a component of the cleaner 200 from coming into contact with the user's arm when the user grips the handle 216.

[0112] The first extension portion may extend from the grip portion toward the main body housing 211 or the suction motor 214. At least a part of the first extension portion may extend in a horizontal direction.

[0113] The second extension portion may extend from the grip portion toward the dust bin 220. At least a part of the second extension portion may extend in the horizontal direction.

[0114] The operating part 218 may be disposed on the handle 216. The operating part 218 may be disposed on an inclined surface formed in an upper region of the handle 216. The user may input a command for operating

or stopping the cleaner 200 through the operating part 218.

[0115] The cleaner 200 may include the dust bin 220. The dust bin 220 may communicate with the cyclone part 213. The dust bin 220 may store the dust separated by the cyclone part 213.

[0116] The dust bin 220 may include a dust bin main body 221, the discharge cover 222, a dust bin compression lever 223, and a compression member (not illustrated).

[0117] The dust bin main body 221 may provide a space capable of storing the dust separated by the cyclone part 213. For example, the dust bin main body 221 may be formed in a shape similar to a cylindrical shape.

[0118] Meanwhile, in the present embodiment, an imaginary dust bin through line may be formed to penetrate the inside (internal space) of the dust bin main body 221 and extend in the longitudinal direction of the dust bin main body 221 (that means the axial direction of the cylindrical dust bin main body 221).

[0119] A part of a lower side (bottom side) of the dust bin main body 221 may be opened. In addition, a lower extension portion 221a may be formed at the lower side (bottom side) of the dust bin main body 221. The lower extension portion 221a may be formed to block a part of the lower side of the dust bin main body 221.

[0120] The dust bin 220 may include the discharge cover 222. The discharge cover 222 may be disposed at a lower side of the dust bin 220.

[0121] The discharge cover 222 may be provided to open or close one end of the dust bin main body 221 based on the longitudinal direction. Specifically, the discharge cover 222 may selectively open or close the lower side of the dust bin 220 that is opened downward.

[0122] The discharge cover 222 may include a cover main body 222a and a hinge part 222b. The cover main body 222a may be formed to block a part of the lower side of the dust bin main body 221. The cover main body 222a may rotate downward relative to the hinge portion 222b. The hinge part 222b may be disposed adjacent to the battery housing 230. The hinge part 222b may have a torsion spring 222d. Therefore, when the discharge cover 222 is separated from the dust bin main body 221, an elastic force of the torsion spring 222d may support the cover main body 222a in a state in which the cover main body 222a is rotated by a predetermined angle or more about the hinge part 222b with respect to the dust bin main body 221.

[0123] The discharge cover 222 may be coupled to the dust bin 220 by a hook engagement. Meanwhile, the discharge cover 222 may be separated from the dust bin 220 by means of a coupling lever 222c. The coupling lever 222c may be disposed at a front side of the dust bin. Specifically, the coupling lever 222c may be disposed on an outer surface at the front side of the dust bin 220. When an external force is applied, the coupling lever 222c may elastically deform a hook, which extends from the cover main body 222a, in order to release the hook engagement between the cover main body 222a and the dust bin main body 221.

[0124] When the discharge cover 222 is closed, the lower side of the dust bin 220 may be blocked (sealed) by the discharge cover 222 and the lower extension portion 221a.

[0125] The dust bin 220 may include the dust bin compression lever 223 (see FIG. 4). The dust bin compression lever 223 may be disposed outside the dust bin 220 or the cyclone part 213. The dust bin compression lever 223 may be disposed outside the dust bin 220 or the cyclone part 213 so as to be movable upward and downward. The dust bin compression lever 223 may be connected to the compression member (not illustrated). When the dust bin compression lever 223 is moved downward by an external force, the compression member (not illustrated) may also be moved downward. Therefore, it is possible to provide convenience for the user. The compression member (not illustrated) and the dust bin compression lever 223 may return back to original positions by an elastic member (not illustrated). Specifically, when the external force applied to the dust bin compression lever 223 is eliminated, the elastic member may move the dust bin compression lever 223 and the compression member (not illustrated) upward.

[0126] The compression member (not illustrated) may be disposed in the dust bin main body 221. The compression member may move in the internal space of the dust bin main body 221. Specifically, the compression member may move upward and downward in the dust bin main body 221. Therefore, the compression member may compress downward the dust in the dust bin main body 221. In addition, when the discharge cover 222 is separated from the dust bin main body 221 and thus the lower side of the dust bin 220 is opened, the compression member may move from an upper side of the dust bin 220 to the lower side of the dust bin 220, thereby removing debris such as residual dust in the dust bin 220. Therefore, it is possible to improve the suction force of the cleaner by preventing the residual dust from remaining in the dust bin 220. Further, it is possible to remove an offensive odor caused by the residual dust by preventing the residual dust from remaining in the dust bin 220.

[0127] The cleaner 200 may include the battery housing 230. A battery 240 may be accommodated in the battery housing 230. The battery housing 230 may be disposed below the handle 216. For example, the battery housing 230 may have a hexahedral shape opened at a lower side thereof. A rear side of the battery housing 230 may be connected to the handle 216.

[0128] The battery housing 230 may include an accommodation portion opened downward. The battery 240 may be attached or detached through the accommodation portion of the battery housing 230.

[0129] The cleaner 200 may include the battery 240.

[0130] For example, the battery 240 may be separably coupled to the cleaner 200. The battery 240 may be separably coupled to the battery housing 230. For ex-

ample, the battery 240 may be inserted into the battery housing 230 from the lower side of the battery housing 230. With this configuration, the portability of the cleaner 200 may be improved.

[0131] On the contrary, the battery 240 may be integrally provided in the battery housing 230. In this case, a lower surface of the battery 240 is not exposed to the outside.

[0132] The battery 240 may supply power to the suction motor 214 of the cleaner 200. The battery 240 may be disposed below the handle 216. The battery 240 may be disposed rearward of the dust bin 220.

[0133] In case that the battery 240 is coupled to the battery housing 230 in accordance with the embodiment, the lower surface of the battery 240 may be exposed to the outside. Because the battery 240 may be placed on the floor when the cleaner 200 is placed on the floor, the battery 240 may be immediately separated from the battery housing 230. In addition, because the lower side of the battery 240 is exposed to the outside and thus in direct contact with the air present outside the battery 240, the performance in cooling the battery 240 may be improved.

[0134] Meanwhile, in case that the battery 240 is fixed integrally to the battery housing 230, the number of structures for attaching or detaching the battery 240 and the battery housing 230 may be reduced, and as a result, it is possible to reduce an overall size of the cleaner 200 and a weight of the cleaner 200.

[0135] The cleaner 200 may include the extension tube 250. The extension tube 250 may communicate with a cleaning module 260. The extension tube 250 may communicate with the main body 210. The extension tube 250 may communicate with the suction part 212 of the main body 210. The extension tube 250 may be formed in a long cylindrical shape.

[0136] The main body 210 may be connected to the extension tube 250. The main body 210 may be connected to the cleaning module 260 through the extension tube 250. The main body 210 may generate the suction force by means of the suction motor 214 and provide the suction force to the cleaning module 260 through the extension tube 250. The outside dust may be introduced into the main body 210 through the cleaning module 260 and the extension tube 250.

[0137] The cleaner 200 may include the cleaning module 260. The cleaning module 260 may communicate with the extension tube 250. Therefore, the outside air may be introduced into the main body 210 of the cleaner 200 via the cleaning module 260 and the extension tube 250 by the suction force generated in the main body 210 of the cleaner 200.

[0138] The dust in the dust bin 220 of the cleaner 200 may be captured by a dust collecting part 170 of the cleaner station 100 by gravity and the suction force of the dust collecting motor 191. Therefore, it is possible to remove the dust in the dust bin without the user's separate manipulation, thereby providing convenience for the user. In addition, it is possible to eliminate the inconvenience of the user having to empty the dust bin all the time. In addition, it is possible to prevent the dust from scattering when emptying the dust bin.

[0139] The cleaner 200 may be coupled to a lateral surface of a housing 110. Specifically, the main body 210 of the cleaner 200 may be mounted on a coupling part 120. More specifically, the dust bin 220 and the battery housing 230 of the cleaner 200 may be coupled to a coupling surface 121, an outer circumferential surface of the dust bin main body 221 may be coupled to a dust bin guide surface 122, and the suction part 212 may be coupled to a suction part guide surface 126 of the coupling part 120. In this case, a central axis of the dust bin 220 may be disposed in a direction parallel to the ground surface, and the extension tube 250 may be disposed in a direction perpendicular to the ground surface.

[0140] The cleaner station 100 of the present disclosure will be described below with reference to FIGS. 2 and 3.

[0141] The cleaner 200 may be disposed in the cleaner station 100. The cleaner 200 may be coupled to a lateral side of the cleaner station 100. Specifically, the main body of the cleaner 200 may be coupled to the lateral surface of the cleaner station 100. The cleaner station 100 may remove dust from the dust bin 220 of the cleaner 200.

[0142] The cleaner station 100 may include the housing 110. The housing 110 may define an external appearance of the cleaner station 100. Specifically, the housing 110 may be provided in the form of a column including one or more outer wall surfaces. For example, the housing 110 may be formed in a shape similar to a quadrangular column.

[0143] The housing 110 may have a space capable of accommodating the dust collecting part 170 configured to store dust therein, and a dust suction module 190 configured to generate a flow force for collecting the dust in the dust collecting part 170.

[0144] The housing 110 may include a bottom surface 111, an outer wall surface 112, and an upper surface 113.

[0145] The bottom surface 111 may support a lower side of the dust suction module 190 based on the gravitational direction. That is, the bottom surface 111 may support a lower side of the dust collecting motor 171 of the dust suction module 190.

[0146] In this case, the bottom surface 111 may be disposed toward the ground surface. The bottom surface 111 may also be disposed in parallel with the ground surface or disposed to be inclined at a predetermined angle with respect to the ground surface. The above-mentioned configuration may be advantageous in stably supporting the dust collecting motor 171 and maintaining balance of an overall weight even in a case in which the cleaner 200 is coupled.

[0147] Meanwhile, according to the embodiment, the bottom surface 111 may further include a ground surface support portion 111a in order to prevent the cleaner

station 100 from falling down and increase an area being in contact with the ground surface to maintain the balance. For example, the ground surface support portion may have a plate shape extending from the bottom surface 111, and one or more frames may protrude and extend from the bottom surface 111 in a direction of the ground surface.

[0148] The outer wall surface 112 may mean a surface formed in the gravitational direction or a surface connected to the bottom surface 111. For example, the outer wall surface 112 may mean a surface connected to the bottom surface 111 so as to be perpendicular to the bottom surface 111. As another embodiment, the outer wall surface 112 may be disposed to be inclined at a predetermined angle with respect to the bottom surface 111.

[0149] The outer wall surface 112 may include at least one surface. For example, the outer wall surface 112 may include a first outer wall surface 112a, a second outer wall surface 112b, a third outer wall surface 112c, and a fourth outer wall surface 112d.

[0150] In this case, in the present embodiment, the first outer wall surface 112a may be disposed at the front side of the cleaner station 100. In this case, the front side may mean a side at which the cleaner 200 is exposed in the state in which the cleaner 200 is coupled to the cleaner station 100. Therefore, the first outer wall surface 112a may define an external appearance of the front side of the cleaner station 100.

[0151] Meanwhile, the directions are defined as follows to understand the present embodiment. In the present embodiment, the directions may be defined in the state in which the cleaner 200 is mounted on the cleaner station 100.

[0152] In the state in which the cleaner 200 is mounted on the cleaner station 100, a direction in which the cleaner 200 is exposed to the outside of the cleaner station 100 may be referred to as a forward direction.

[0153] In another point of view, in the state in which the cleaner 200 is mounted on the cleaner station 100, a direction in which the suction motor 214 of the cleaner 200 is disposed may be referred to as the forward direction. Further, a direction opposite to the direction in which the suction motor 214 is disposed on the cleaner station 100 may be referred to as a rearward direction.

[0154] Further, based on an internal space of the housing 110, a surface facing the front surface may be referred to as a rear surface of the cleaner station 100. Therefore, the rear surface may mean a direction in which the second outer wall surface 112b is formed.

[0155] Further, based on the internal space of the housing 110, a left surface when viewing the front surface may be referred to as a left surface, and a right surface when viewing the front surface may be referred to as a right surface. Therefore, the left surface may mean a direction in which the third outer wall surface 112c is formed, and the right surface may mean a direction in which the fourth outer wall surface 112d is formed.

[0156] The first outer wall surface 112a may be formed in the form of a flat surface, or the first outer wall surface 112a may be formed in the form of a curved surface as a whole or formed to partially include a curved surface.

[0157] The first outer wall surface 112a may have an external appearance corresponding to the shape of the cleaner 200. In detail, the coupling part 120 may be disposed on the first outer wall surface112a. With this configuration, the cleaner 200 may be coupled to the cleaner station 100 and supported by the cleaner station 100. The specific configuration of the coupling part 120 will be described below.

[0158] Meanwhile, a structure for mounting various types of cleaning modules 260 used for the cleaner 200 may be additionally provided on the first outer wall surface 112a.

[0159] In the present embodiment, the second outer wall surface 112b may be a surface facing the first outer wall surface 112a. That is, the second outer wall surface 112b may be disposed on the rear surface of the cleaner station 100. In this case, the rear surface may be a surface facing the surface to which the cleaner 200 is coupled. Therefore, the second outer wall surface 112b may define an external appearance of the rear surface of the cleaner station 100.

[0160] For example, the second outer wall surface 112b may be formed in the form of a flat surface. With this configuration, the cleaner station 100 may be in close contact with a wall in a room, and the cleaner station 100 may be stably supported.

[0161] As another example, the structure for mounting various types of cleaning modules 260 used for the cleaner 200 may be additionally provided on the second outer wall surface 112b.

[0162] In the present embodiment, the third outer wall surface 112c and the fourth outer wall surface 112d may mean surfaces that connect the first outer wall surface 112a and the second outer wall surface 112b. In this case, the third outer wall surface 112c may be disposed on the left surface of the station 100, and the fourth outer wall surface 112d may be disposed on the right surface of the cleaner station 100. On the contrary, the third outer wall surface 112c may be disposed on the right surface of the cleaner station 100, and the fourth outer wall surface 112d may be disposed on the left surface of the cleaner station 100.

[0163] The third outer wall surface 112c or the fourth outer wall surface 112d may be formed in the form of a flat surface, or the third outer wall surface 112c or the fourth outer wall surface 112d may be formed in the form of a curved surface as a whole or formed to partially include a curved surface.

[0164] Meanwhile, the structure for mounting various types of cleaning modules 260 used for the cleaner 200 may be additionally provided on the third outer wall surface 112c or the fourth outer wall surface 112d.

[0165] The upper surface 113 may define an upper external appearance of the cleaner station. That is, the

upper surface 113 may mean a surface disposed at an outermost side of the cleaner station in the gravitational direction and exposed to the outside.

[0166] For reference, in the present embodiment, the terms 'upper side' and 'lower side' may mean the upper and lower sides in the gravitational direction (a direction perpendicular to the ground surface) in the state in which the cleaner station 100 is installed on the ground surface.

[0167] In this case, the upper surface 113 may also be disposed in parallel with the ground surface or disposed to be inclined at a predetermined angle with respect to the ground surface.

[0168] A display part 410 may be disposed on the upper surface 113. For example, the display part 410 may display a state of the cleaner station 100 and a state of the cleaner 200. The display part may further display information such as a cleaning process situation, a map of the cleaning zone, and the like.

[0169] Meanwhile, according to the embodiment, the upper surface 113 may be separable from the outer wall surface 112. In this case, when the upper surface 113 is separated, the battery separated from the cleaner 200 may be accommodated in the internal space surrounded by the outer wall surface 112, and a terminal (not illustrated) capable of charging the separated battery may be provided in the internal space.

[0170] FIG. 11 is a view for explaining the coupling part of the cleaner station according to the embodiment of the present disclosure, FIG. 12 is a view for explaining a fixing unit of the cleaner station according to the embodiment of the present disclosure, FIGS. 13 and 14 are views for explaining a relationship between the cleaner and a door unit in the cleaner station according to the embodiment of the present disclosure, and FIG. 15 is a view for explaining a relationship between the cleaner and a cover opening unit in the cleaner station according to the embodiment of the present disclosure.

[0171] The coupling part 120 of the cleaner station 100 according to the present disclosure will be described below with reference to FIGS. 3 and 11.

[0172] The cleaner station 100 may include the coupling part 120 to which the cleaner 200 is coupled. Specifically, the coupling part 120 may be disposed in the first outer wall surface 112a, and the main body 210, the dust bin 220, and the battery housing 230 of the cleaner 200 may be coupled to the coupling part 120.

[0173] The coupling part 120 may include the coupling surface 121. The coupling surface 121 may be disposed on the lateral surface of the housing 110. For example, the coupling surface 121 may mean a surface formed in the form of a groove which is concave toward the inside of the cleaner station 100 from the first outer wall surface 112a. That is, the coupling surface 121 may mean a surface formed to have a stepped portion with respect to the first outer wall surface 112a.

[0174] The cleaner 200 may be coupled to the coupling surface 121. For example, the coupling surface 121 may be in contact with the lower surface of the dust bin 220 and the lower surface of the battery housing 230 of the cleaner 200. In this case, the lower surface may mean a surface directed toward the ground surface when the user uses the cleaner 200 or places the cleaner 200 on the ground surface.

