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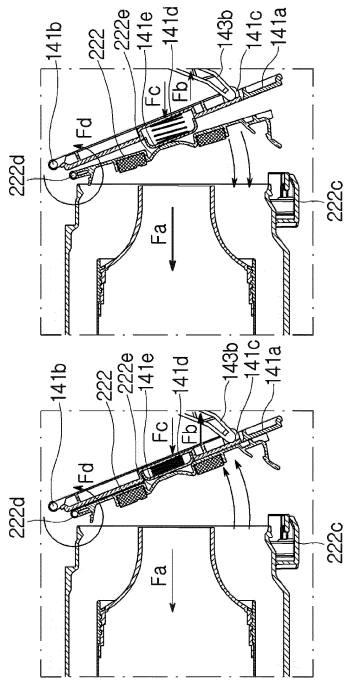
(54) CLEANER SYSTEM AND CONTROL METHOD THEREFOR

(57) The present disclosure relates to a cleaner system and a method of controlling the same, the cleaner system including a dust passing hole formed in a coupling part and having an outlet end connected to a flow path part, the dust passing hole having an inlet end configured to communicate with a discharge port of a dust bin of a cleaner when the cleaner is coupled, and a door hingedly coupled to the coupling part and configured to open or close the dust passage hole formed in the coupling part, in which the door is stopped for a particular time or longer when a rotation angle from the discharge port reaches a first opening angle, the door is stopped for a particular time or longer when the rotation angle reaches a second opening angle smaller than the first opening angle, such that dust in the dust bin may be removed without the separate air resistance when the door rotates to the first opening angle in a dust collecting step, and an airflow is rapidly changed in the dust passage hole when the door rotates to the second opening angle in an additional dust collecting step, such that dust attached to a discharge cover may be effectively removed.

[FIG. 10]



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Description

[Technical Field]

[0001] The present disclosure relates to a cleaner system and a method of controlling the same, and more particularly, to a cleaner system, which includes a cleaner configured to suck outside dust, and a cleaner station configured to suck dust, which is stored in the cleaner, into the cleaner station, and a method of controlling the same.

[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] In addition, recently, a robot cleaner, which autonomously performs a cleaning operation without a user's manipulation, is used. The robot cleaner automatically cleans a zone to be cleaned by sucking debris such as dust from the floor while autonomously traveling in the zone to be cleaned.

[0009] However, because the handy cleaner, the stick cleaner, or the robot cleaner in the related art has a dust bin with a small capacity for storing collected dust, which inconveniences the user because the user needs to empty the dust bin frequently.

[0010] In addition, because the dust scatters during the process of emptying the dust bin, there is a problem in that the scattering dust has a harmful effect on the user's health.

[0011] In addition, if residual dust is not removed from the dust bin, there is a problem in that a suction force of the cleaner deteriorates.

[0012] In addition, if the residual dust is not removed from the dust bin, there is a problem in that the residual dust causes an offensive odor.

[0013] Patent Document 1 discloses a cleaning apparatus including a vacuum cleaner and a docking station.

[0014] The cleaning apparatus disclosed in Patent Document 1 includes the vacuum cleaner including a dust collecting container for collecting debris, and the docking station connected to the dust collecting container and configured to remove the debris collected in the dust collecting container. The dust collecting container is configured to be docked to the docking station, and the docking station includes a suction device configured to suck debris and inside air in the dust collecting container docked to the docking station.

[0015] In addition, Patent Document 1 includes the capturing part disposed in the docking station and configured to capture debris. According to Patent Document, when the suction device disposed in the docking station operates, the suction device generates a negative pressure to suck debris collected in the dust collecting container and collects the debris in the capturing part, thereby cleaning the dust collecting container of the cleaner.

[0016] As one embodiment of Patent Document 1, the docking station includes a flow rate change device. The flow rate change device includes a flow path cover configured to open or close a connection flow path, and an opening/closing unit configured to operate the flow path cover. The opening/closing unit has a plurality of pressing protrusions and a plurality of non-pressing portions that are alternately formed. When the opening/closing unit rotates, the pressing protrusions repeatedly press the flow path cover, such that the flow path cover repeatedly opens or closes the connection flow path.

[0017] However, with reference to the drawings of Patent Document 1, even when the flow path cover is structurally opened maximally, the flow path cover is opened by an angle smaller than about 20 degrees, which causes a problem in that dust attached to an upper surface of the flow path cover cannot be effectively separated even when the opening/closing unit operates. Further, there is also a problem in that an angle by which the flow path cover is opened is small, and the small angle hinders an airflow. In addition, Patent Document 1 has a problem in that a separate drive motor needs to be provided to op-

erate the opening/closing unit.

[0018] Patent Document 2 discloses a cleaning apparatus including a vacuum cleaner and a docking station, and a method of controlling the same.

[0019] Patent Document 2 provides the cleaning apparatus including the docking station that provides an irregular suction airflow to automatically and effectively discharge debris in a dust collecting container of the cleaner.

[0020] In order to achieve the above-mentioned object, Patent Document 2 provides a suction device configured to move air into the docking station from the dust collecting container of the dust bin, and a flow rate adjustment device configured to open or close a suction flow path. A control unit operates the suction device or controls the flow rate adjustment device to periodically open or close the suction flow path in the state in which the suction device operates. According to Patent Document 2, an irregular airflow occurs in the flow path as the flow path is opened or closed by the flow rate adjustment device, and the irregular airflow more efficiently discharges dust.

[0021] However, a flow rate change device and a flow rate adjustment device may be simultaneously provided on a single connection flow path by combining the flow rate adjustment device of Patent Document 2 with Patent Document 1. However, the flow rate adjustment device and the flow rate change device are respectively equipped with drive motors and operated independently. However, this cannot be an effective solution for separating dust attached to the flow path cover.

[0022] Patent Document 3 discloses a cleaning system configured to remove dust from a robot cleaner.

[0023] Patent Document 3 provides a station, a handy cleaner coupled to one side of the station, and the robot cleaner is coupled to the other side of the station. A dust bin of the robot cleaner and a dust bin of the handy cleaner communicate with each other. When a suction motor of the robot cleaner operates, dust collected in the dust bin of the robot cleaner is moved to the handy cleaner, such that the dust bin of the robot cleaner is emptied.

[0024] However, when Patent Documents 1 and 3 are combined, an airflow in a connection flow path may be irregularly changed by a suction motor of a cleaner. However, because the flow rate change device is independently operated by a separate drive motor even in this case, this cannot be an effective solution for separating dust attached to the flow path cover.