[0175] For example, an angle of the coupling surface 121 with respect to the ground surface may be a right angle. Therefore, it is possible to minimize a space of the cleaner station 100 when the cleaner 200 is coupled to the coupling surface 121.

[0176] As another example, the coupling surface 121 may be disposed to be inclined at a predetermined angle with respect to the ground surface. Therefore, the cleaner station 100 may be stably supported when the cleaner 200 is coupled to the coupling surface 121.

[0177] The coupling surface 121 may have a dust passage hole 121a through which air present outside the housing 110 may be introduced into the housing 110. The dust passage hole 121a may be formed in the form of a hole corresponding to the shape of the dust bin 220 so that the dust in the dust bin 220 may be introduced into the dust collecting part 170. The dust passage hole 121a may be formed to correspond to the shape of the discharge cover 222 of the dust bin 220. The dust passage hole 121a may be formed to communicate with a first suction flow path 181 to be described below.

[0178] The coupling part 120 may include the dust bin guide surface 122. The dust bin guide surface 122 may be disposed on the first outer wall surface 112a. The dust bin guide surface 122 may be connected to the first outer wall surface 112a. In addition, the dust bin guide surface 122 may be connected to the coupling surface 121.

[0179] The dust bin guide surface 122 may be formed in a shape corresponding to the outer surface of the dust bin 220. A front outer surface of the dust bin 220 may be coupled to the dust bin guide surface 122. Therefore, it is possible to provide the convenience when coupling the cleaner 200 to the coupling surface 121.

[0180] Meanwhile, a protrusion moving hole 122a may be formed in the dust bin guide surface 122, and a push protrusion 151 to be described below may rectilinearly move along the protrusion moving hole 122a. In addition, a gearbox 155 may be provided below the dust bin guide surface 122 based on the gravitational direction and accommodate a gear or the like of a cover opening unit 150 to be described below. In this case, a guide space 122b, through which the push protrusion 151 may move, may be formed between the dust bin guide surface 122, the lower surface, and the upper surface of the gearbox 155. Further, the guide space 122b may communicate with the first suction flow path 181 through a bypass hole 122c. That is, the protrusion moving hole 122a, the guide space 122b, the bypass hole 122c, and the first suction flow path 181 may define one bypass flow path (see FIG. 10). With this configuration, when the dust collecting motor 191 operates in the state in which the dust bin 220 is coupled to the coupling part 120, the dust or the like, which remains in the dust bin 220 and remains on the

dust bin guide surface 122, may be sucked through the bypass flow path.

[0181] The coupling part 120 may include guide protrusions 123. The guide protrusions 123 may be disposed on the coupling surface 121. The guide protrusions 123 may protrude upward from the coupling surface 121. Two guide protrusions 123 may be disposed to be spaced apart from each other. A distance between the two guide protrusions 123, which are spaced apart from each other, may correspond to a width of the battery housing 230 of the cleaner 200. Therefore, it is possible to provide the convenience when coupling the cleaner 200 to the coupling surface 121.

[0182] The coupling part 120 may include sidewalls 124. The sidewalls 124 may mean wall surfaces disposed at two opposite sides of the coupling surface 121 and may be perpendicularly connected to the coupling surface 121. The sidewalls 124 may be connected to the first outer wall surface 112a. In addition, the sidewalls 124 may define surfaces connected to the dust bin guide surface 122. Therefore, the cleaner 200 may be stably accommodated.

[0183] The coupling part 120 may include a coupling sensor 125. The coupling sensor 125 may detect whether the cleaner 200 is coupled to the coupling part 120.

[0184] The coupling sensor 125 may include a contact sensor. For example, the coupling sensor 125 may include a micro-switch. In this case, the coupling sensor 125 may be disposed on the guide protrusion 123. Therefore, when the battery housing 230 or the battery 240 of the cleaner 200 is coupled between the pair of guide protrusions 123, the battery housing 230 or the battery 240 comes into contact with the coupling sensor 125, such that the coupling sensor 125 may detect that the cleaner 200 is coupled to the coupling part.

[0185] Meanwhile, the coupling sensor 125 may include a contactless sensor. For example, the coupling sensor 125 may include an infrared ray (IR) sensor. In this case, the coupling sensor 125 may be disposed on the sidewall 124. Therefore, when the dust bin 220 or the main body 210 of the cleaner 200 passes the sidewall 124 and then reaches the coupling surface 121, the coupling sensor 125 may detect the presence of the dust bin 220 or the main body 210.

[0186] The coupling sensor 125 may face the dust bin 220 or the battery housing 230 of the cleaner 200.

[0187] The coupling sensor 125 may be a mean for determining whether the cleaner 200 is coupled and power is applied to the battery 240 of the cleaner 200.

[0188] The coupling part 120 may include the suction part guide surface 126. The suction part guide surface 126 may be disposed on the first outer wall surface 112a. The suction part guide surface 126 may be connected to the dust bin guide surface 122. The suction part 212 may be coupled to the suction part guide surface 126. The suction part guide surface 126 may be formed in a shape corresponding to the shape of the suction part 212.

[0189] The coupling part 120 may further include a fixing member entrance hole 127. The fixing member entrance hole 127 may be formed in the form of a long hole along the sidewall 124 so that fixing members 131 may enter and exit the fixing member entrance hole 127.

[0190] With this configuration, when the user couples the cleaner 200 to the coupling part 120 of the cleaner station 100, the main body 210 of the cleaner 200 may be stably disposed on the coupling part 120 by the dust bin guide surface 122, the guide protrusions 123, and the suction part guide surface 126. Therefore, it is possible to provide convenience when coupling the dust bin 220 and the battery housing 230 of the cleaner 200 to the coupling surface 121.

[0191] A fixing unit 130 according to the present disclosure will be described below with reference to FIGS. 3, 12, and 16.

[0192] The cleaner station 100 according to the present disclosure may include the fixing unit 130. The fixing unit 130 may be disposed on the sidewall 124. In addition, at least a part of the fixing unit 130 may be disposed on a back surface to the coupling surface 121. The fixing unit 130 may fix the cleaner 200 coupled to the coupling surface 121. Specifically, the fixing unit 130 may fix the dust bin 220 and the battery housing 230 of the cleaner 200 coupled to the coupling surface 121.

[0193] The fixing unit 130 may include fixing members 131 configured to fix the dust bin 220 and the battery housing 230 of the cleaner 200, and a fixing part motor 133 configured to operate the fixing members 131. In addition, the fixing unit 130 may further include fixing part links 135 configured to transmit power of the fixing part motor 133 to the fixing members 131.

[0194] The fixing members 131 may be disposed on the sidewall 124 of the coupling part 120 and provided on the sidewall 124 so as to reciprocate in order to fix the dust bin 220. Specifically, the fixing members 131 may be accommodated in the fixing member entrance hole 127.

[0195] The fixing members 131 may be respectively disposed at two opposite sides of the coupling part 120. For example, a pair of two fixing members 131 may be symmetrically disposed with respect to the coupling surface 121.

[0196] The fixing part motor 133 may provide power for moving the fixing member 131.

[0197] The fixing part links 135 may convert a rotational force of the fixing part motor 133 into the reciprocations of the fixing members 131.

[0198] A stationary sealer 136 may be disposed on the dust bin guide surface 122 so as to seal the dust bin 220 when the cleaner 200 is coupled. With this configuration, when the dust bin 220 of the cleaner 200 is coupled, the cleaner 200 may press the stationary sealer 136 by its own weight, such that the dust bin 220 and the dust bin guide surface 122 may be sealed.

[0199] The stationary sealer 136 may be disposed on an imaginary extension line of the fixing member 131. With this configuration, when the fixing part motor 133 operates and the fixing members 131 press the dust bin

220, a circumference of the dust bin 220 at the same height may be sealed.

[0200] According to the embodiment, the stationary sealer 136 may be disposed on the dust bin guide surface 122 and formed in the form of a bent line corresponding to an arrangement of the cover opening unit 150 to be described below.

[0201] Therefore, when the main body 210 of the cleaner 200 is disposed on the coupling part 120, the fixing unit 130 may fix the main body 210 of the cleaner 200. Specifically, when the coupling sensor 125 detects that the main body 210 of the cleaner 200 is coupled to the coupling part 120 of the cleaner station 100, the fixing part motor 133 may move the fixing members 131 to fix the main body 210 of the cleaner 200.

[0202] Therefore, it is possible to improve the suction force of the cleaner by preventing the residual dust from remaining in the dust bin. Further, it is possible to remove an offensive odor caused by the residual dust by preventing the residual dust from remaining in the dust bin.

[0203] A door unit 140 according to the present disclosure will be described below with reference to FIGS. 3, 13, 14, and 16.

[0204] The cleaner station 100 according to the present disclosure may include the door unit 140. The door unit 140 may be configured to open or close the dust passage hole 121a.

[0205] The door unit 140 may include a door 141, a door motor 142, and a door arm 143.

[0206] The door 141 may be hingedly coupled to the coupling surface 121 and may open or close the dust passage hole 121a. The door 141 may include a door main body 141a.

[0207] The door main body 141a may be formed in a shape capable of blocking the dust passage hole 121a. For example, the door main body 141a may be formed in a shape similar to a circular plate shape.

[0208] Based on a state in which the door main body 141a blocks the dust passage hole 121a, the hinge part may be disposed at an upper side of the door main body 141a, and an arm coupling part 141b may be disposed at a lower side of the door main body 141a.

[0209] The door main body 141a may be formed in a shape capable of sealing the dust passage hole 121a. For example, an outer surface of the door main body 141a, which is exposed to the outside of the cleaner station 100, is formed to have a diameter corresponding to a diameter of the dust passage hole 121a, and an inner surface of the door main body 141a, which is disposed in the cleaner station 100, is formed to have a diameter greater than the diameter of the dust passage hole 121a. In addition, a level difference may be defined between the outer surface and the inner surface. Meanwhile, one or more reinforcing ribs may protrude from the inner surface of the door main body 141a in order to connect the hinge part and the arm coupling part 141b and reinforce a supporting force of the door main body 141a.

[0210] The hinge part may be a means by which the door 141 is hingedly coupled to the coupling surface 121. The hinge part may be disposed at an upper end of the door main body 141a and coupled to the coupling surface 121.

[0211] The arm coupling part 141b may be a means to which the door arm 143 is rotatably coupled. The arm coupling part 141b may be disposed at a lower side of the door main body 141a and rotatably coupled to the door main body 141a, and the door arm 143 may be rotatably coupled to the arm coupling part 141b.

[0212] With this configuration, when the door arm 143 pulls the door main body 141a in the state in which the door 141 closes the dust passage hole 121a, the door main body 141a is rotated about the hinge part toward the inside of the cleaner station 100, such that the dust passage hole 121a may be opened. Meanwhile, when the door arm 143 pushes the door main body 141a in the state in which the dust passage hole 121a is opened, the door main body 141a is rotated about the hinge part 141b toward the outside of the cleaner station 100, such that the dust passage hole 121a may be closed.

[0213] Meanwhile, the door 141 may be in contact with the discharge cover 222 in the state in which the cleaner 200 is coupled to the cleaner station 100 and the discharge cover 222 is separated from the dust bin main body 210. Further, when the door 141 rotates, the discharge cover 222 may rotate in conjunction with the door 141.

[0214] The door motor 142 may provide power for rotating the door 141. Specifically, the door motor 142 may rotate the door arm 143 in a forward or reverse direction. In this case, the forward direction may mean a direction in which the door arm 143 pulls the door 141. Therefore, when the door arm 143 is rotated in the forward direction, the dust passage hole 121a may be opened. In addition, the reverse direction may mean a direction in which the door arm 143 pushes the door 141. Therefore, when the door arm 143 is rotated in the reverse direction, at least a part of the dust passage hole 121a may be closed. The forward direction may be opposite to the reverse direction.

[0215] The door arm 143 may connect the door 141 and the door motor 142 and open or close the door 141 using the power generated from the door motor 142.

[0216] For example, the door arm 143 may include a first door arm 143a and a second door arm 143b. One end of the first door arm 143a may be coupled to the door motor 142. The first door arm 143a may be rotated by the power of the door motor 142. The other end of the first door arm 143a may be rotatably coupled to the second door arm 143b. The first door arm 143a may transmit a force transmitted from the door motor 142 to the second door arm 143b. One end of the second door arm 143b may be coupled to the first door arm 143a. The other end of the second door arm 143b may be coupled to the door 141. The second door arm 143b may open or close the dust passage hole 121a by pushing or pulling the door 141.

[0217] The door unit 140 may further include door opening/closing detecting parts 144. The door opening/-closing detecting parts 144 may be provided in the housing 110 and may detect whether the door 141 is in an opened state.

[0218] For example, the door opening/closing detecting parts 144 may be disposed at both ends in a rotational region of the door arm 143, respectively. As another example, the door opening/closing detecting parts 144 may be disposed at both ends in a movement region of the door 141, respectively.

[0219] Therefore, when the door arm 143 is moved to a preset door opening position or when the door 141 is opened to a predetermined position, the door opening/-closing detecting parts 144 may detect that the door is opened. In addition, when the door arm 143 is moved to a preset door closing position or when the door 141 is opened to a predetermined position, the door opening/-closing detecting parts 144 may detect that the door is opened.

[0220] The door opening/closing detecting part 144 may include a contact sensor. For example, the door opening/closing detecting part 144 may include a micro-switch.

[0221] Meanwhile, the door opening/closing detecting part 144 may also include a contactless sensor. For example, the door opening/closing detecting part 144 may include an infrared ray (IR) sensor.

[0222] With this configuration, the door unit 140 may selectively open or close at least a part of the coupling surface 121, thereby allowing the outside of the first outer wall surface 112a to communicate with the flow path part 180 and/or the dust collecting part 170.

[0223] The door unit 140 may be opened when the discharge cover 222 of the cleaner 200 is opened. In addition, when the door unit 140 is closed, the discharge cover 222 of the cleaner 200 may also be closed in conjunction with the door unit 140.

[0224] When the dust in the dust bin 220 of the cleaner 200 is removed, the door motor 142 may rotate the door 141, thereby coupling the discharge cover 222 to the dust bin main body 221. Specifically, the door motor 142 may rotate the door 141 to rotate the door 141, and the rotating door 141 may push the discharge cover 222 toward the dust bin main body 221.

[0225] The cover opening unit 150 according to the present disclosure will be described below with reference to FIGS. 3, 15, and 16.

[0226] The cleaner station 100 according to the present disclosure may include the cover opening unit 150. The cover opening unit 150 may be disposed on the coupling part 120 and may open the discharge cover 222 of the cleaner 200.

[0227] The cover opening unit 150 may include the push protrusion 151, a cover opening motor 152, cover opening gears 153, a support plate 154, and the gear box 155.

[0228] The push protrusion 151 may move to press the coupling lever 222c when the cleaner 200 is coupled.

[0229] The push protrusion 151 may be disposed on the dust bin guide surface 122. Specifically, the protrusion moving hole may be formed in the dust bin guide surface 122, and the push protrusion 151 may be exposed to the outside by passing through the protrusion moving hole.

[0230] When the cleaner 200 is coupled, the push protrusion 151 may be disposed at a position at which the push protrusion 151 may push the coupling lever 222c. That is, the coupling lever 222c may be disposed on the protrusion moving hole. In addition, the coupling lever 222c may be disposed in a movement region of the push protrusion 151.

[0231] The push protrusion 151 may rectilinearly reciprocate to press the coupling lever 222c. Specifically, the push protrusion 151 may be coupled to the gear box 155, such that the rectilinear movement of the push protrusion 151 may be guided. The push protrusion 151 may be coupled to the cover opening gears 153 and moved together with the cover opening gears 153 by the movements of the cover opening gears 153.

[0232] The cover opening motor 152 may provide power for moving the push protrusion 151. Specifically, the cover opening motor 152 may rotate a motor shaft (not illustrated) in a forward direction or a reverse direction. In this case, the forward direction may mean a direction in which the push protrusion 151 pushes the coupling lever 222c. In addition, the reverse direction may mean a direction in which the push protrusion 151, which has pushed the coupling lever 222c, returns back to an original position. The forward direction may be opposite to the reverse direction.

[0233] The cover opening gears 153 may be coupled to the cover opening motor 152 and may move the push protrusion 151 using the power from the cover opening motor 152. Specifically, the cover opening gears 153 may be accommodated in the gear box 155. A driving gear 153a of the cover opening gears 153 may be coupled to the motor shaft of the cover opening motor 152 and supplied with the power. A driven gear 153b of the cover opening gears 153 may be coupled to the push protrusion 151 to move the push protrusion 151. For example, the driven gear 153b may be provided in the form of a rack gear, engage with the driving gear 153a, and receive power from the driving gear 153a.

[0234] In this case, the discharge cover 222 may have the torsion spring 222d. The discharge cover 222 may be rotated by a predetermined angle or more and supported in the rotated position by an elastic force of the torsion spring 222d. Therefore, the discharge cover 222 may be opened, and the dust passage hole 121a and the inside of the dust bin 220 may communicate with each other.

[0235] The gear box 155 may be disposed in the housing 110 and disposed at the lower side of the coupling part 120 in the gravitational direction, and the cover opening gears 153 may be accommodated in the gear box 155.