[Disclosure]

[Technical Problem]

[0025] The present disclosure has been made in an effort to solve the above-mentioned problem with the cleaner system and the method of controlling the same in the related art. That is, in the related art, there is a problem in that dust is firmly attached, by an electrostatic force and gravity, to an upper surface of a discharge cover disposed at a lower side of a dust bin. An object of the present disclosure is to provide a cleaner system capable of effectively separating dust, which is attached to a discharge cover, from the discharge cover.

[0026] Another object of the present disclosure is to provide a cleaner system and a method of controlling the same, which are capable of generating a high-speed airflow on a particular portion by changing a cross-sectional area of a flow path part, thereby effectively separating the attached dust even when a motor operates at a low rotational speed.

[0027] Still another of the present disclosure is to provide a cleaner system capable of effectively removing dust attached to a discharge cover by forming various airflows by controlling at least any one of a suction motor of a cleaner and a dust collecting motor of a cleaner station.

[0028] Yet another object of the present disclosure is to provide a cleaner system and a method of controlling the same, which are capable of performing control to improve a lifespan of a suction motor or a dust collecting motor during a process of removing dust attached to a discharge cover of a dust bin.

[0029] Technical problems of the present disclosure are not limited to the aforementioned technical problems, and other technical problems, which are not mentioned above, may be clearly understood by those skilled in the art from the following descriptions.

[Technical Solution]

[0030] In order to achieve the above-mentioned object, a cleaner system according to the present disclosure includes: a cleaner configured to collect dust; and a cleaner station to which the cleaner is coupled. The cleaner includes a dust bin configured to collect the sucked dust and having a discharge port formed at one side and configured to discharge the dust. The cleaner station includes: a housing having a coupling part to which the cleaner is coupled, the housing having an internal space configured to accommodate a flow path part through which the dust in the dust bin flows; a dust passage hole formed in the coupling part and having an outlet end connected to the flow path part, the dust passage hole having an inlet end connected to the discharge port of the dust bin when the cleaner is coupled; and a door hingedly coupled to the coupling part and configured to open or close the dust passage hole. The door is stopped for a particular time or longer when a rotation angle of the door from the discharge port reaches a first opening angle, and the door is stopped for a particular time or longer when the rotation angle reaches a second opening angle smaller than the first opening angle.

[0031] An upper end of the door may be hingedly coupled to the coupling part.

[0032] The door may alternately perform a rotation to the first opening angle and a rotation to the second opening angle.

[0033] The cleaner may include a discharge cover configured to cover the discharge port of the dust bin. In this case, the cleaner station may include a vibration spring configured to vibrate the discharge cover by providing an elastic force to the discharge cover.

[0034] The vibration spring may be disposed in the door and provide an elastic force to the discharge cover in a direction in which the discharge port is closed.

[0035] The cleaner may include a torsion spring disposed at one side of the discharge cover and configured to provide an elastic force to the discharge cover in a direction in which the discharge port is opened.

[0036] The discharge cover may vibrate when the door is rotated by the second opening angle.

[0037] The cleaner station may include a dust collecting motor disposed at a downstream side of the flow path part and configured to provide a suction force to the discharge cover in a direction in which the discharge port is opened.

[0038] A suction force of the dust collecting motor may be changed as a rotational speed is changed, and the rotational speed may include a first dust collecting speed and a second dust collecting speed lower than the first dust collecting speed.

[0039] The first dust collecting speed and the second dust collecting speed of the dust collecting motor may be alternately implemented, and the rotational speed may be continuously changed for a predetermined time when the rotational speed is changed.

[0040] The first dust collecting speed and the second dust collecting speed of the dust collecting motor may be alternately implemented, and the dust collecting motor may be turned off for a predetermined time when the rotational speed is changed.

[0041] The cleaner may include a suction motor configured to generate a suction force so that air containing dust is introduced into the dust bin. In this case, the suction motor may provide the suction force to the discharge cover in a direction in which the discharge port is closed, and the suction force may be changed as a rotational speed is changed.

[0042] In order to achieve the above-mentioned object, a cleaner system according to the present disclosure includes: a cleaner configured to suck and collect dust; and a cleaner station to which the cleaner is coupled. The cleaner includes a dust bin configured to collect the sucked dust and having a discharge port formed at one side and configured to discharge the dust. The cleaner station includes: a housing having a coupling part to which the cleaner is coupled, the housing having an internal space configured to accommodate a flow path part through which the dust in the dust bin flows; a dust passage hole formed in the coupling part and having an outlet end connected to the flow path part, the dust passage hole having an inlet end connected to the discharge port of the dust bin when the cleaner is coupled; a door configured to open or close the dust passage hole; and a passage area defined by the dust passage hole and an outer peripheral surface of the door. The door is stopped for a particular time or longer when the passage area becomes a first passage area, and the door is stopped for a particular time or longer when the passage area becomes a second passage area smaller than the first passage area.

[0043] The door may be hingedly coupled to the coupling part, and the passage area may be changed as the door rotates.

[0044] In order to achieve the above-mentioned object, a cleaner system according to the present disclosure includes: a cleaner configured to collect dust; and a cleaner station to which the cleaner is coupled. The cleaner includes a dust bin configured to collect the dust and having a discharge port formed at one side and configured to discharge the dust. The cleaner station includes: a housing having a coupling part to which the cleaner is coupled, the housing having an internal space; a flow path part disposed in the internal space of the housing and configured to communicate with the dust bin; and a door configured to open or close a dust passage hole formed in the coupling part and disposed between the dust bin and the flow path part. The door alternately performs a complete opening step in which the door opens the dust passage hole to an opening position and is stopped for a particular time or longer and a partial opening step in which the door opens the dust passage hole to a flow velocity change position, which is smaller than the opening position, and is stopped for a particular time or longer.

[0045] The cleaner station may include a vibration spring disposed at one side of a discharge cover configured to cover the discharge port of the dust bin, and the vibration spring may provide an elastic force to the discharge cover in one direction.

[0046] The cleaner station may include a torsion spring disposed at one side of the discharge cover, and the torsion spring may provide the discharge cover with an elastic force in a direction opposite to the elastic force provided by the vibration spring.

[0047] The cleaner station may include a dust collecting motor configured to provide a suction force to the discharge cover in a direction opposite to a direction of the elastic force provided by the vibration spring. The cleaner may include a suction motor configured to provide a suction force to the discharge cover in a direction opposite to a direction of the elastic force provided by the torsion spring.

[0048] In order to achieve the above-mentioned object, in a method of controlling a cleaner system according to the present disclosure, the cleaner system includes a cleaner including a dust bin configured to collect dust and having a discharge port configured to discharge the collected dust, and a cleaner station including a housing having a coupling part to which the cleaner is coupled, the housing having an internal space configured to accommodate a flow path part through which the dust in the dust bin flows, and a dust passage hole formed in the coupling part and having an outlet end connected to

the flow path part, the dust passage hole having an inlet end connected to the discharge port of the dust bin when the cleaner is coupled. The method of controlling the cleaner system includes a dust collecting step of opening a door, which is hingedly coupled to the coupling part and configured to open or close the dust passage hole, to a first opening angle from the discharge port and sucking the dust in the dust bin into the cleaner station; and an additional dust collecting step of opening the door from the discharge port to a second opening angle, which is smaller than the first opening angle, and removing dust attached to the discharge cover.

[0049] In the additional dust collecting step, the door may alternately perform a rotation to the first opening angle and a rotation to the second opening angle.

[Advantageous Effects]

[0050] The cleaner system and the method of controlling the same according to the present disclosure described above have one or more of the following effects.

[0051] First, in case that the door rotates to the first opening angle in the dust collecting step, the dust in the dust bin may be removed without separate air resistance. In case that the door rotates to the second opening angle in the additional dust collecting step, the airflow is rapidly changed in the dust passage hole, such that the dust attached to the discharge cover may be effectively removed.

[0052] Second, in the additional dust collecting step, the passage area, which is defined by the outer peripheral surface of the door and the dust passage hole, has the second passage area smaller than the first passage area, such that the flow velocity rapidly increases in the dust passage hole. Therefore, it is not necessary to increase the output of the dust collecting motor to remove the remaining dust, such that electric power consumption and noise are reduced.

[0053] Third, in the additional dust collecting step, the discharge cover is vibrated by the suction force of the dust collecting motor or the elastic force of the vibration spring, such that the dust attached to the discharge cover may be effectively separated from the discharge cover by the generated vibration. Further, the passage area is irregularly changed, and the suction pressure is changed, such that turbulent flows are formed, and the dust attached to the discharge cover is effectively removed.

[0054] Fourth, because the dust attached to the discharge cover is effectively removed, the time required to remove the dust attached to the discharge cover is reduced, such that the electric power consumption is reduced, and the time for which the user is exposed to noise is reduced.

[0055] Fourth, because the vibration of the discharge cover is generated by the dust collecting motor or the suction motor, a separate drive motor is not required, such that the structure for vibrating the discharge cover is simplified.

[0056] Fifth, because the vibration of the discharge cover is generated by the interaction between the suction force of the dust collecting motor and the elastic force of the vibration spring, the discharge cover may be easily vibrated by controlling only the suction force of the dust collecting motor, such that the dust attached to the discharge cover may be easily removed.

[0057] Sixth, the vibration of the discharge cover may be generated by the suction force of the suction motor or the elastic force of the torsion spring in addition to the suction force of the dust collecting motor, such that a sufficient vibration width may be ensured even when the suction force of the dust collecting motor is low. Therefore, the electric power consumption is reduced.

[0058] The effects of the present disclosure are not limited to the aforementioned effects, and other effects, which are not mentioned above, will be clearly understood by those skilled in the art from the claims.

[Description of Drawings]

[0059]

FIG. 1 is a perspective view of a cleaner system including a cleaner station and a cleaner according to an embodiment of the present disclosure.

FIG. 2 is a schematic view illustrating a configuration of the cleaner system according to the embodiment of the present disclosure.

FIG. 3 is a view for explaining the cleaner in the cleaner system according to the embodiment of the present disclosure.

FIG. 4 is a view for explaining a dust separating part and a cyclone filter of a first cleaner according to the embodiment of the present disclosure.

FIG. 5 is a view for explaining a lower side of a dust bin of the first cleaner according to the embodiment of the present disclosure.

FIG. 6 is a view for explaining a coupling part of the cleaner station according to the embodiment of the present disclosure.

FIG. 7 is an exploded perspective view for explaining a fixing unit of the cleaner station according to the embodiment of the present disclosure.

FIG. 8 is a view for explaining a relationship between the first cleaner and a door unit in the cleaner station according to the embodiment of the present disclosure.

FIG. 9 is a view for explaining a relationship between the first cleaner and a cover opening unit in the cleaner station according to the embodiment of the present disclosure.

FIG. 10 is a view illustrating first and second positions of a discharge cover in accordance with vibration of the discharge cover in the cleaner system according to the present disclosure.

FIG. 11 is a block diagram for explaining a control configuration of the cleaner station according to the

embodiment of the present disclosure.

FIG. 12 is a flowchart for explaining a step of operating the cleaner system according to the embodiment of the present disclosure.

FIG. 13 is a view for explaining operations of motors over time in a method of controlling the cleaner system according to the embodiment of the present disclosure.

FIG. 14 is a view for explaining a recovery step in accordance with an operation of the door unit in the method of controlling the cleaner system according to the embodiment of the present disclosure.

FIGS. 15 and 16 are views illustrating opening/closing degrees of a discharge cover in accordance with an operation of the door unit in FIG. 13.

FIG. 17 is a view illustrating operations of a suction motor and a dust collecting motor according to a first embodiment of the present disclosure.

FIG. 18 is a view illustrating operations of the suction motor and the dust collecting motor according to a second embodiment of the present disclosure.

FIG. 19 is a view illustrating operations of the suction motor and the dust collecting motor according to a third embodiment of the present disclosure.

FIG. 20 is a view illustrating operations of the suction motor and the dust collecting motor according to a fourth embodiment of the present disclosure.

[Best Mode]

[0060] Hereinafter, exemplary embodiments of the present disclosure will be described in detail with reference to the accompanying drawings.

[0061] 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.

[0062] 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.

[0063] 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.

[0064] FIG. 1 is a perspective view illustrating a cleaner system including a cleaner station and a cleaner according to an embodiment of the present disclosure, and FIG. 2 is a schematic view illustrating a configuration of the cleaner system according to the embodiment of the present disclosure.

[0065] With reference to FIGS. 1 and 2, a cleaner system 10 according to an embodiment of the present specification may include a cleaner station 100 and a cleaner 200. Meanwhile, the present embodiment may be carried out without some of the above-mentioned components and does not exclude additional components.