[0236] Cover opening detecting parts 155f may be

disposed on the gear box 155. In this case, the cover opening detecting part 155f may include a contact sensor. For example, the cover opening detecting part 155f may include a micro-switch. Meanwhile, the cover opening detecting part 155f may also include a contactless sensor. For example, the cover opening detecting part 155f may include an infrared (IR) sensor.

[0237] The cover opening detecting part 155f may be disposed on at least one of inner and outer walls of the gear box 155. For example, the single cover opening detecting part 155f may be disposed on the inner surface of the gear box 155. In this case, the cover opening detecting part 155f may detect that the push protrusion 151 is positioned at the initial position.

[0238] As another example, the two cover opening detecting parts 155f may be disposed on the outer surface of the gear box 155. In this case, the cover opening detecting part 155f may detect the initial position and the cover opening position of the push protrusion 151.

[0239] Accordingly, according to the present disclosure, the cover opening unit 150 may open the dust bin 220 even though the user does not separately open the discharge cover 222 of the cleaner, and as a result, it is possible to improve convenience.

[0240] In addition, because the discharge cover 222 is opened in the state in which the cleaner 200 is coupled to the cleaner station 100, it is possible to prevent the dust from scattering.

[0241] Meanwhile, the dust collecting part 170 will be described below with reference to FIGS. 3 and 16.

[0242] The cleaner station 100 may include the dust collecting part 170. The dust collecting part 170 may be disposed in the housing 110. The dust collecting part 170 may be disposed at the lower side of the coupling part 120 based on the gravitational direction.

[0243] For example, the dust collecting part 170 may mean a dust bag for collecting dust sucked from the inside of the dust bin 220 of the cleaner 200 by the dust collecting motor 191.

[0244] The dust collecting part 170 may be detachably coupled to the housing 110.

[0245] Therefore, the dust collecting part 170 may be separated from the housing 110 and discarded, a new dust collecting part 170 may be coupled to the housing 110. That is, the dust collecting part 170 may be defined as a consumable component.

[0246] When the suction force is generated by the dust collecting motor 191, a volume of the dust bag is increased, such that the dust may be accommodated in the dust bag.

[0247] To this end, the dust bag may be made of a material that transmits air but does not transmit debris such as dust. For example, the dust bag may be made of a non-woven fabric material and have a hexahedral shape when the dust bag has an increased volume.

[0248] Therefore, it is not necessary for the user to separately tie a bag in which the dust is captured, and as a result, it is possible to improve convenience for the user.

[0249] On the contrary, the dust bag may be made of a permeable material. For example, the dust bag may include a roll vinyl film (not illustrated). With this configuration, the dust bag is sealed or joined, which may prevent dust or offensive odor captured in the dust bag from leaking to the outside from the dust bag. In this case, the dust bag may be mounted in the housing 110 by means of a dust bag cartridge (not illustrated). As necessary, the dust bag may be replaced by means of the dust bag cartridge.

[0250] Meanwhile, the flow path part 180 will be described below with reference to FIGS. 3 and 11.

[0251] The cleaner station 100 may include the flow path part 180.

[0252] The flow path part 180 may connect the dust bin 220 of the cleaner 200 and the dust collecting part 170. The flow path part 180 may be disposed at a rear side of the coupling surface 121. The flow path part 180 may mean a space between the dust bin 220 of the cleaner 200 and the dust collecting part 170. The flow path part 180 may be a space formed at a rear side of the dust passage hole 121a. The flow path part 180 may be a flow path bent downward from the dust passage hole 121a, and the dust and the air may flow through the flow path part 180.

[0253] Specifically, the flow path part 180 may include the first suction flow path 181 and a second suction flow path 182. When the cleaner 200 is coupled to the cleaner station 100 and the dust passage hole 121a is opened, the first suction flow path 181 may communicate with the internal space of the dust bin 220, and the second suction flow path 182 may allow the first suction flow path 181 to communicate with the internal space of the dust collecting part 170.

[0254] For example, the first suction flow path 181 may be disposed to be substantially parallel to an axis of the suction motor 214 or an imaginary through-line that penetrates the dust bin 220. In this case, the axis of the suction motor 214 or the through-line of the dust bin 220 may penetrate the first suction flow path 181.

[0255] In this case, the second suction flow path 182 may be provided at a predetermined angle with respect to the first flow path 181. For example, an angle between the first suction flow path 181 and the second suction flow path 182 may be a right angle. With this configuration, it is possible to minimize an overall volume of the cleaner station 100.

[0256] The dust in the dust bin 220 of the cleaner 200 may move to the dust collecting part 170 through the flow path part 180.

[0257] Meanwhile, the dust suction module 190 will be described below with reference to FIGS. 3 and 16.

[0258] The cleaner station 100 may include the dust suction module 190. The dust suction module 190 may include the dust collecting motor 191, a first filter 192, and a second filter (not illustrated).

[0259] The dust collecting motor 191 may be disposed below the dust collecting part 170. The dust collecting

motor 191 may generate a suction force in the flow path part 180. Therefore, the dust collecting motor 191 may provide a suction force capable of sucking the dust in the dust bin 220 of the cleaner 200.

[0260] The dust collecting motor 191 may generate the suction force by means of the rotation. For example, the dust collecting motor 191 may be formed in a shape similar to a cylindrical shape.

[0261] Meanwhile, in case that the cleaner 200 is coupled to the cleaner station 100, the cyclone flow may be generated by the suction force of the dust collecting motor 191.

[0262] Specifically, in case that the user operates the dust collecting motor 191 by coupling the cleaner 200 to the cleaner station 100 in order to remove dust in the dust bin 220, the air sucked through the suction part 212 may generate the cyclone flow in the cyclone part 213 by the suction force of the dust collecting motor 191.

[0263] Meanwhile, in the present embodiment, an imaginary dust collecting motor axis may be formed by extending a rotation axis of the dust collecting motor 191.

[0264] The first filter 192 may be disposed between the dust collecting part 170 and the dust collecting motor 191. The first filter 192 may be a prefilter.

[0265] The second filter (not illustrated) may be disposed between the dust collecting motor 191 and the outer wall surface 112. The second filter (not illustrated) may be an HEPA filter.

[0266] Meanwhile, the cleaner station 100 may further include a charging part 128. The charging part may be disposed on the coupling part 120. The charging part 128 may be electrically connected to the cleaner 200 coupled to the coupling part 120. The charging part 128 may supply power to the battery of the cleaner 200 coupled to the coupling part 120.

[0267] In addition, the cleaner station 100 may further include a lateral door (not illustrated). The lateral door may be disposed in the housing 110. The lateral door may selectively expose the dust collecting part 170 to the outside. Therefore, the user may easily remove the dust collecting part 170 from the cleaner station 100.

[0268] In addition, the cleaner station 100 may further include a discharge port 311. The discharge port 311 may be formed in the housing 110. For example, the discharge port 311 may be formed at a lower side of the housing 110 and fluidly connected to the dust collecting motor 191. Therefore, the air passing through the dust collecting motor 191 may be discharged to the outside of the housing 110 through the discharge port 311.

[0269] FIG. 17 is a perspective view for explaining the filter part of the cleaner according to the embodiment of the present disclosure, FIG. 18 is a cross-sectional perspective view for explaining filter holes of the cleaner according to the embodiment of the present disclosure, FIG. 19 is a cross-sectional front view for explaining the filter holes of the cleaner according to the embodiment of the present disclosure, FIG. 20 is an enlarged view for explaining an angle between a central axis of the filter hole and a tangent line of a cyclone flow in the cleaner according to the embodiment of the present disclosure, FIG. 21 is a view for explaining angles defined between a plurality of filter holes in the cleaner according to the embodiment of the present disclosure, and FIGS. 22 and 23 are enlarged views for explaining the filter holes of the cleaner according to the embodiment of the present disclosure.

[0270] The filter part 300 of the cleaner 200 of the present disclosure will be described below with reference to FIGS. 17 to 23.

[0271] The cleaner of the present disclosure may include the filter part 300.

[0272] The filter part 300 may filter the air discharged from the cyclone part 213.

[0273] The filter part 300 may guide the air, which is separated from the dust by the cyclone part 213, to the cyclone module 270. That is, the filter part 300 may be a mesh filter having a plurality of holes.

[0274] The filter part 300 may include the filter body 310 and filter holes 320.

[0275] The filter body 310 may be disposed in the dust bin 220. Specifically, the filter body 310 may be disposed in the cyclone part 213. The cyclone module 270 may be disposed in the filter body 310. The filter body 310 may be disposed between the cyclone part 213 and the cyclone module 270.

[0276] The filter body 310 may be formed in, but not limited to, a cylindrical shape.

[0277] The central axis a5 of the filter body may extend in the upward/downward direction. The central axis a5 of the filter body may extend in a longitudinal direction of the filter body 310.

[0278] For example, the central axis a5 of the filter body 310 may be coaxially with the axis a4 of the cyclone flow. As another example, the central axis a5 of the filter body 310 may be disposed in parallel with the axis a4 of the cyclone flow.

[0279] The cyclone flow may be generated along the outer periphery of the filter body 310.

[0280] A thickness of the filter body 310 may be 0.3 to 0.4 mm. In this case, the thickness of the filter body 310 may mean a distance between an inner surface 310a and an outer surface 310b at a predetermined point on the filter body 310.

[0281] The filter body 310 may be made of one or more materials selected from plastic and metal. The filter body 310 may be made of at least any one material selected from plastic and metal.

[0282] The filter hole 320 may guide the air into the filter body 310. The plurality of filter holes 320 may be formed in the longitudinal direction along the outer periphery of the filter body 310.

[0283] The filter hole 320 is a hole having a predetermined diameter. Large foreign substances, which are contained in the air discharged from the cyclone part 213, may be filtered out by the filter holes 320. Therefore, foreign substances such as hairs are filtered out by the

filter holes 320.

[0284] The air having passed through the filter holes 320 may be introduced into the cyclone module 270 disposed in the filter body 310.

[0285] In this case, an outer side and/or an outer portion of the filter body 310 may mean a direction facing the cyclone part 213 based on the filter body 310, and an inner side and/or an inner portion of the filter body 310 may mean a direction facing the cyclone module 270 based on the filter body 310.

[0286] The air may be introduced into the filter body 310 through the filter hole 320 in a state in which the air is inclined in a reverse direction to a flow direction DF of the cyclone flow generated in at the inlet side of the filter hole 320. The air may pass through the filter hole 320 in the state in which the air is inclined in the reverse direction to the flow direction DF of the cyclone flow generated at the inlet side of the filter hole 320. This is to prevent a problem in which foreign substances such as hairs are caught by the filter holes 320, and the suction force of the cleaner 200 decreases.

[0287] In this case, the reverse direction to the flow direction DF of the cyclone flow may mean a direction having an obtuse angle with respect to the flow direction DF of the cyclone flow.

[0288] In addition, the inlet side of the filter hole 320 may mean a space through which the air is introduced into the filter hole 320 in the cyclone part 213. Specifically, the inlet side of the filter hole 320 may mean a space corresponding to a boundary between the filter hole 320 and the cyclone part 213.

[0289] In addition, an outlet side of the filter hole 320 may mean a space through which the air is discharged to the cyclone module 270 from the filter hole 320. Specifically, the outlet side of the filter hole 320 may mean a space corresponding to a boundary between the filter hole 320 and the cyclone module 270.

[0290] Meanwhile, the cyclone flow generated in the cyclone part 213 may include at least one bent point at which the flow direction changes from a direction in which the cyclone flow flows along the outer side of the filter body 310 to a direction in which the cyclone flow is introduced into the filter body 310 through the filter hole 320.

[0291] For example, the flow direction of the cyclone flow, which flows along the outer side of the filter body 310, may be changed to the flow direction in which the air is introduced into the filter body 310 by the suction force of the suction motor 214 at the inlet side of the filter hole 320.

[0292] As another example, the flow direction of the cyclone flow, which flows along the outer side of the filter body 310, may be changed to the flow direction in which the air is introduced into the filter body 310 by the suction force of the dust collecting motor 191 at the inlet side of the filter hole 320.

[0293] That is, the cyclone flow generated by the cyclone part 213 may be generated by a suction force of the suction motor 214 in case that the cleaner 200 is used singly. Alternatively, the cyclone flow generated by the cyclone part 213 may be generated by a suction force of the dust collecting motor 191 in case that the cleaner 200 is coupled to the cleaner station 100.

[0294] An angle between a first direction D1, which is an inward direction of a central axis C of the filter hole 320, and a second direction D2, which is a tangential direction of the cyclone flow intersecting the central axis C of the filter hole 320, may be an obtuse angle.

[0295] The inward direction of the central axis C of the filter hole 320 may mean an axial direction of the filter hole 320 directed toward the inside of the filter body 310.

[0296] The tangential direction of the cyclone flow may mean a flow direction of the cyclone flow adjoining the outer periphery of the filter body 310. In this case, a tangent line TL of the cyclone flow may mean an imaginary straight line extending in the flow direction of the cyclone flow at a position intersecting the central axis of the filter hole 320.

[0297] The first direction D1 may be parallel to or overlap the direction in which the air is introduced into the filter body 310. The second direction D2 may be parallel to or overlap the flow direction DF of the cyclone flow generated at the inlet side of the filter hole 320.

[0298] With reference to FIGS. 20 and 21, an angle θ defined between the central axis C of the filter hole 320 and the tangent line TL of the cyclone flow may be 110 to 150 degrees. For example, an angle $\theta 1$ defined between a first central axis C1 and the tangent line TL of the cyclone flow may be 113.2 degrees, and an angle $\theta 2$ defined between a second central axis C2 and the tangent line TL of the cyclone flow may be 146.3 degrees. In this case, the angle θ defined between the central axis C of the filter hole 320 and the tangent line TL of the cyclone flow may increase toward the second central axis C2 from the first central axis C1.

[0299] Particularly, the angle θ may be 135 degrees. The angle θ may be 110 degrees. The angle θ may be 117.2 degrees. The angle θ may be 121.3 degrees. The angle θ may be 125.5 degrees. The angle θ may be 130.1 degrees. The angle θ may be 141 degrees. The angle θ may be 150 degrees.

[0300] The angle θ between the direction, in which the air is introduced into the filter body 310 through the filter hole 320, and the flow direction DF of the cyclone flow generated at the inlet side of the filter hole 320 may be an obtuse angle. In this case, the angle θ may be 110 to 150 degrees. Particularly, the angle θ may be 135 degrees. The angle θ may be 110 degrees. The angle θ may be 113.2 degrees. The angle θ may be 117.2 degrees. The angle θ may be 121.3 degrees. The angle θ may be 125.5 degrees. The angle θ may be 130.1 degrees. The angle θ may be 141 degrees. The angle θ may be 146.3 degrees. The angle θ may be 150 degrees.

[0301] An inner surface 320a of the filter hole 320 may be formed to be inclined in the reverse direction to the flow direction DF of the cyclone flow generated at the inlet side of the filter hole 320. The angle θ between the inner

surface 320a of the filter hole 320 and the flow direction DF of the cyclone flow generated at the inlet side of the filter hole 320 may be an obtuse angle. In this case, the angle θ may be 110 to 150 degrees. Particularly, the angle θ may be 135 degrees. The angle θ may be 110 degrees. The angle θ may be 113.2 degrees. The angle θ may be 117.2 degrees. The angle θ may be 121.3 degrees. The angle θ may be 125.5 degrees. The angle θ may be 130.1 degrees. The angle θ may be 141 degrees. The angle θ may be 146.3 degrees. The angle θ may be 150 degrees.

[0302] In comparison with the outlet side, the inlet side of the filter hole 320 may be disposed to be biased in the flow direction DF of the cyclone flow flowing along the outer side of the filter body 310.

[0303] A first intersection line region I1 in which the inner surface 320a of the filter hole 320 and the outer surface 310b of the filter body intersect each other may be disposed to be biased in the flow direction DF of the cyclone flow in comparison with a second intersection line region I2 in which the inner surface of the filter hole and the inner surface 310a of the filter body intersect each other.

[0304] With reference to FIG. 22, a first through-line P1, which penetrates the first intersection line region I1 in a direction perpendicular to the flow direction DF of the cyclone flow, and a second through-line P2, which penetrates the second intersection line region I2 in the direction perpendicular to the flow direction DF of the cyclone flow, may penetrate the filter body 310.

[0305] The first through-line P1 may pass through the inside of the first intersection line region I1. The first through-line P1 may extend while adjoining a rim of the first intersection line region I1. The first through-line P1 may extend while adjoining a rim of the second intersection line region I2. The first through-line P1 may traverse the inside of the filter body 310.

[0306] The second through-line P2 may pass through the inside of the second intersection line region I2. The second through-line P2 may extend while adjoining a rim of the second intersection line region I2. The second through-line P2 may extend while adjoining a rim of the first intersection line region I1. The second through-line P2 may traverse the inside of the filter body 310.

[0307] As illustrated in FIG. 23, in case that the first through-line P1 and the second through-line P2 do not penetrate the filter body 310, a separation space 320b may be formed in the filter hole 320 and allow an internal space and an external space of the filter body 310 to communicate with each other in the direction perpendicular to the flow direction DF of the cyclone flow.

[0308] Specifically, because a part of the air introduced into the filter body 310 through the separation space 320b does not define an obtuse angle with respect to the flow direction DF of the cyclone flow, foreign substances such as hairs may be easily introduced into the filter body 310 through the separation space 320b.

[0309] Therefore, in case that the first through-line P1 and the second through-line P2, which penetrate the first intersection line region I1, penetrate the filter body 310, it is possible to prevent the air passing through the filter hole 320 from passing through the filter hole 320 without being inclined at an obtuse angle with the flow direction DF of the cyclone flow.

[0310] Meanwhile, the central axes of at least some of the plurality of filter holes 320 may be parallel to one another. In addition, the angles θ of some of the plurality of filter holes 320 may be different from the angles θ of some of the other filter holes 320.

[0311] Specifically, when the central axes of the filter holes 320 are parallel to one another, the angles of the filter holes 320, which are defined between the first direction D1, which is the inward direction of the central axis C, and the tangential direction of the cyclone flow, which intersects the central axis C of the filter hole 320, may be obtuse angles and be different from one another.

[0312] That is, because the central axes of some of the plurality of filter holes 320 are parallel to one another and the tangential direction of the cyclone flow flowing along the outer peripheral surface of the filter body 310 varies always, the angles of the filter holes 320, which are defined between the first direction D1, which is the inward direction of the central axis C, and the second direction D2, which is the tangential direction of the cyclone flow intersecting the central axis C of the filter hole 320, may be different from one another for the respective filter holes 320.

[0313] Meanwhile, FIG. 24 is a perspective view for explaining a filter part of a cleaner according to another embodiment of the present disclosure.

[0314] With reference to FIG. 24, the cleaner according to another embodiment of the present disclosure may include a filter part 1300.

[0315] In order to avoid a repeated description, the contents related to the filter part 1300 according to the embodiment of the present disclosure may be used to describe the filter part 1300 of the cleaner according to another embodiment of the present disclosure, except for the components particularly mentioned.

[0316] The filter part 1300 may include a filter body 1310 and filter holes 1320.

[0317] An outer surface of the filter body 1310 may be divided into a plurality of regions. The plurality of regions may be disposed differently depending on the flow directions of the cyclone flow generated along the outer side of the filter body 1310.

[0318] For example, a part of the outer surface of the filter body 1310 may be divided into a first region T1, a second region T2, a third region T3, and a fourth region T4. An imaginary straight line, which perpendicularly connects a center of the first region T1 and a central axis a15 of the filter body, and an imaginary straight line, which perpendicularly connects a center of the second region T2 and the central axis a15 of the filter body may be positioned at skew positions. The imaginary straight line, which perpendicularly connects the center of the second region T2 and the central axis a15 of the filter body, and an

imaginary straight line, which perpendicularly connects a center of the third region T3 and the central axis a15 of the filter body may be positioned at skew positions. The imaginary straight line, which perpendicularly connects the center of the third region T3 and the central axis a15 of the filter body, and an imaginary straight line, which perpendicularly connects a center of the fourth region T4 and the central axis a15 of the filter body may be positioned at skew positions.

[0319] The filter hole 1320 may guide the air into the filter body 1310. The plurality of filter holes 1320 may be formed in the longitudinal direction along a part of the outer periphery of the filter body 1310.

[0320] The plurality of filter holes 1320 may be disposed in the plurality of regions defined on the outer surface of the filter body 1310. The plurality of filter holes 1320 may be disposed differently depending on the flow directions of the cyclone flow generated along the outer side of the filter body 1310.

[0321] For example, the filter holes 1320 may include first filter holes 1321, second filter holes 1322, third filter holes 1333, and fourth filter holes 1334. The first filter hole 1321 may mean a filter hole disposed in the first region T1. The second filter hole 1322 may mean a filter hole disposed in the second region T2. The third filter hole 1323 may mean a filter hole disposed in the third region T3. The fourth filter hole 1324 may mean a filter hole disposed in the fourth region T4.

[0322] Meanwhile, FIG. 16 is a block diagram for explaining a control configuration of the cleaner system according to the embodiment of the present disclosure.

[0323] The control configuration of the cleaner system 10 of the present disclosure will be described below with reference to FIG. 16.

[0324] The cleaner system 10 according to the embodiment of the present disclosure may further include a control unit 400 configured to control the coupling part 120, the fixing unit 130, the door unit 140, the cover opening unit 150, the dust collecting part 170, the flow path part 180, the dust suction module 190, the suction motor 214, the operating part 218, and the battery 240.

[0325] The control unit 400 may include a printed circuit board and elements mounted on the printed circuit board.

[0326] The control unit 400 may include a station control unit 401 configured to control the cleaner station 100, and a cleaner control unit 402 configured to control the cleaner 200. The station control unit 401 and the cleaner control unit 402 may exchange information and process data while performing communication. Hereinafter, the station control unit 401 and the cleaner control unit 402 will be referred to collectively as the control unit 400 unless otherwise noted.

[0327] When the coupling sensor 125 detects the coupling of the cleaner 200, the coupling sensor 125 may transmit a signal indicating that the cleaner 200 is coupled to the coupling part 120. In this case, the control unit 400 may receive the signal from the coupling sensor 125 and determine that the cleaner 200 is coupled to the coupling part 120.

[0328] In addition, when the charging part 128 supplies power to the battery 240 of the cleaner 200, the control unit 400 may determine that the cleaner 200 is coupled to the coupling part 120.

[0329] When the control unit 400 determines that the cleaner 200 is coupled to the coupling part 120, the control unit 400 may operate the fixing part motor 133 to fix the cleaner 200.

[0330] When the fixing members 131 or the fixing part links 135 are moved to a predetermined fixing position, a fixing detecting part 137 may transmit a signal indicating that the cleaner 200 is fixed. The station control unit 400 may receive the signal, which indicates that the cleaner 200 is fixed, from the fixing detecting part 137, and determine that the cleaner 200 is fixed. When the control unit 400 determines that the cleaner 200 is fixed, the control unit 400 may stop the operation of the fixing part motor 133.

[0331] Meanwhile, when the operation of emptying the dust bin 220 is ended, the control unit 400 may rotate the fixing part motor 133 in the reverse direction to release the cleaner 200.

[0332] When the control unit 400 determines that the cleaner 200 is fixed to the coupling part 120, the control unit 400 may operate the door motor 142 to open the door 141 of the cleaner station 100.

[0333] When the door 141 or the door arm 143 reaches a predetermined opening position, the door opening/closing detecting part 144 may transmit a signal indicating that the door 141 is opened. The control unit 400 may receive the signal, which indicates that the door 141 is opened, from the door opening/closing detecting part 137 and determine that the door 141 is opened. When the control unit 400 determines that the door 141 is opened, the control unit 400 may stop the operation of the door motor 142.

[0334] Meanwhile, when the operation of emptying the dust bin 220 is ended, the control unit 400 may rotate the door motor 142 in the reverse direction to close the door 141.

[0335] When the control unit 400 determines that the door 141 is opened, the control unit 400 may operate the cover opening motor 152 to open the discharge cover 222 of the cleaner 200.

[0336] When a guide frame 151e reaches the predetermined opening position, the cover opening detecting part 155f may transmit a signal indicating that the discharge cover 222 is opened. The control unit 400 may receive the signal, which indicates that the discharge cover 222 is opened, from the cover opening detecting part 155f and determine that the discharge cover 222 is opened. When the control unit 400 determines that the discharge cover 222 is opened, the control unit 400 may stop the operation of the cover opening motor 152.

[0337] The control unit 400 may operate the dust collecting motor 191 to suck the dust in the dust bin 220.

[0338] The control unit 400 may operate the display

part 410 to display a dust bin emptied situation and a charged situation of the cleaner 200.

[0339] Meanwhile, the cleaner station 100 according to the present disclosure may include the display part 410.

[0340] The display part 410 may be disposed on the housing 110, disposed on a separate display device, or disposed on a terminal such as a mobile phone.

[0341] The display part 410 may be configured to include at least any one of a display panel capable of outputting letters and/or figures and a speaker capable of outputting voice signals and sound. The user may easily ascertain a situation of a currently performed process, a residual time, and the like on the basis of information outputted through the display part.

[0342] Meanwhile, the cleaner station 100 according to the embodiment of the present disclosure may include a memory 430. The memory 430 may include various data for operating or driving the cleaner station 100.

[0343] Meanwhile, the cleaner station 100 according to the embodiment of the present disclosure may include an input part 440. The input part 440 generates key input data inputted by the user to control the operation of the cleaner station 100. To this end, the input part 440 may include a keypad, a dome switch, a touchpad (resistive touchpad/capacitive touchpad), and the like. In particular, in case that the touchpad defines a mutual layer structure together with the display part 410, the touchpad may be called a touch screen.

[0344] While the present disclosure has been described with reference to the specific embodiments, the specific embodiments are only for specifically explaining the present disclosure, and the present disclosure is not limited to the specific embodiments. It is apparent that the present disclosure may be modified or altered by those skilled in the art without departing from the technical spirit of the present disclosure.

[0345] All the simple modifications or alterations to the present disclosure fall within the scope of the present disclosure, and the specific protection scope of the present disclosure will be defined by the appended claims.

Claims

1. A cleaner comprising:

a dust bin;
a suction part configured to guide air into the dust bin;
a suction motor configured to generate a suction force so that air is sucked through the suction part;
a cyclone part configured to separate dust from air by generating a cyclone flow in the air sucked through the suction part; and
a filter part configured to filter air discharged from the cyclone part,
wherein the filter part comprises:
a filter body disposed in the dust bin and having an outer periphery along which the cyclone flow is generated; and
filter holes configured to guide air into the filter body and
wherein the air is introduced into the filter body through the filter holes in a state in which the air is inclined in a reverse direction to a flow direction of the cyclone flow generated at an inlet side of the filter hole.

2. The cleaner of claim 1, wherein an angle between a direction in which the air is introduced into the filter body through the filter hole and the flow direction of the cyclone flow generated at the inlet side of the filter hole is an obtuse angle.

3. The cleaner of claim 1, wherein an angle between a first direction, which is an inward direction of a central axis of the filter hole, and a second direction, which is a tangential direction of the cyclone flow intersecting the central axis, is an obtuse angle.

4. The cleaner of claim 2 or 3, wherein the angle is 110 to 150 degrees.

5. The cleaner of claim 1, wherein an inner surface of the filter hole is inclined in a reverse direction to the flow direction of the cyclone flow generated at the inlet side of the filter hole.

6. The cleaner of claim 5, wherein a first intersection line region, in which the inner surface of the filter hole and an outer surface of the filter body intersect each other, is disposed to be biased in the flow direction of the cyclone flow in comparison with a second intersection line region in which the inner surface of the filter hole and an inner surface of the filter body intersect each other.

7. The cleaner of claim 6, wherein a first through-line, which penetrates the first intersection line region in a direction perpendicular to the flow direction of the cyclone flow, and a second through-line, which penetrates the second intersection line region in the direction perpendicular to the flow direction of the cyclone flow, penetrate the filter body.

8. The cleaner of claim 1, wherein the filter body is made of at least any one material selected from plastic and metal.

9. The cleaner of claim 2 or 3, wherein the filter holes are provided as a plurality of filter holes formed in a longitudinal direction along the outer periphery of the filter body.

10. The cleaner of claim 9, wherein central axes of at

least some of the plurality of filter holes are parallel to one another.

11. The cleaner of claim 9, wherein angles of some of the plurality of filter holes are different from angles of some of the other filter holes.

12. The cleaner of claim 1, wherein the cyclone flow includes at least one bent point at which the flow direction changes from a direction in which the cyclone flow flows along an outer side of the filter body to a direction in which the cyclone flow is introduced into the filter body through the filter hole.

13. The cleaner of claim 1, wherein the air passes through the filter hole in a state in which the air is inclined in the reverse direction to the flow direction of the cyclone flow generated at the inlet side of the filter hole.

14. A cleaner system comprising:

a cleaner comprising a dust bin, and a suction part configured to guide air into the dust bin; and a cleaner station comprising a housing in which a coupling part onto which the cleaner is seated and coupled is disposed, a dust collecting part accommodated in the housing and configured to capture dust in the dust bin, a flow path part configured to connect the dust collecting part and a dust passage hole formed in the coupling part, and a dust collecting motor disposed below the dust collecting part and configured to generate a suction force so that the dust is introduced into the dust collecting part through the flow path part,
wherein the cleaner comprises:

a cyclone part configured to separate dust from air sucked by the suction part by means of a cyclone flow generated by a suction force of the dust collecting motor; and
a filter part configured to filter air discharged from the cyclone part,
wherein the filter part comprises:

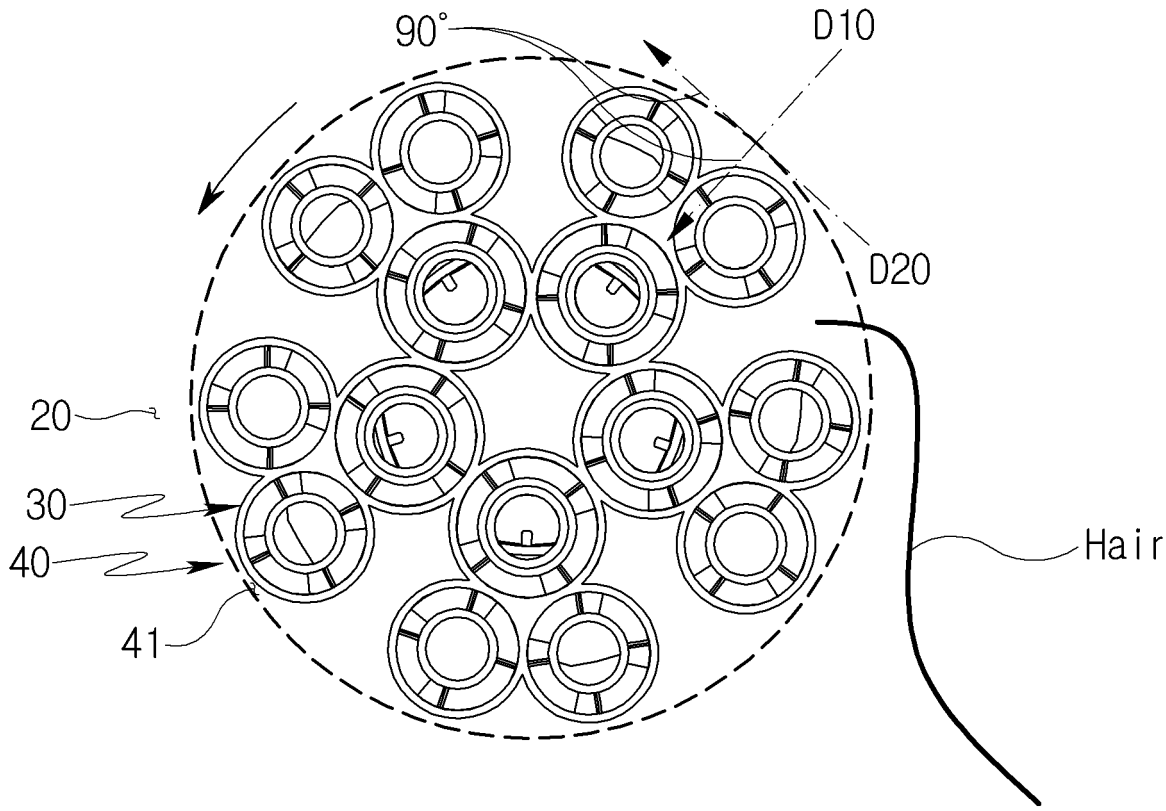
a filter body disposed in the dust bin and having an outer periphery along which the cyclone flow is generated; and
filter holes configured to guide air into the filter body and
wherein the air is introduced into the filter body through the filter hole in a state in which the air is inclined in a reverse direction to a flow direction of the cyclone flow generated at an inlet side of the filter hole.

15. The cleaner system of claim 14, wherein an angle between a direction in which the air is introduced into the filter body through the filter hole and the flow direction of the cyclone flow generated at the inlet side of the filter hole is an obtuse angle.