[0066] The cleaner system 10 may include the cleaner station 100. The cleaner 200 may be coupled to the cleaner station 100. Specifically, the cleaner 200 may be coupled to the lateral side of the cleaner station 100. The cleaner station 100 may remove dust from the dust bin 220 of the cleaner 200.

[0067] Meanwhile, FIG. 3 is a view for explaining the cleaner 200 in the cleaner system according to the embodiment of the present disclosure, FIG. 4 is a view for explaining a dust separating part and a cyclone filter of the cleaner 200 according to the embodiment of the present disclosure, and FIG. 5 is a view for explaining a lower side of the dust bin of the cleaner 200 according to the embodiment of the present disclosure.

[0068] First, a structure of the cleaner 200 will be described below with reference to FIGS. 1 to 5.

[0069] 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.

[0070] 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.

[0071] Meanwhile, in the embodiment of the present disclosure, directions 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.

[0072] 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. Further, on the basis of 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.

[0073] 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 dust separating part 213, the

suction motor 214, an air discharge cover 215, the handle 216, and an operating part 218.

[0074] 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.

[0075] 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 flow path (hereinafter, referred to as a 'suction flow path') through which air containing dust may flow.

[0076] Meanwhile, in the present embodiment, an imaginary line may be defined to penetrate the inside of the suction part 212 having a cylindrical shape. That is, an imaginary suction flow path through line a2 may be formed to penetrate the suction flow path in a longitudinal direction.

[0077] The dust separating part 213 may communicate with the suction part 212. The dust separating part 213 may separate dust sucked into the dust separating part 213 through the suction part 212. A space in the dust separating part 213 may communicate with a space in the dust bin 220.

[0078] For example, the dust separating part 213 may have two or more cyclone parts capable of separating dust using a cyclone flow. Further, the space in the dust separating part 213 may communicate with the suction flow path. Therefore, air and dust, which are sucked through the suction part 212, spirally flow along an inner circumferential surface of the dust separating part 213. Therefore, the cyclone flow may be generated in an internal space of the dust separating part 213.

[0079] The dust separating part 213 communicates with the suction part 212. The dust separating part 213 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.

[0080] For example, the dust separating part 213 may include at least one cyclone part capable of separating dust by using a cyclone flow. The cyclone part may communicate with the suction part 212. The air and dust introduced through the suction part 212 spirally flows along an inner peripheral surface of the cyclone part.

[0081] The dust separating part 213 may further include a secondary cyclone part configured to separate again dust from the air discharged from the cyclone part. In this case, the secondary cyclone part may be positioned in the cyclone part to minimize a size of the dust separating part. The secondary cyclone part may include a plurality of cyclone bodies disposed in parallel. The air discharged from the cyclone part may be distributed to and pass through the plurality of cyclone bodies.

[0082] In this case, an axis of a cyclone flow of the secondary cyclone part may also extend in an upward/downward direction. The axis of the cyclone flow of the cyclone part and the axis of the cyclone flow of the secondary cyclone part may be disposed coaxially in the upward/downward direction and collectively called an axis of the cyclone flow of the dust separating part 213. Meanwhile, in the present embodiment, an imaginary cyclone line a4 may be defined with respect to the axis of the cyclone flow.

[0083] The dust separating part 213 may further include a cyclone filter 219 disposed to surround the secondary cyclone part. For example, the cyclone filter 219 is formed in a cylindrical shape and guides the air, which is separated from dust in the cyclone part, to the secondary cyclone part. The cyclone filter 213a may filter out dust while the air pass through the cyclone filter.

[0084] To this end, the cyclone filter 219 may include a mesh portion having a plurality of holes. The mesh portion may be made of a metallic material. However, the present disclosure is not limited thereto.

[0085] The suction motor 214 may generate a suction force Fa for sucking air. Air containing dust is introduced into the dust bin 220 by the suction force. 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.

[0086] Meanwhile, in the present embodiment, an imaginary suction motor axis a1 may be formed by extending a rotation axis of the suction motor 214.

[0087] 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.

[0088] The air discharge cover 215 may have an air discharge port 215a for discharging the air introduced by the suction force of the suction motor 214.

[0089] A flow guide may be disposed on the air discharge cover 215. The flow guide may guide a flow of the air to be discharged through the air discharge port 215a.

[0090] The handle 216 may be grasped by a 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 dust separating part 213.

[0091] The handle 216 may include a grip portion 216a formed in a column shape so that the user may grip the grip portion 216a, a first extension portion 216b connected to one end of the grip portion 216a based on the longitudinal direction (axial direction) and extending toward the suction motor 214, and a second extension portion 216c connected to the other end of the grip portion 216a based on the longitudinal direction (axial direction) and

extending toward the dust bin 220.

[0092] Meanwhile, in the present embodiment, an imaginary grip portion through line a3 may be formed to extend in the longitudinal direction of the grip portion 216a (the axial direction of the column) and penetrate the grip portion 216a.

[0093] For example, the grip portion through line 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 216a.

[0094] 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.

[0095] The first extension portion 216b may extend from the grip portion 216a toward the main body housing 211 or the suction motor 214. At least a part of the first extension portion 216b may extend in a horizontal direction.

[0096] The second extension portion 216c may extend from the grip portion 216a toward the dust bin 220. At least a part of the second extension portion 216c may extend in the horizontal direction.

[0097] 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.

[0098] The cleaner 200 may include the dust bin 220. The dust bin 220 may communicate with the dust separating part 213. The dust bin 220 may store the dust separated by the dust separating part 213.

[0099] The dust bin 220 may include a dust bin main body 221, a discharge cover 222, a dust bin compression lever 223, and a compression member (not illustrated).

[0100] The dust bin main body 221 may provide a space capable of storing the dust separated by the dust separating part 213. For example, the dust bin main body 221 may be formed in a shape similar to a cylindrical shape.

[0101] Meanwhile, in the present embodiment, an imaginary dust bin through line a5 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).

[0102] A discharge port, through which the collected dust is discharged, is formed at one side of the dust bin main body 221. The discharge port may be formed in a bottom surface of the dust bin main body.

[0103] 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.

[0104] 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.

[0105] 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.

[0106] The opened discharge port is formed at one side of the dust bin 220. The dust collected in the dust bin 220 may be discarded through the discharge port. The discharge port may be formed at the lower side of the dust bin 220.

[0107] 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 be rotated downward about the hinge part 222b. The hinge part 222b may be disposed adjacent to the battery housing 230. For example, the hinge part 222b may include 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.

[0108] 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.

[0109] 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.

[0110] A vibration spring support part 222e may be disposed on the discharge cover 222.

[0111] A hollow portion is formed in a region of the discharge cover main body 222a that is in contact with a vibration spring 141d. The vibration spring support part 222e is disposed in the hollow portion. The vibration spring support part 222e is in contact with the vibration spring 141d. More specifically, the vibration spring support part 222e is in contact with a vibration spring cover 141e configured to cover the vibration spring 141d.

[0112] The vibration spring support part 222e may have a curved surface convex outward.

[0113] The vibration spring support part 222e may be made of a material having elasticity. For example, the vibration spring support part 222e may be made of a rub-

ber material. When the discharge cover 222 vibrates, the discharge cover 222e and the door 141 may repeatedly collide with each other, which causes fatigue damage. The vibration spring support part 222e absorbs a repeated impact and improves durability of the discharge cover 222.

[0114] Because the vibration spring support part 222e has elasticity, at least a part of the vibration spring support part 222e may be recessed toward the inside of the dust bin when the vibration spring support part 222e is in contact with the vibration spring 141d. In this case, the vibration spring 141d or the vibration spring cover 141e are inserted into the hollow portion of the discharge cover main body 222a, such that the elastic cover 222 and the door 141 are aligned at an exact position.

[0115] The dust bin 220 may include the dust bin compression lever 223 (see FIG. 8). The dust bin compression lever 223 may be disposed outside the dust bin 220 or the dust separating part 211. The dust bin compression lever 223 may be disposed outside the dust bin 220 or the dust separating part 211 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.

[0116] 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 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.

[0117] 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.

[0118] 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 220.

[0119] The cleaner 200 may include the battery 240.

[0120] 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 example, 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.

[0121] 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.

[0122] The battery 240 may supply power to the suction motor 214 of the cleaner 200. The battery 240 may be disposed on a lower portion of the handle 216. The battery 240 may be disposed at a rear side of the dust bin 220. That is, the suction motor 214 and the battery 240 may be disposed so as not to overlap each other in the upward/downward direction and disposed at different disposition heights. Based on the handle 216, the suction motor 214, which is heavy in weight, is disposed at a front side of the handle 216, and the battery 240, which is heavy in weight, is disposed at the lower side of the handle 216, such that an overall weight of the cleaner 200 may be uniformly distributed. Therefore, it is possible to prevent stress from being applied to the user's wrist when the user grasps the handle 216 and performs a cleaning operation.

[0123] 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.

[0124] 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.

[0125] 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 214 of the main body 210. The extension tube 250 may be formed in a long cylindrical shape.

[0126] 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.

[0127] 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.

[0128] 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 a suction force of a 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 caused because the user needs to empty the dust bin all the time. In addition, it is possible to prevent the dust from scattering when emptying the dust bin.

[0129] 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 (see FIG. 2).

[0130] The cleaner station 100 of the present disclosure will be described below with reference to FIGS. 1 and 2.

[0131] The cleaner 200 may be disposed in the cleaner station 100. Specifically, the cleaner 200 may be coupled to the lateral side of the cleaner station 100. The cleaner station 100 may remove dust from the dust bin 220 of the cleaner 200.

[0132] 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.

[0133] The housing 110 may have an internal space capable of accommodating the dust collecting part 130 configured to store dust therein, and a dust suction module 170 configured to generate a flow force for collecting the dust in the dust collecting part 130. A flow path part 180 may be provided in the internal space.

[0134] The housing 110 may include a bottom surface 111, an outer wall surface 112, and an upper surface 113.

[0135] The bottom surface 111 may support a lower side of the dust suction module 170 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 170.

[0136] 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.

[0137] Meanwhile, according to the embodiment, the bottom surface 111 may further include ground surface support portions 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.

[0138] 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.

[0139] 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.

[0140] 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.

[0141] 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.

[0142] 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.

[0143] 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.

[0144] In still another point of view, a direction in which an intersection point at which the grip portion through line a3 and the suction motor axis a1 intersect is disposed may be referred to as the forward direction based on the cleaner station 100. Alternatively, a direction in which an intersection point P2 at which the grip portion through line a3 and the suction flow path through line a2 intersect is disposed may be referred to as the forward direction. Alternatively, a direction in which an intersection point P1 at which the suction motor axis a1 and the suction flow path through line a2 intersect is disposed may be referred to as the forward direction. Further, a direction opposite to the direction in which the intersection point is disposed may be referred to as the rearward direction based on the cleaner station 100.

[0145] Further, based on the 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.

[0146] 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.

[0147] 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.

[0148] 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.

[0149] Meanwhile, a structure for mounting various types of cleaning modules 290 used for the cleaner 200 may be additionally provided on the first outer wall surface 112a.

[0150] 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.

[0151] 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.

[0152] As another example, the structure for mounting various types of cleaning modules 290 used for the cleaner 200 may be additionally provided on the second outer wall surface 112b.

[0153] 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.

[0154] 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.

[0155] Meanwhile, the structure for mounting various types of cleaning modules 290 used for the cleaner 200 may be additionally provided on the third outer wall surface 112c or the fourth outer wall surface 112d.

[0156] 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.

[0157] 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.

[0158] 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.

[0159] 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.

[0160] 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

or 300 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.

[0161] FIG. 6 is a view for explaining the coupling part 120 of the cleaner station 100 according to the embodiment of the present disclosure, FIG. 7 is an exploded perspective view for explaining a fixing unit 130 of the cleaner station 100 according to the embodiment of the present disclosure, FIG. 8 is a view for explaining a relationship between the cleaner 200 and a door unit 140 in the cleaner station 100 according to the embodiment of the present disclosure, and FIG. 9 is a view for explaining a relationship between the cleaner 200 and a cover opening unit 150 in the cleaner station 100 according to the embodiment of the present disclosure.

[0162] The coupling part 120 of the cleaner station 100 according to the present disclosure will be described below with reference to FIGS. 2 and 6.

[0163] 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.

[0164] The coupling part 120 is disposed in the housing 110 and includes a coupling surface 121 to which at least a part of the cleaner 200 is coupled.

[0165] 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.

[0166] 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.

[0167] 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.

[0168] 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.

[0169] The coupling part 120 may have a dust passage hole 121a through which air present outside the housing 110 may be introduced into the housing 110.

[0170] The dust passage hole 121a is formed in the coupling part 120. Specifically, the dust passage hole 121a is formed in the coupling surface 121.

[0171] An outlet end of the dust passage hole 121a is connected to the flow path part 180. When the cleaner 200 is coupled to the cleaner station 100, an inlet end of the dust passage hole 121a is connected to the discharge port of the dust bin 220.