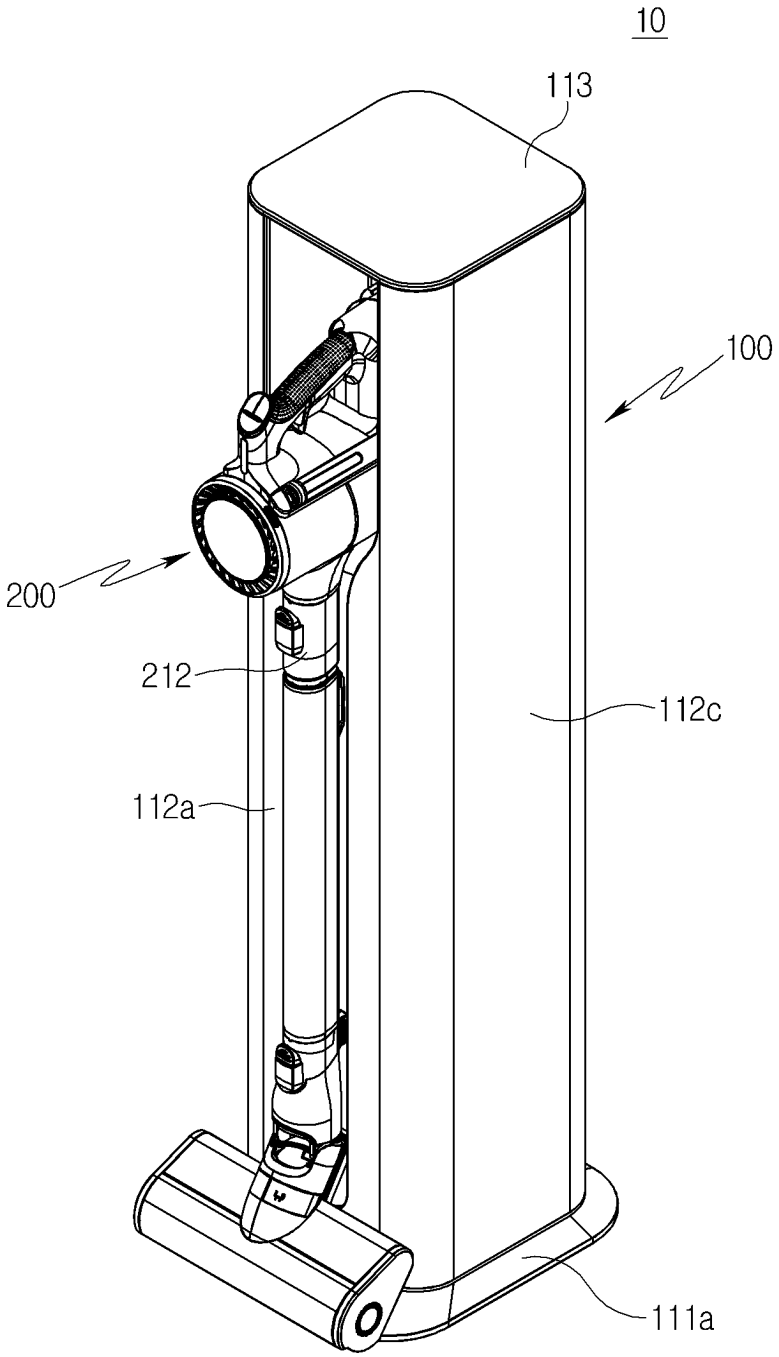
16. The cleaner system of claim 14, wherein an angle between a first direction, which is an inward direction of a central axis of the filter hole, and a second direction, which is a tangential direction of the cyclone flow intersecting the central axis, is an obtuse angle.

17. The cleaner system of claim 15 or 16, wherein the angle is 110 to 150 degrees.

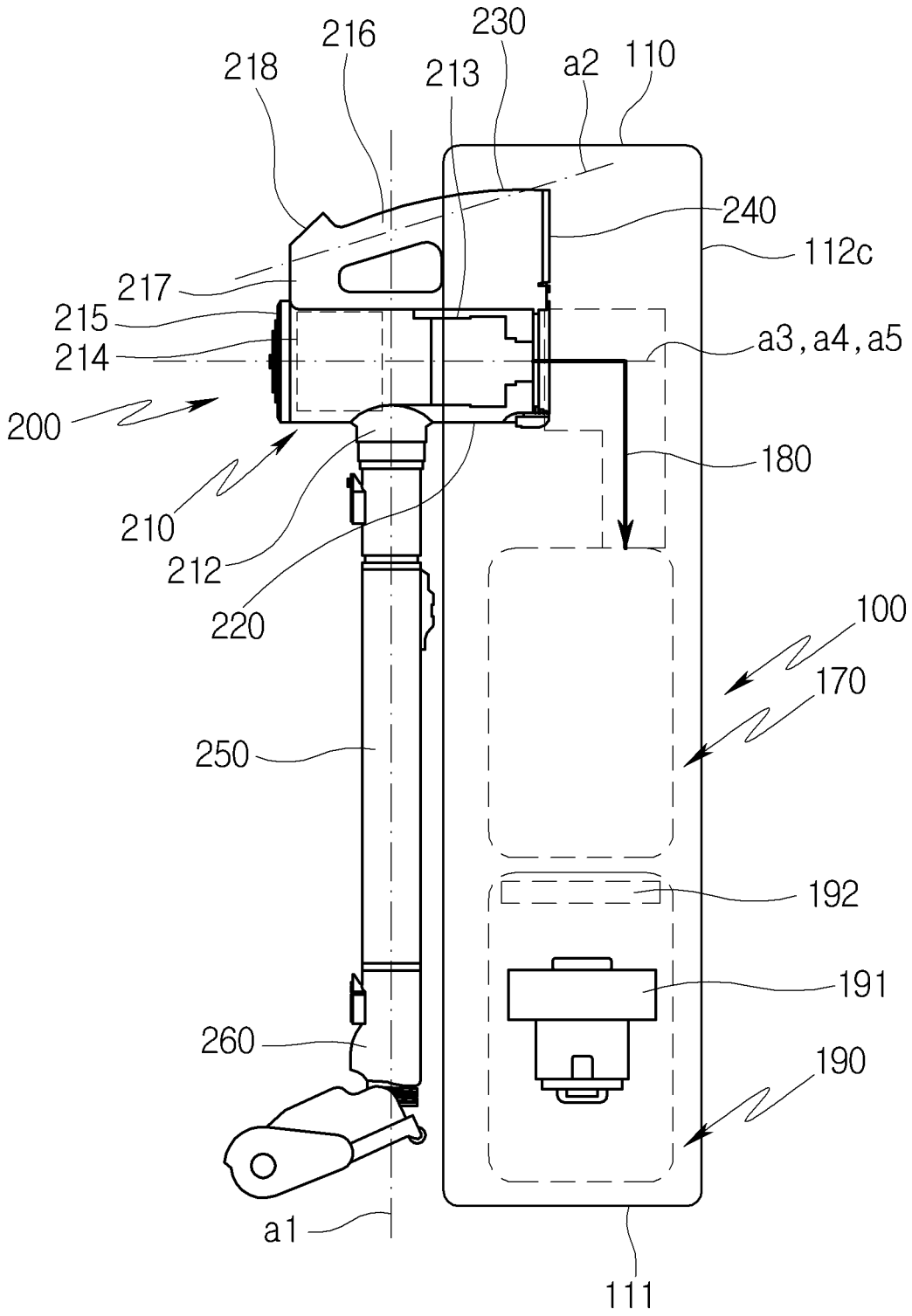
[FIG. 1]



[FIG. 2]



[FIG. 3]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a1
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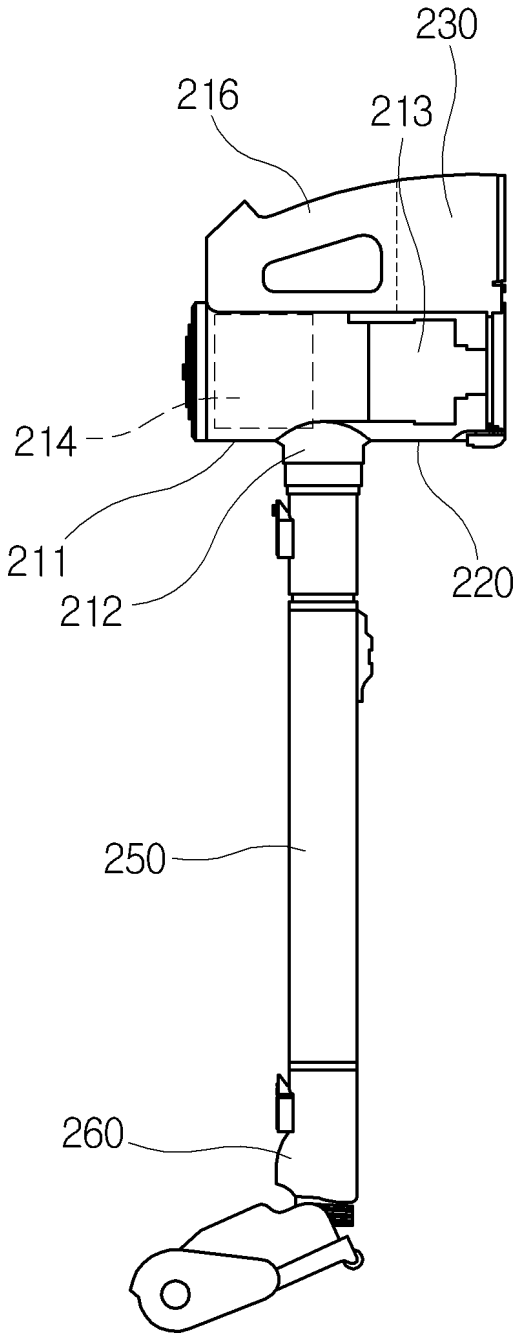
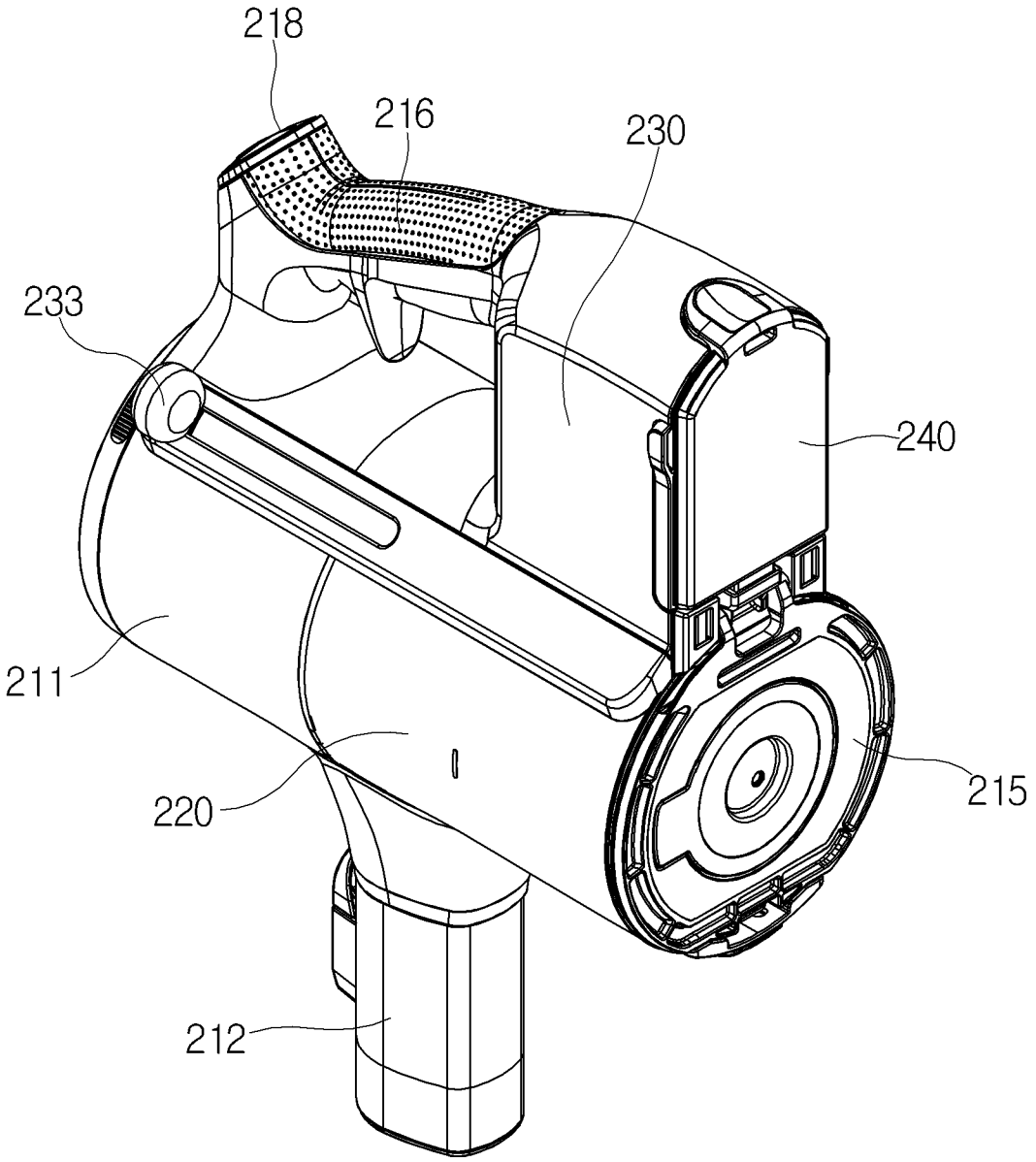
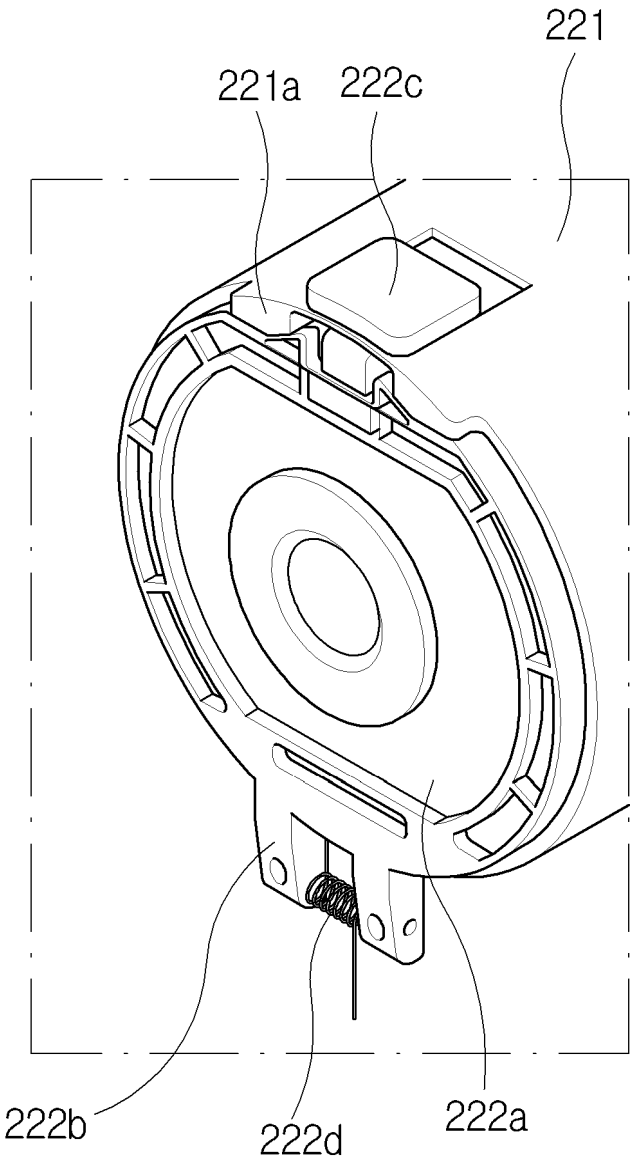
[FIG. 4]



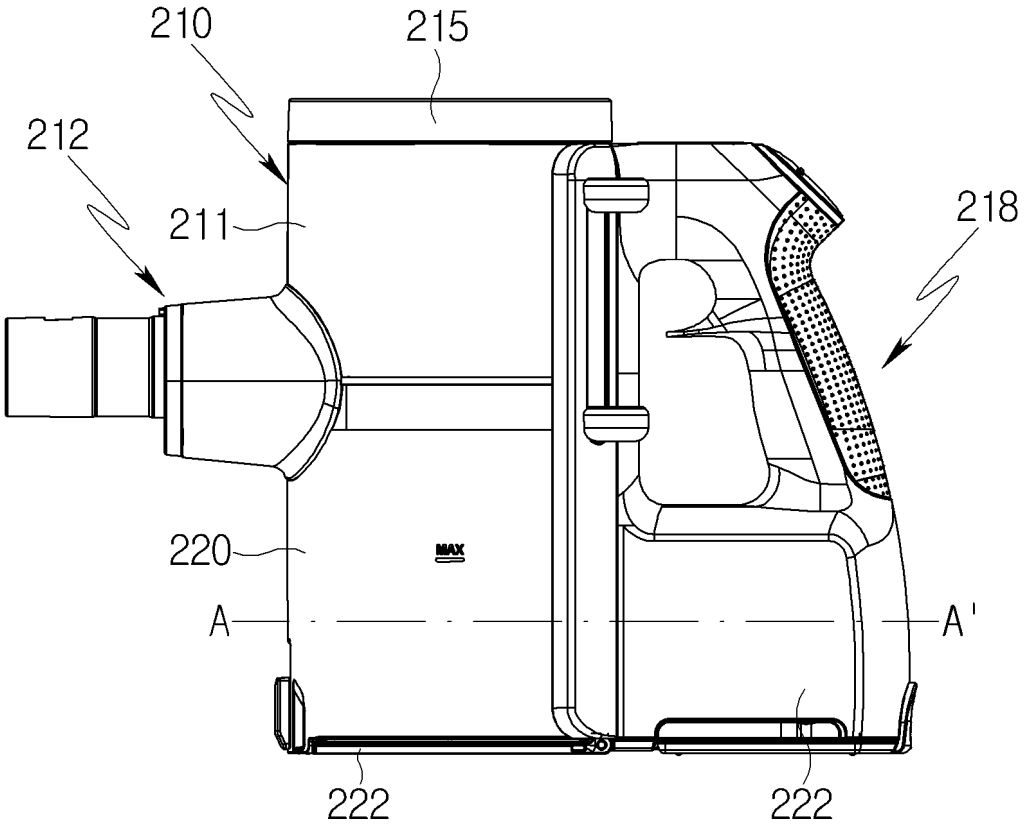
[FIG. 5]



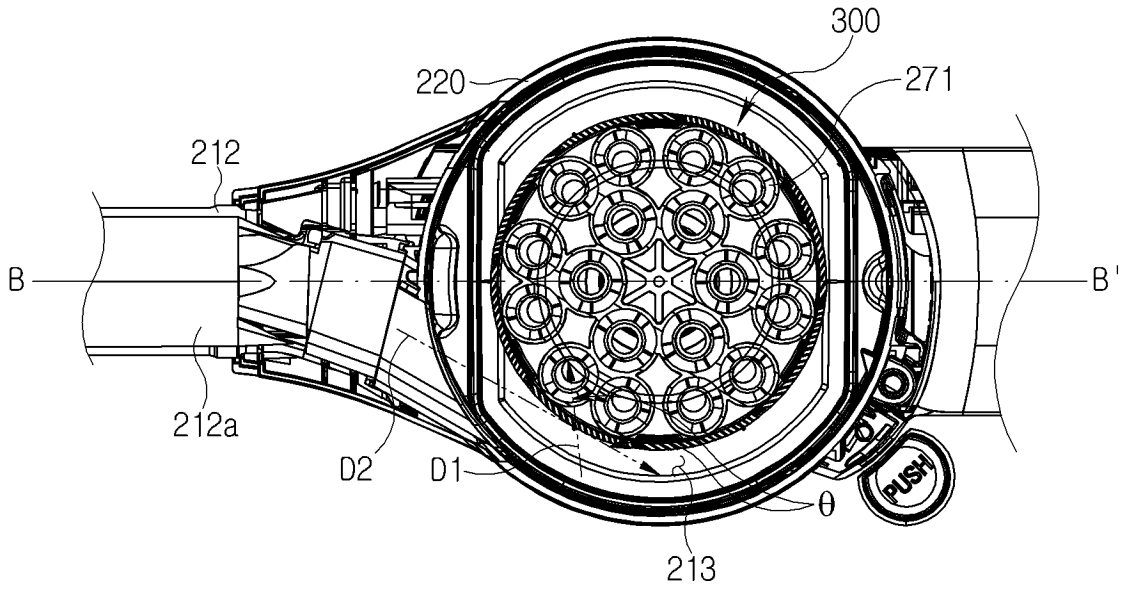
[FIG. 6]



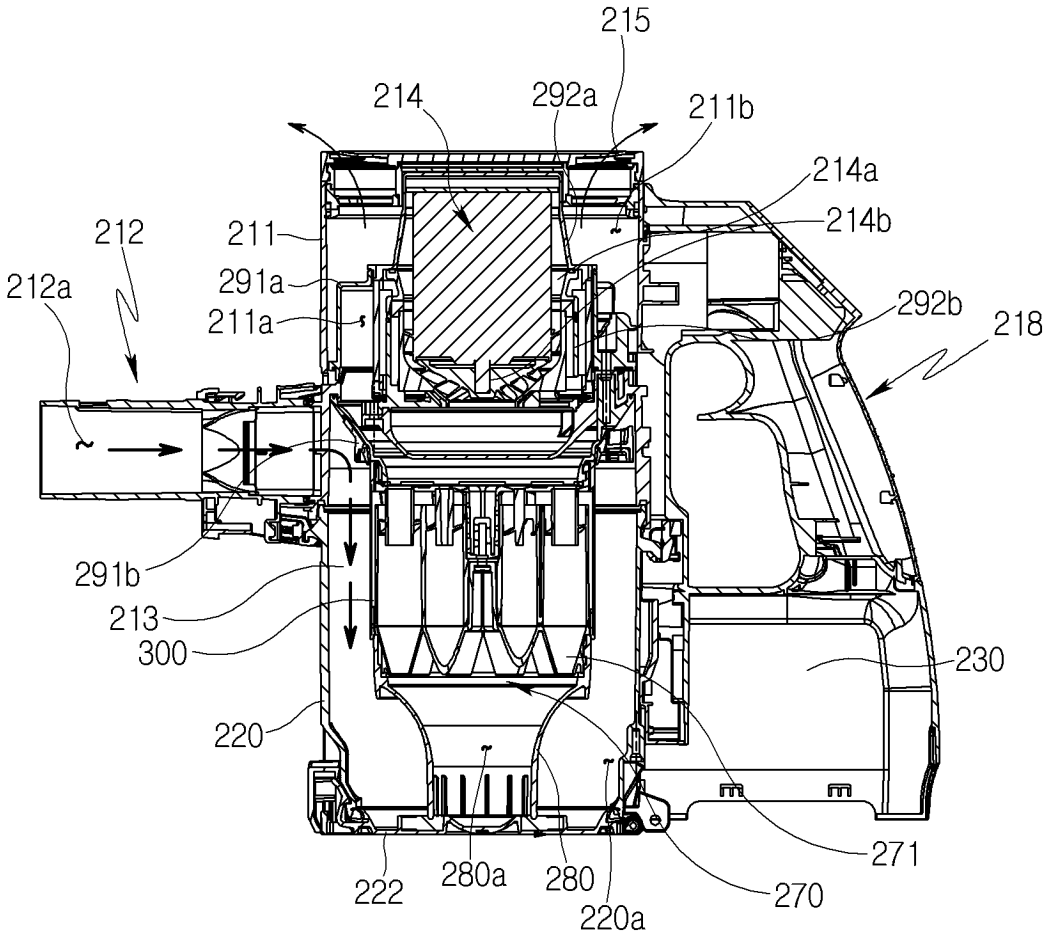
[FIG. 7]



[FIG. 8]



[FIG. 9]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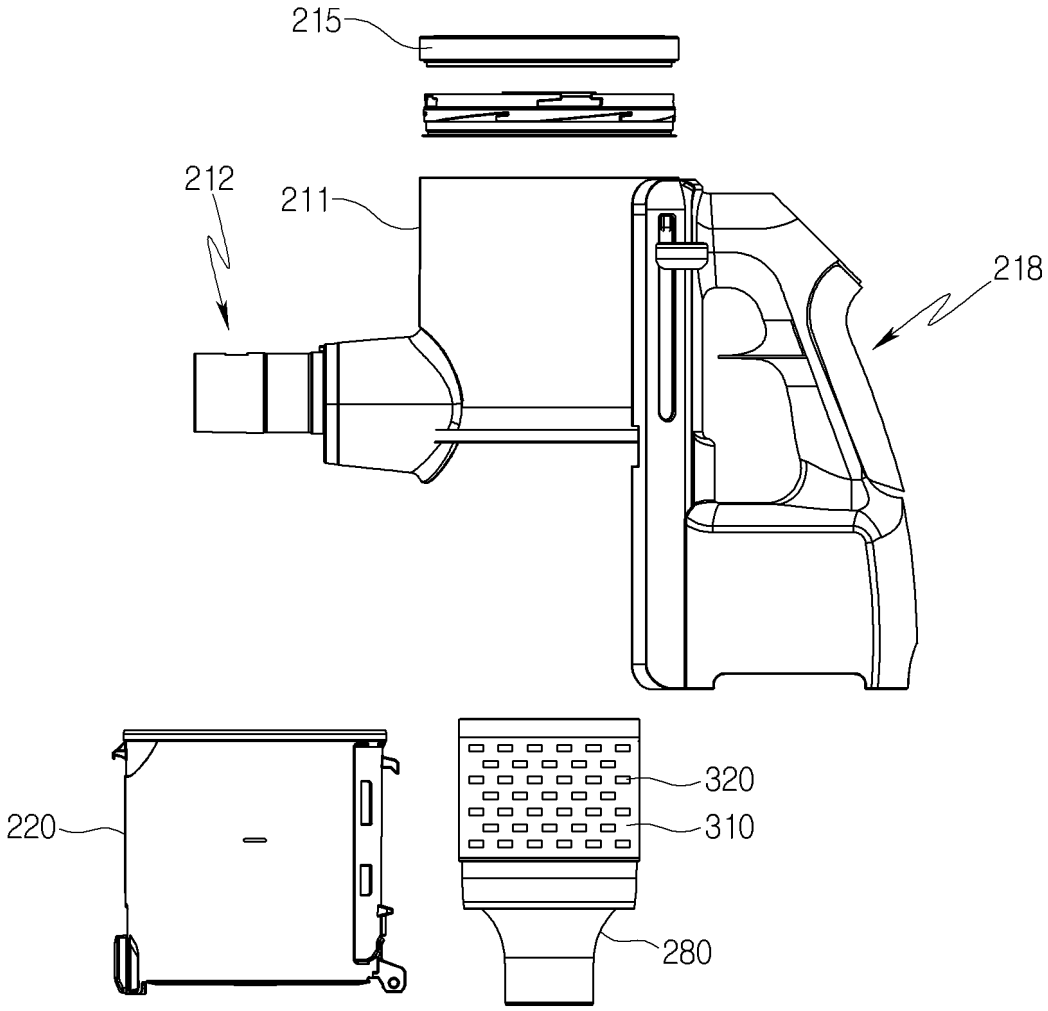
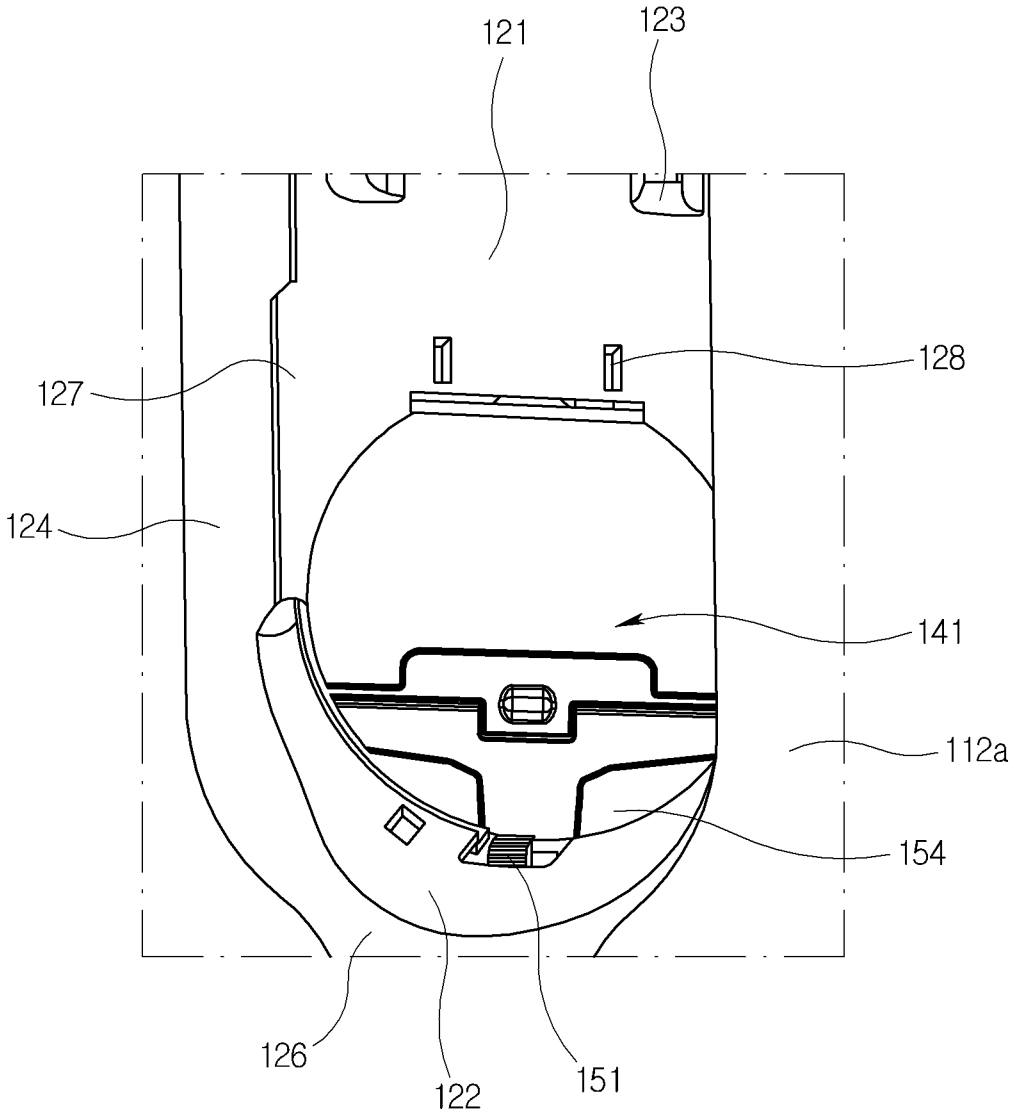
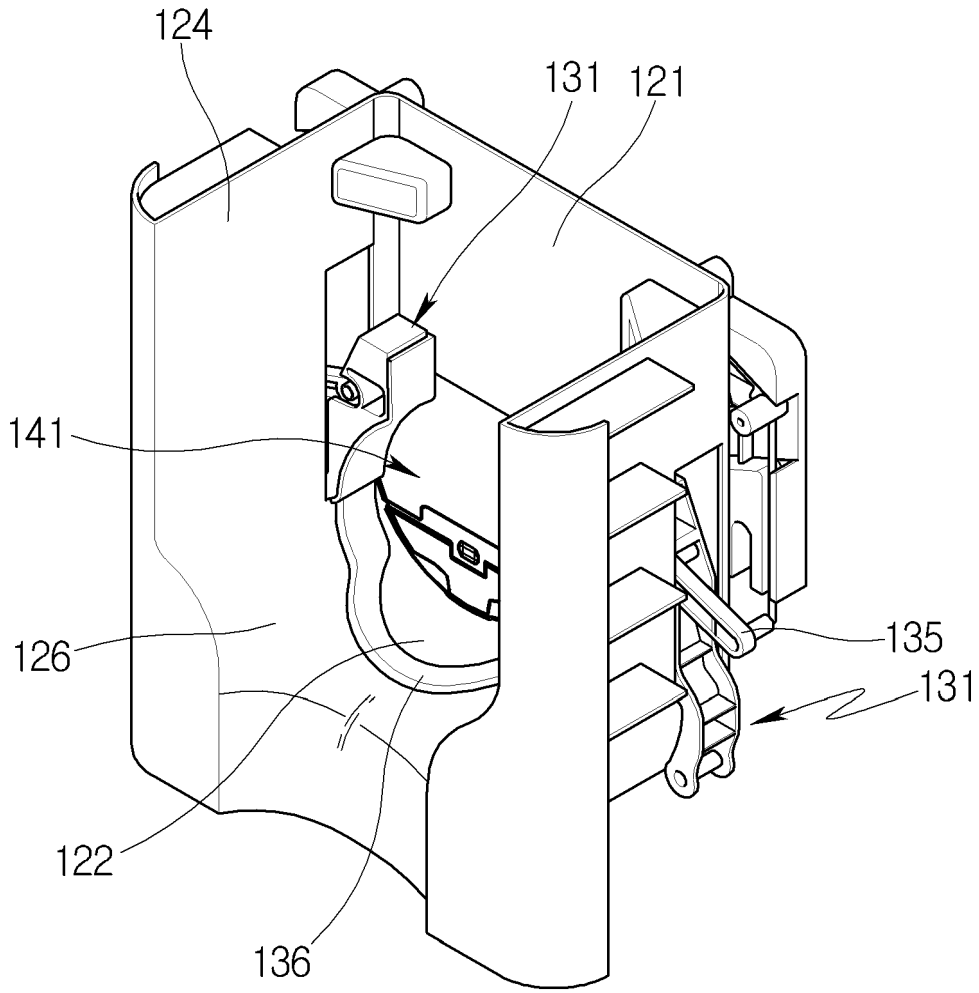
[FIG. 10]



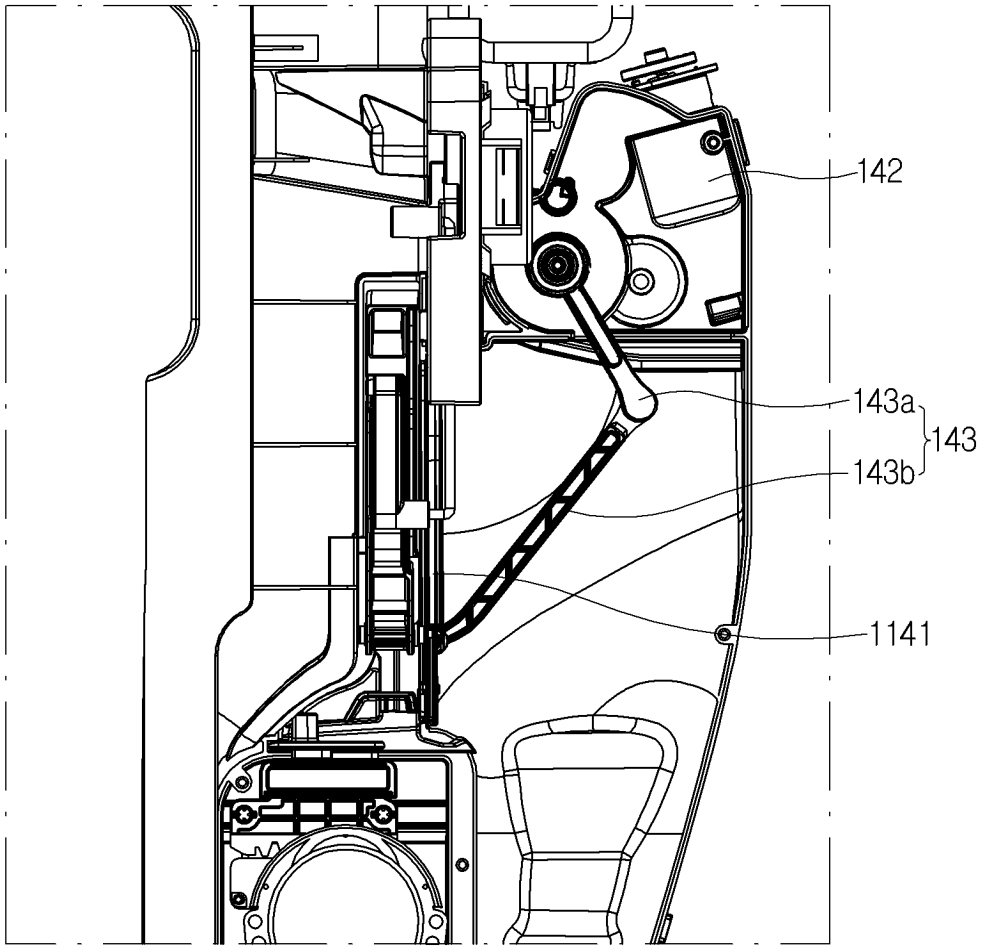
[FIG. 11]