[0172] 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 the flow path 180 to be described below.

[0173] 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.

[0174] 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.

[0175] 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 a first flow path 180a through a bypass hole 122c. That is, the protrusion moving hole 122a, the guide space 122b, the bypass hole 122c, and the first flow path 180a may define one bypass flow path (see FIG. 9). 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.

[0176] 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.

[0177] 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.

[0178] 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.

[0179] 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.

[0180] 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.

[0181] The coupling sensor 125 may face the dust bin 220 or the battery housing 230 of the cleaner 200.

[0182] 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.

[0183] 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.

[0184] The coupling part 120 may further include fixing member entrance holes 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.

[0185] 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.

[0186] The fixing unit 130 according to the present disclosure will be described below with reference to FIGS. 2 and 7.

[0187] 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, 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.

[0188] The fixing unit 130 may include a 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.

[0189] 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 holes 127.

[0190] The fixing members 131 may be disposed at two opposite sides of the coupling part 120, respectively. For example, a pair of two fixing members 131 may be symmetrically disposed with respect to the coupling surface 121.

[0191] The fixing part motor 133 may provide power for moving the fixing member 131.

[0192] The fixing part links 135 may convert a rotational force of the fixing part motor 133 into the reciprocations of the fixing members 131.

[0193] 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.

[0194] 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.

[0195] 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.

[0196] 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.

[0197] 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.

[0198] The door unit 140 according to the present disclosure will be described below with reference to FIGS. 2 and 8.

[0199] 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.

[0200] The door unit 140 may include a door 141, a door motor 142, and a door arm 143.

[0201] The door 141 is hingedly coupled to the coupling part 120. Specifically, the door 141 is hingedly coupled to the coupling surface 121. The door 141 may open or close the dust passage hole 121a while rotating. The door 141 may include a door main body 141a, a hinge part 141b, and an arm coupling part 141c.

[0202] An upper end of the door 141 is hingedly coupled to the coupling part 120. Therefore, the door 141 opens or closes the dust passage hole 121a as a lower end of the door 141 rotates. Specifically, when viewed from the right side, the door 141 opens the dust passage hole 121a while rotating counterclockwise, and the door 141 closes the dust passage hole 121a while rotating clockwise.

[0203] 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. On the basis of a state in which the door main body 141a blocks the dust passage hole 121a, the hinge part 141b may be disposed at an upper side of the door main body 141a, and the arm coupling part 141c may be disposed at a lower side of the door main body 141a.

[0204] 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 in order to connect the hinge part 141b and the arm coupling part 141c and reinforce a supporting force of the door main body 141a.

[0205] The hinge part 141b may be a means by which the door 141 is hingedly coupled to the coupling surface 121. The hinge part 141b may be disposed at an upper end of the door main body 141a and coupled to the coupling surface 121.

[0206] The arm coupling part 141c may be a means to which the door arm 143 is rotatably coupled. The arm coupling part 141c may be disposed at a lower side of the inner surface, and the door arm 143 may be rotatably coupled to the arm coupling part 141c.

[0207] 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 141b 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.

[0208] The vibration spring 141d is disposed in the door 141. One side of the vibration spring 141d is supported on the door main body 141a, and the other side of the vibration spring 141d supports the discharge cover 222. The vibration spring 141d provides an elastic force Fc to the discharge cover 222 in a direction in which the discharge cover 222 closes the dust bin 220.

[0209] 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.

[0210] 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.

[0211] For example, the door arm 143 may include a first door arm 143a and the 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.

[0212] 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 100 and may detect whether the door 141 is in an opened state.

[0213] 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.

[0214] Therefore, when the door arm 143 is moved to a preset door opening position Po 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 DP2 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, in the present embodiment, when the door arm 143 is moved to a preset door flow velocity change position Pc or when the door 141 is rotated to a predetermined position, the door opening/closing detecting parts 144 may detect that the door reaches a position at which the dust collecting motor 191 may change a flow velocity of air to be introduced.

[0215] Alternatively, the door 141 may move to a position perpendicular to the discharge port.

[0216] The door opening/closing detecting part 144 may include a contact sensor. For example, the door opening/closing detecting part 144 may include a microswitch.

[0217] 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.

[0218] 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.

[0219] 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.

[0220] 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 142 about the hinge part 141b, and the door 142 rotated about the hinge part 141b may push the discharge cover 222 toward the dust bin main body 221.

[0221] The cover opening unit 150 according to the present disclosure will be described below with reference to FIGS. 2 and 9.

[0222] 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.

[0223] 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.

[0224] The push protrusion 151 may move to press the coupling lever 222c when the cleaner 200 is coupled.

[0225] 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.

[0226] When the cleaner 100 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.

[0227] 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.

[0228] 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.

[0229] 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.

[0230] 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 Fd 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.

[0231] 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.

[0232] 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.

[0233] 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.

[0234] 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.

[0235] Accordingly, according to the present disclosure, the cover opening unit 150 may open the dust bin 220 even though the user separately opens the discharge cover 222 of the cleaner, and as a result, it is possible to improve convenience.

[0236] In addition, since 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.

[0237] Meanwhile, the dust collecting part 170 will be described below with reference to FIGS. 2 and 10.

[0238] 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 a lower side in the gravitational direction of the coupling part 120.

[0239] The dust collecting part 170 is accommodated in the housing 110 and disposed at the lower side of the coupling part 120. The dust collecting part 170 captures the dust in the dust bin 220 of the cleaner 200.

[0240] 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.

[0241] The dust collecting part 170 may be detachably coupled to the housing 110.

[0242] 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.

[0243] When the suction force is generated by the dust collecting motor 200, a volume of the dust bag is increased, such that the dust may be accommodated in the dust bag. 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 nonwoven fabric material and have a hexahedral shape when the dust bag has an increased volume.

[0244] 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.

[0245] Meanwhile, the cleaner station 100 according to the embodiment of the present disclosure may further include a sterilization module 175.

[0246] At least one sterilization module 175 may be provided on the flow path part 180 or provided at the periphery of the dust collecting part 170.

[0247] The sterilization module 175 is configured to sterilize the dust captured in the dust collecting part 170. The sterilization module 175 may include a light source configured to emit sterilization light, and a protection panel disposed below the light source and configured to protect the light source.

[0248] In this case, the light source may include one or more light-emitting diodes (LEDs) capable of emitting the sterilization light having sterilizing power for removing bacteria. The sterilization light emitted from the light source may have a wavelength that varies depending on types of light-emitting diodes.