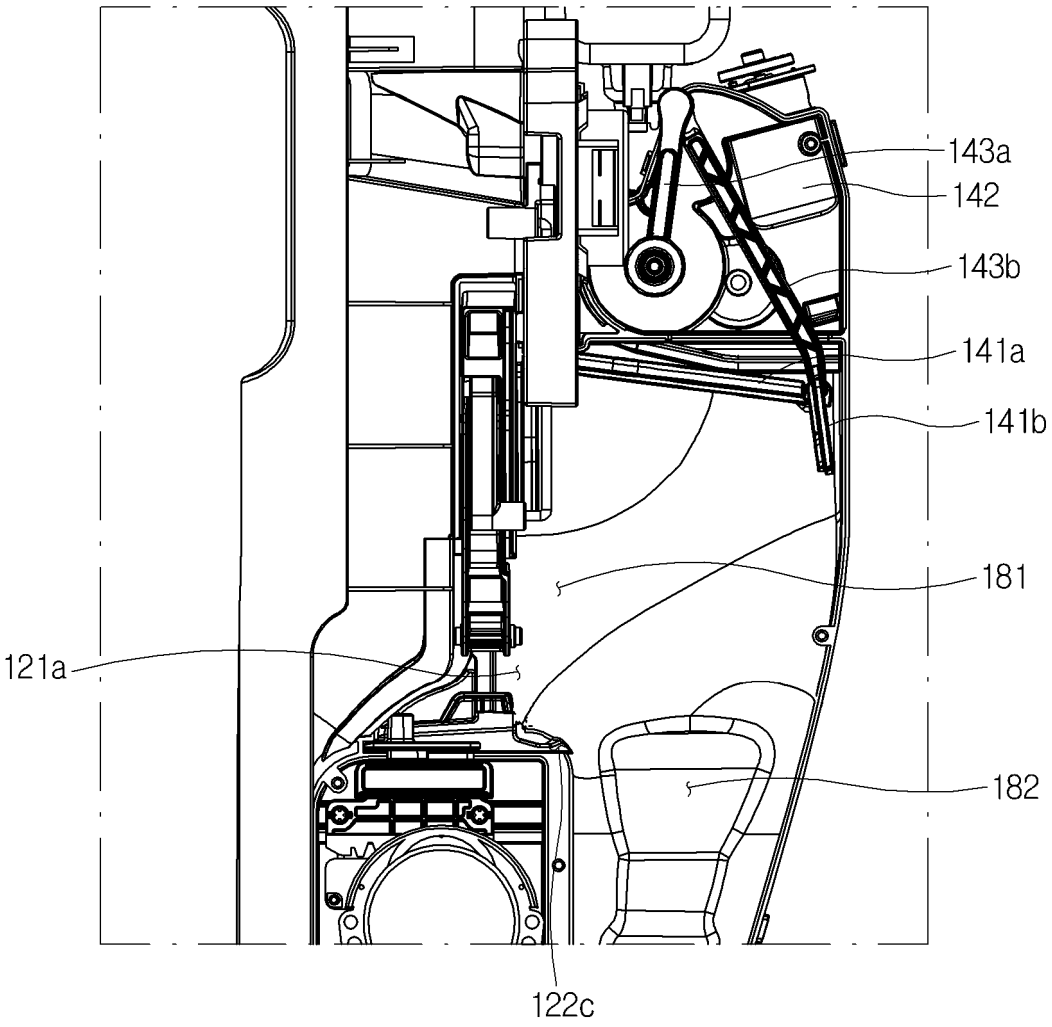
[FIG. 12]



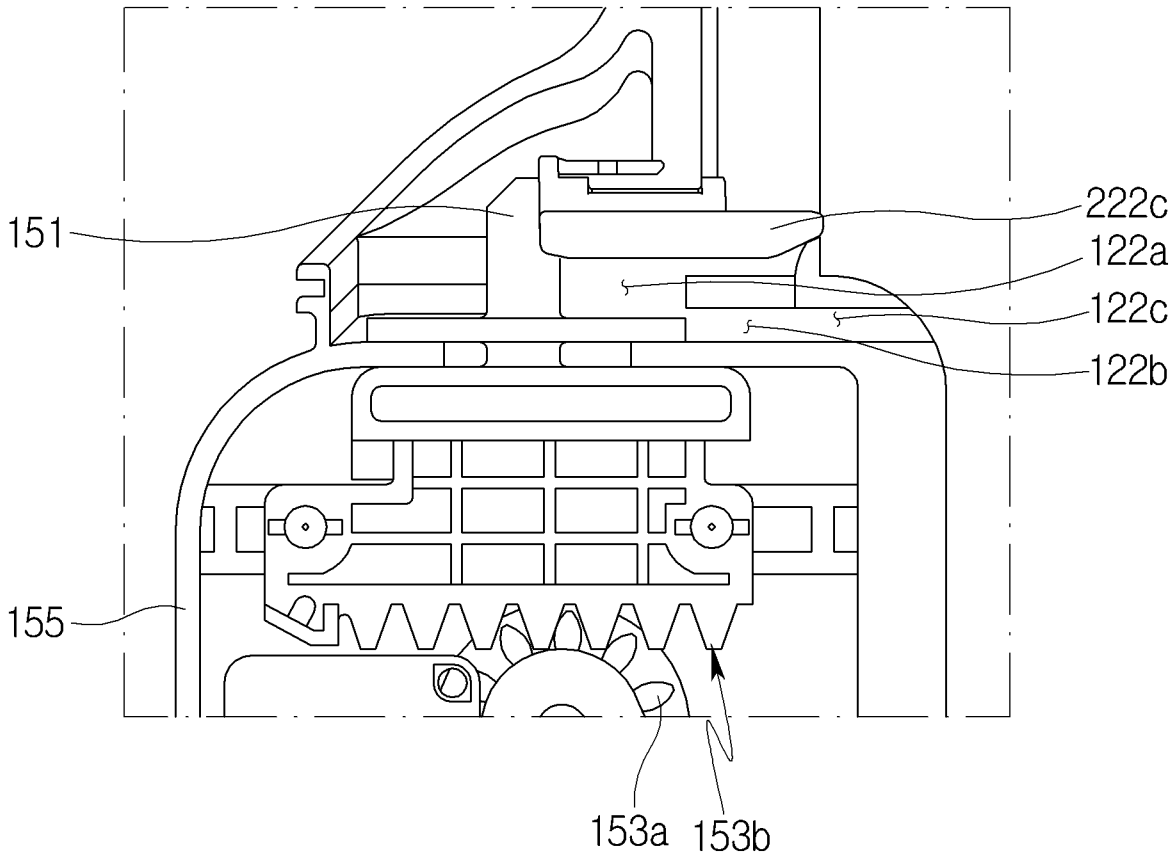
[FIG. 13]



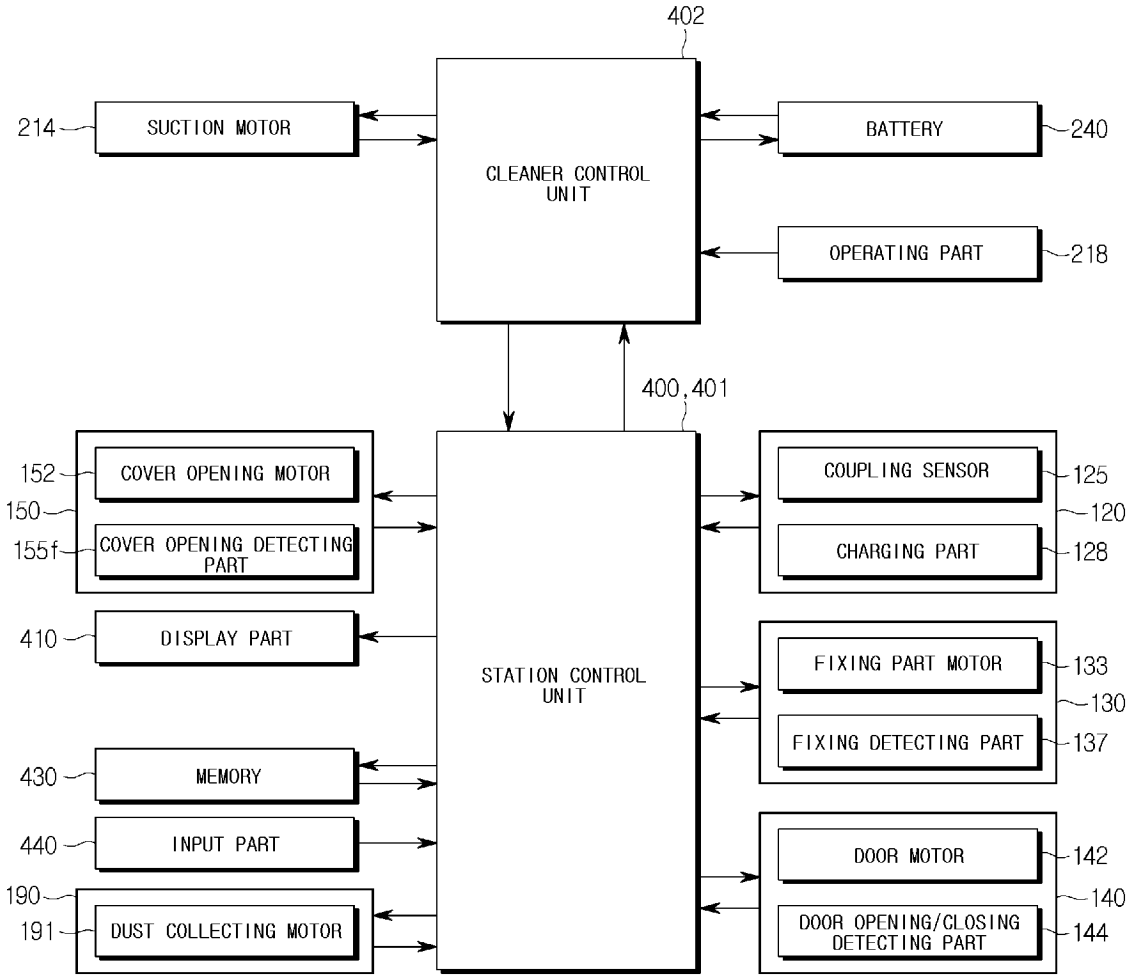
[FIG. 14]



[FIG. 15]



[FIG. 16]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CLEANER CONTROL UNIT
BATTERY
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OPERATING PART
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COVER OPENING MOTOR
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155f
COVER OPENING DETECTING PART
COUPLING SENSOR
125
120
CHARGING PART
128
410
DISPLAY PART
STATION CONTROL UNIT
FIXING PART MOTOR
133
130
FIXING DETECTING PART
137
430
MEMORY
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INPUT PART
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DUST COLLECTING MOTOR
DOOR MOTOR
142
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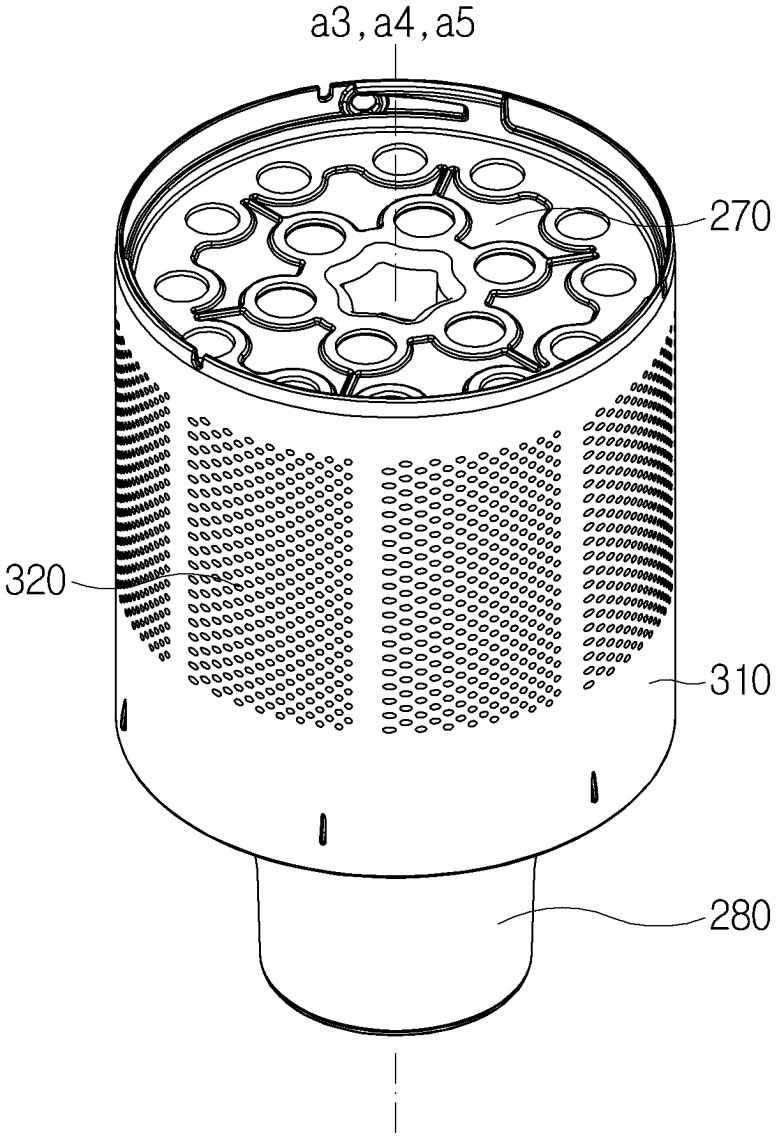
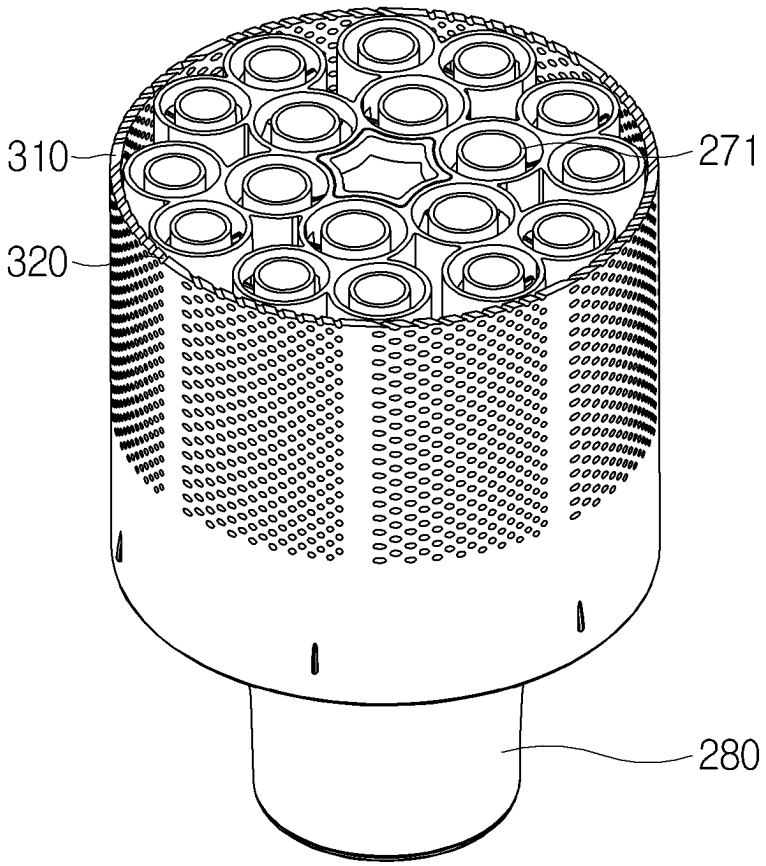
DOOR OPENING/CLOSING DETECTING PART
144

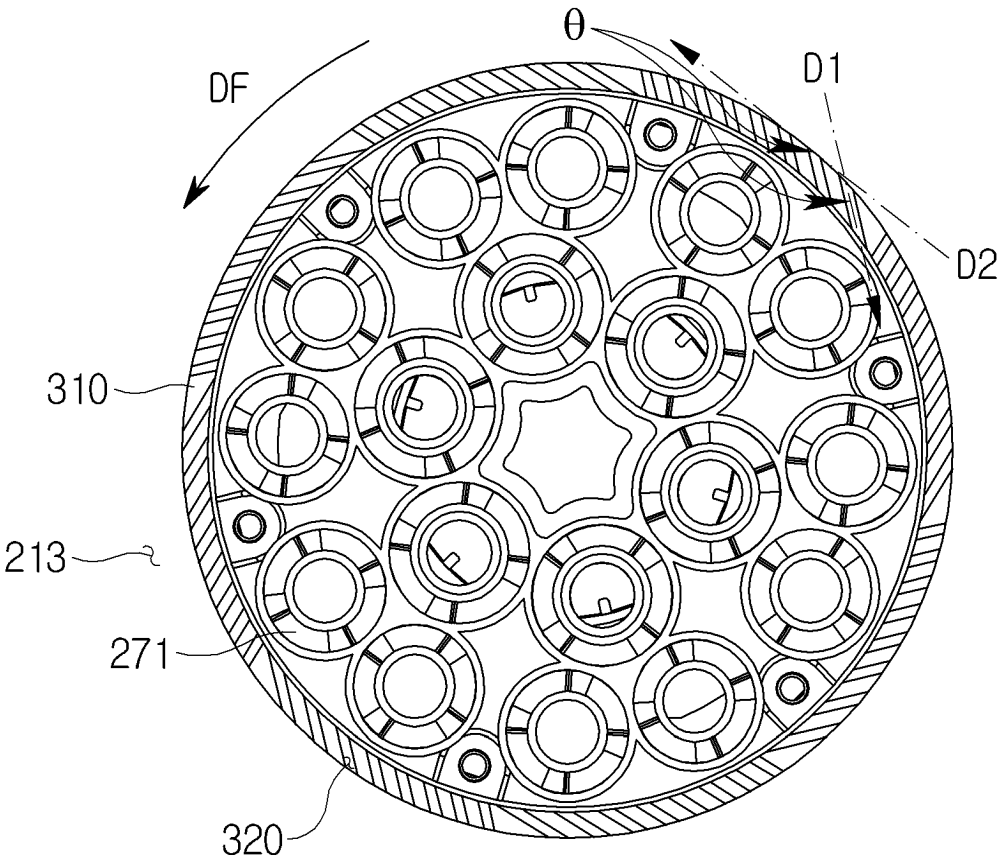
[FIG. 17]



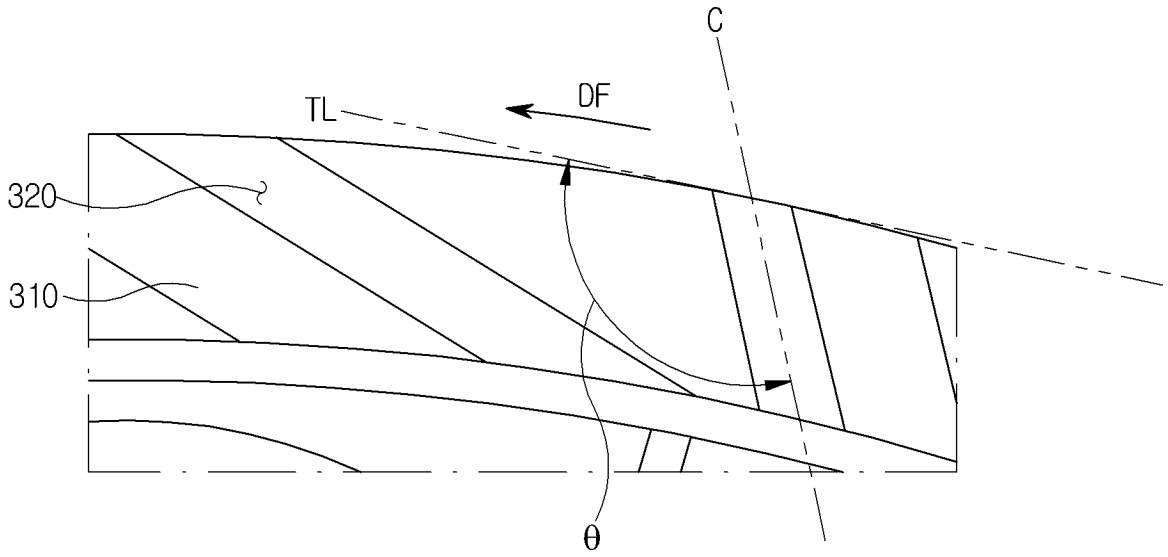
[FIG. 18]



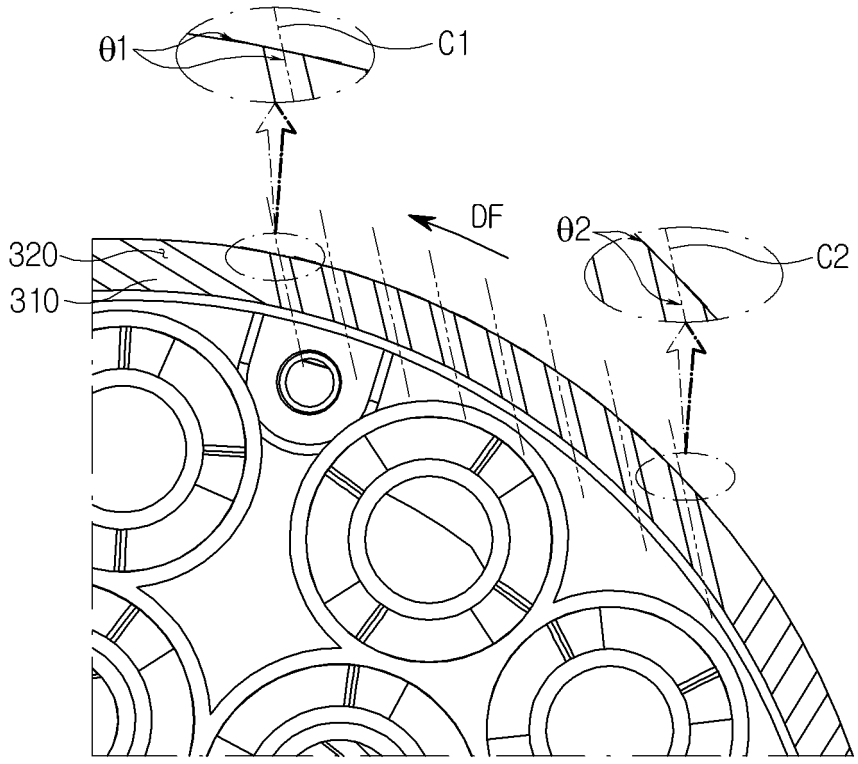
[FIG. 19]



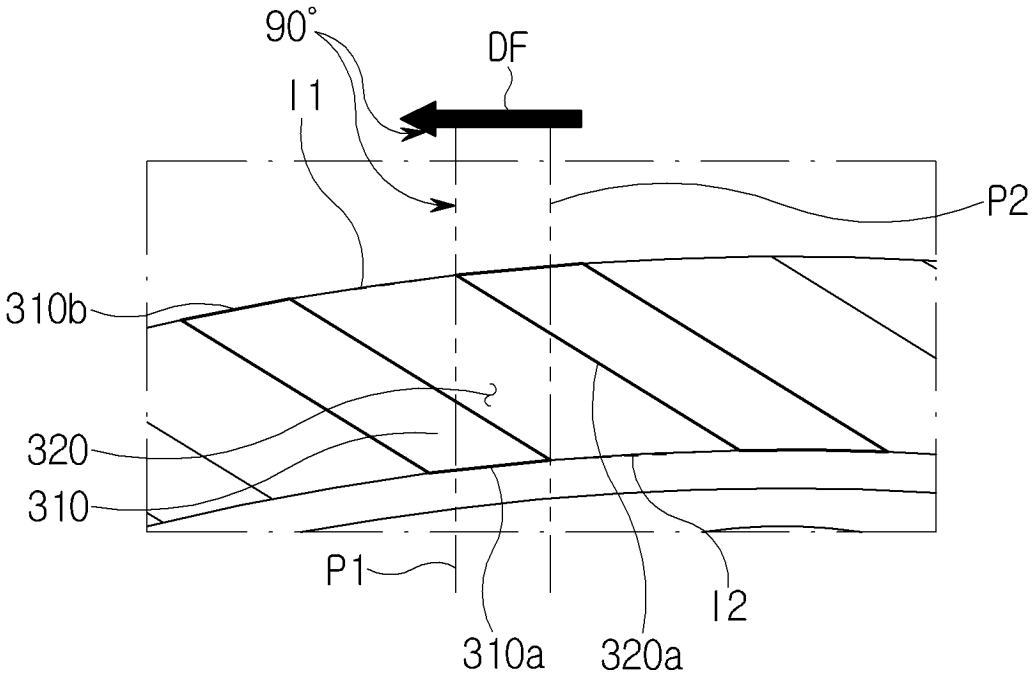
[FIG. 20]



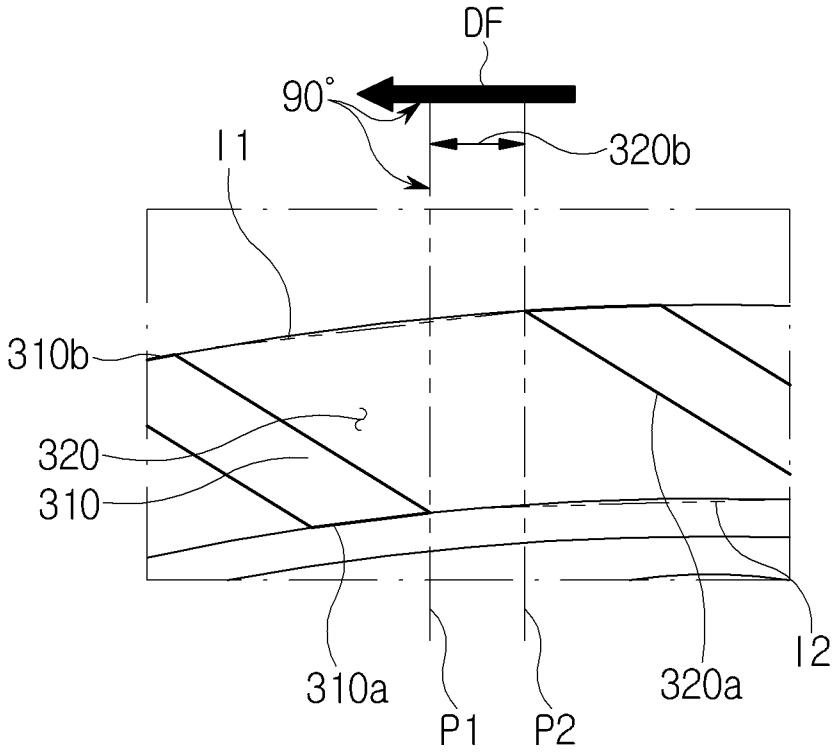
[FIG. 21]



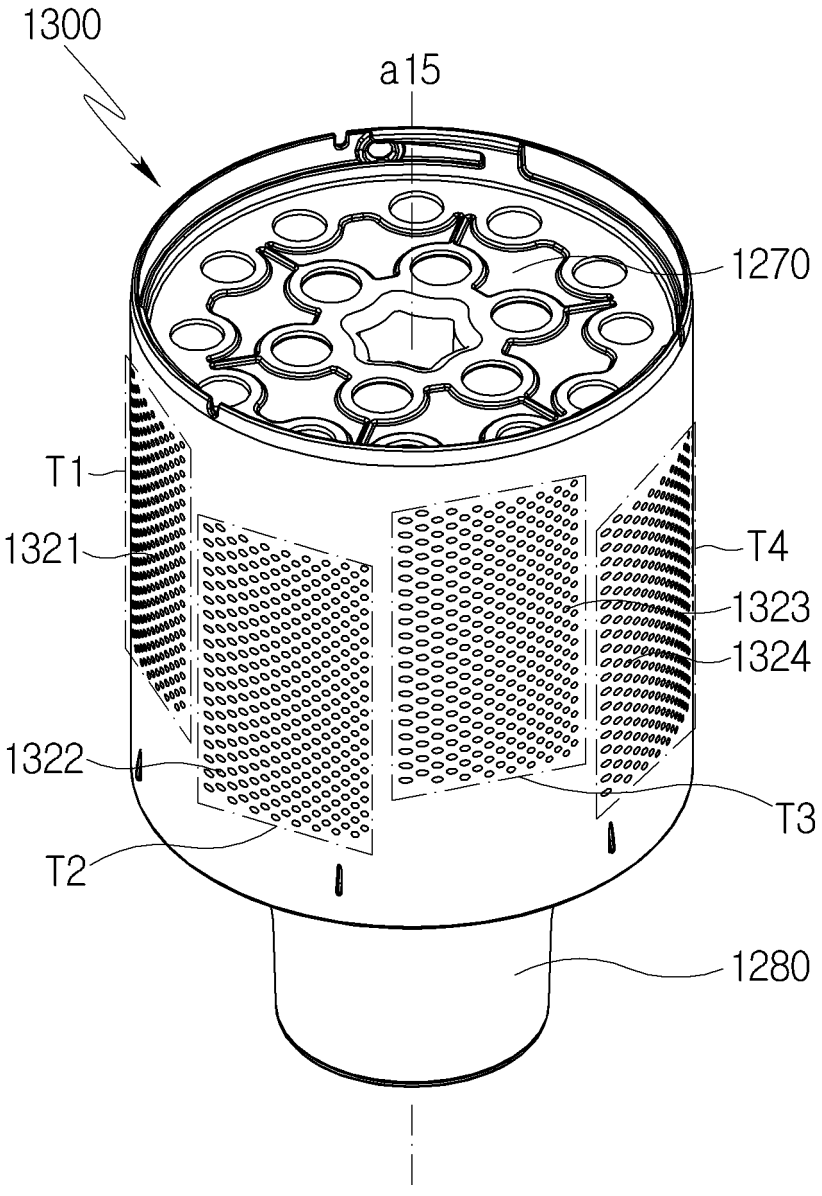
[FIG. 22]



[FIG. 23]



[FIG. 24]



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2022/019832

A. CLASSIFICATION OF SUBJECT MATTER

A47L 9/16(2006.01)i; **A47L 9/12**(2006.01)i; **A47L 9/28**(2006.01)i; **A47L 7/00**(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A47L 9/16(2006.01); A47L 9/06(2006.01); A47L 9/10(2006.01); A47L 9/12(2006.01); B04C 5/10(2006.01)

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

Korean utility models and applications for utility models: IPC as above
Japanese utility models and applications for utility models: IPC as above

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

eKOMPASS (KIPO internal) & keywords: 청소기(vacuum cleaner), 스테이션(station), 필터(filter), 필터홀(filter hole), 경사(incline), 각도(angle), 역방향(reverse), 싸이클론(cyclone), 둔각(obtuse angle), 메쉬(mesh)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 5957699 B2 (PANASONIC CORP.) 27 July 2016 (2016-07-27) See paragraphs [0017]-[0047] and figures 1-9.	1-13
Y		14-17
Y	KR 10-2022-0029054 A (SAMSUNG ELECTRONICS CO., LTD.) 08 March 2022 (2022-03-08) See paragraphs [0117]-[0121] and figure 12.	14-17
X	KR 10-1148358 B1 (PANASONIC CORPORATION) 21 May 2012 (2012-05-21) See paragraphs [0013]-[0056] and figures 1-7b.	1
X	JP 2013-132339 A (PANASONIC CORP.) 08 July 2013 (2013-07-08) See paragraphs [0022]-[0049] and figures 1-9.	1
A	CN 216090302 U (ANKER INNOVATIONS TECHNOLOGY CO., LTD.) 22 March 2022 (2022-03-22) See paragraphs [0025]-[0061] and figures 1-6.	1-17

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

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"D" document cited by the applicant in the international application
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
24 April 2023	**25 April 2023**
Name and mailing address of the ISA/KR **Korean Intellectual Property Office** **Government Complex-Daejeon Building 4, 189 Cheongsa-ro, Seo-gu, Daejeon 35208** Facsimile No. **+82-42-481-8578**	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (July 2022)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/KR2022/019832

Patent document cited in search report			Publication date (day/month/year)	Patent family member(s)			Publication date (day/month/year)
JP	5957699	B2	27 July 2016	CN	103654616	A	26 March 2014
				CN	103654616	B	11 July 2017
				JP	2014-061125	A	10 April 2014
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KR	10-1148358	B1	21 May 2012	CN	101861117	A	13 October 2010
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				CN	102715870	A	10 October 2012
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				EP	2191761	A1	02 June 2010
				EP	2191761	A4	12 December 2012
				EP	2662009	A1	13 November 2013
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				JP	4770821	B2	14 September 2011
				KR	10-2010-0092933	A	23 August 2010
				MY	151255	A	30 April 2014
				US	2010-0275406	A1	04 November 2010
				US	8443486	B2	21 May 2013
				WO	2009-063581	A1	22 May 2009
JP	2013-132339	A	08 July 2013	None			
CN	216090302	U	22 March 2022	None			

Form PCT/ISA/210 (patent family annex) (July 2022)