[0249] For example, the light source may be a light-emitting diode that emits ultraviolet rays within UV-C wavelength ranges. The ultraviolet rays are divided into UV-A rays (315 nm to 400 nm), UV-B rays (280 nm to 315 nm), and UV-C rays (200 nm to 280 nm) based on the wavelengths. The ultraviolet ray in the UV-C region may inhibit the proliferation of microorganisms by damaging DNA double helices of the microorganisms.

[0250] Alternatively, as another example, the light source may be a light-emitting diode that emits visible light with a wavelength of 405 nm. The blue light having a wavelength of 405 nm has a wavelength in a boundary region between the visible ray and the ultraviolet ray and has proved sterilizing power.

[0251] In order to prevent damage to the light source, the protection panel may be disposed below the light source and spaced apart from the light source at a predetermined distance. In this case, the protection panel may be made of a material that maximize the transmittance of the light source. For example, the protection panel may be made of quartz. It is known that the quartz does not hinder the transmission of the ultraviolet rays in the UV-C region.

[0252] The cleaner station 100 according to the embodiment of the present disclosure has the sterilization module 175 that sterilizes the dust collecting part 170 to

prevent bacteria from proliferating in the dust collecting part 170, thereby hygienically managing the dust collecting part 170 that stores the sucked dust for a long period of time.

[0253] Meanwhile, the flow path part 180 will be described below with reference to FIGS. 2 and 10.

[0254] The cleaner station 100 may include the flow path part 180. The flow path part 180 may connect the cleaner 200 and the dust collecting part 170.

[0255] The flow path part 180 is formed so that the dust in the dust bin 220 may flow through the flow path part 180. The flow path part 180 is accommodated in the internal space of the housing 110.

[0256] 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.

[0257] Specifically, the flow path part 180 may include the first flow path 180a and a second flow path 180b. When the cleaner 200 is coupled to the cleaner station 200 and the dust passage hole 121a is opened, the first flow path 180a communicates with the internal space of the dust bin 220, and the second flow path 181b allows the first flow path 181a to communicate with the internal space of the dust collecting part 170.

[0258] For example, the first flow path 180a may be disposed substantially in parallel with the suction motor axis a1 or the dust bin through line a5. In this case, the suction motor axis a1 or the dust bin through line a5 may penetrate the first flow path 180a.

[0259] In addition, the second flow path 180b may be disposed in a direction parallel to a dust collecting motor axis C. With this configuration, it is possible to minimize a decrease in suction force of the dust collecting motor 191 in the first flow path 180a and the second flow path 180b.

[0260] In this case, the first flow path 180a may be provided at a predetermined angle with respect to the second flow path 180b. For example, an angle between the first flow path 180a and the second flow path 180b may be a right angle. With this configuration, it is possible to minimize an overall volume of the cleaner station 100.

[0261] Meanwhile, a length of the first flow path 180a may be equal to or shorter than a length of the second flow path. With this configuration, the suction force of the dust collecting motor 191 may be transmitted to the space in the dust bin 220 even though the entire flow path for removing the dust is bent once.

[0262] 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.

[0263] Meanwhile, the dust suction module 190 will be described below with reference to FIGS. 2 and 10.

[0264] 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).

[0265] 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.

[0266] The dust collecting motor 191 is disposed at a downstream side of the flow path part and provides the suction force to the dust bin through the flow path part. The dust collecting motor 191 is disposed at the lower side of the flow path part 180, and the flow direction in the flow path part 180 is directed downward from above. Therefore, the dust collecting motor 191 may be disposed at the downstream side of the flow path part 180. The dust collecting motor 191 generates the suction force in the flow path part 180, and the flow path part 180 communicates with the dust bin 220. The dust collecting motor 190 may provide the suction force to the dust bin 220 through the flow path part 180.

[0267] 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.

[0268] Meanwhile, in the present embodiment, an imaginary dust collecting motor axis C may be defined by extending the rotation axis of the dust collecting motor 191.

[0269] 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.

[0270] 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.

[0271] 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.

[0272] In addition, the charging part 128 may be electrically connected to a separate cleaner (not illustrated) coupled to the lower region of the housing 110 and supply power to the battery.

[0273] 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.

[0274] Meanwhile, FIG. 11 is a block diagram for explaining a control configuration of the cleaner system according to the embodiment of the present disclosure.

[0275] The control configuration of the cleaner system 100 of the present disclosure will be described below with reference to FIG. 11.

[0276] The cleaner station 100 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, and the dust suction module 190.

[0277] The control unit 400 may include a printed circuit board and elements mounted on the printed circuit board.

[0278] 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.

[0279] 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.

[0280] 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.

[0281] 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.

[0282] When the fixing members 131 or the fixing part links 135 are moved to a predetermined fixing point FP1, 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.

[0283] Meanwhile, when the operation of emptying the dust bin 200 is ended, the control unit 400 may rotate the fixing part motor 133 in the reverse direction to release the cleaner 200.

[0284] 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.

[0285] When the door 141 or the door arm 143 reaches the predetermined opening position Po, 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.

[0286] Meanwhile, when the operation of emptying the dust bin 200 is ended, the control unit 400 may rotate the door motor 142 in the reverse direction to close the door 141.

[0287] 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.

[0288] When the guide frame 151e reaches the predetermined opening position CP1, 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.

[0289] The control unit 400 may control the sterilization module 175. For example, the control unit 400 may operate the sterilization module 175 after the dust is captured in the dust collecting part 170 or operate the sterilization module 175 at a predetermined time interval, thereby killing viruses, microorganisms, and the like present inside or outside the dust collecting part 170.

[0290] The control unit 400 may operate the dust collecting motor 191 to suck the dust in the dust bin 220.

[0291] 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.

[0292] Meanwhile, the cleaner station 100 according to the present disclosure may include the display part 410.

[0293] 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.

[0294] 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.

[0295] 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.

[0296] 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.

[0297] Meanwhile, the state in which the cleaner 200 is coupled to the cleaner station 100 will be described below with reference to FIGS. 2 and 3.

[0298] In the present disclosure, the cleaner 200 may be mounted on the outer wall surface 112 of the cleaner station 100. For example, the dust bin 220 and the battery housing 230 of the cleaner 200 may be coupled to the coupling surface 121 of the cleaner station 100. That is, the cleaner 200 may be mounted on the first outer wall surface 112a.

[0299] In this case, the suction motor axis a1 may be defined to be perpendicular to the first outer wall surface 112a. That is, the suction motor axis a1 may be defined in parallel with the ground surface. The suction motor axis a1 may be defined on a plane perpendicular to the ground surface. In addition, the suction motor axis a1 may be defined on the plane that perpendicularly intersects the first outer wall surface 112a.

[0300] The suction flow path through line a2 may be defined in parallel with the first outer wall surface 112a. The suction flow path through line a2 may be defined in the gravitational direction. That is, the suction flow path through line a2 may be defined to be perpendicular to the ground surface. In addition, the suction flow path through line a2 may be defined on the plane that perpendicularly intersects the first outer wall surface 112a.

[0301] The grip portion through line a3 may be defined to be inclined at a predetermined angle with respect to the first outer wall surface 112a. In addition, the grip portion through line a3 may be defined to be inclined at a predetermined angle with respect to the ground surface. The grip portion through line a3 may be defined on the plane that perpendicularly intersects the first outer wall surface 112a.

[0302] The cyclone line a4 may be defined to be perpendicular to the first outer wall surface 112a. That is, the cyclone line a4 may be defined in parallel with the ground surface. The cyclone line a4 may be defined on the plane perpendicular to the ground surface. In addition, the cyclone line a4 may be defined on the plane that perpendicularly intersects the first outer wall surface 112a.

[0303] The dust bin through line a5 may be defined to be perpendicular to the first outer wall surface 112a. That is, the dust bin through line a5 may be defined in parallel with the ground surface. The dust bin through line a5 may be defined on the plane perpendicular to the ground surface. In addition, the dust bin through line a5 may be defined on the plane that perpendicularly intersects the first outer wall surface 112a.

[0304] The dust collecting motor axis C may be defined to be perpendicular to the ground surface. The dust collecting motor axis C may be defined in parallel with at least any one of the first outer wall surface 112a, the second outer wall surface 112b, the third outer wall surface 112c, and the fourth outer wall surface 112d.

[0305] When the cleaner 200 is coupled to the cleaner station 100, the suction motor axis a1 may intersect the longitudinal axis of the cleaner station 100. That is, the rotation axis of the suction motor 214 may intersect the longitudinal axis of the cleaner station 100.

[0306] When the cleaner 200 is coupled to the cleaner station 100, the suction motor axis a1 may intersect the dust collecting motor axis C.

[0307] In the state in which the cleaner 200 and the cleaner station 100 are coupled, the suction motor axis a1 may intersect the dust collecting motor axis C at a predetermined angle. For example, an included angle $\theta 1$ between the suction motor axis a1 and the dust collecting motor axis C may be 40 degrees or more and 95 degrees or less.

[0308] In this case, the included angle may mean an angle defined as the suction motor axis a1 and the dust collecting motor axis C intersect each other, that is, an included angle defined between the suction motor axis a1 and the dust collecting motor axis C.

[0309] Meanwhile, when the cleaner 200 is coupled to the cleaner station 100, the handle 216 may be disposed to be farther from the ground surface than is the suction motor axis a1. With this configuration, when the user grasps the handle 216, the relatively heavy suction motor 214 is positioned at the lower side in the gravitational direction, and the user may couple or separate the cleaner 200 to/from the cleaner station 100 only by simply moving the cleaner 200 in the direction parallel to the ground surface. As a result, it is possible to provide convenience for the user.

[0310] In addition, when the cleaner 200 is coupled to the cleaner station 100, the battery 240 may be disposed to be farther from the ground surface than is the suction motor axis a1. With this configuration, the cleaner 200 may be stably supported on the cleaner station 100.

[0311] When the cleaner 200 is coupled to the cleaner station 100, the suction flow path through line a2 may be defined in parallel with the dust collecting motor axis C. With this configuration, it is possible to minimize an occupied space on a horizontal plane in the state in which the cleaner 200 is coupled to the cleaner station 100.

[0312] In this case, the coupling part 120 may be disposed between the suction flow path through line a2 and the dust collecting motor axis C. The fixing member 131 may be disposed between the suction flow path through line a2 and the dust collecting motor axis C. The cover opening unit 150 may be between the suction flow path through line a2 and the dust collecting motor axis C. With this configuration, the user may couple or separate the cleaner 200 to/from the cleaner station 100, fix the dust bin 220, and open the dust bin 220 only by simply moving the cleaner 200 in the direction parallel to the ground surface. As a result, it is possible to provide convenience for the user.

[0313] The grip portion through line a3 may intersect

the dust collecting motor axis C at a predetermined angle. In this case, an intersection point P6 between the grip portion through line a3 and the dust collecting motor axis C may be positioned in the housing 110. This configuration is advantageous in that the user may couple the cleaner 200 to the cleaner station 100 only by simply pushing his/her arm toward the lateral side of the cleaner station 100 in the state in which the user grasps the cleaner 200. In addition, since the dust collecting motor 191, which is relatively heavy in weight, is accommodated in the housing 110, it is possible to prevent the cleaner station 100 from swaying even though the user strongly pushes the cleaner 200 into the cleaner station 100.

[0314] When the cleaner 200 is coupled to the cleaner station 100, the cyclone line a4 may intersect the longitudinal axis of the cleaner station 100. That is, the flow axis of the dust separating part 213 may intersect the longitudinal axis of the cleaner station 100. In this case, the intersection point between the flow axis of the dust separating part 213 and the longitudinal axis of the cleaner station 100 may be positioned in the housing 110, and more particularly, positioned in the flow path part 180.

[0315] When the cleaner 200 is coupled to the cleaner station 100, the cyclone line a4 may intersect the dust collecting motor axis C. In this case, an intersection point between the cyclone line a4 and the dust collecting motor axis C may be positioned in the housing 110, and more particularly, positioned in the flow path part 180. With this configuration, the cleaner 200 may be stably supported on the cleaner station 100 in the state in which the cleaner 200 is coupled to the cleaner station 100, and a loss of flow path may be reduced during the operation of emptying the dust bin 220.

[0316] When the cleaner 200 is coupled to the cleaner station 100, the dust bin through line a5 may intersect the longitudinal axis of the cleaner station 100. That is, the longitudinal axis of the dust bin 220 may intersect the longitudinal axis of the cleaner station 100. In this case, an intersection point between the longitudinal axis of the dust bin 220 and the longitudinal axis of the cleaner station 100 may be positioned in the housing 110, and more particularly, positioned in a flow path part 180.

[0317] Meanwhile, when the cleaner 200 is coupled to the cleaner station 100, the handle 216 may be disposed to be farther from the ground surface than is the dust bin through line a5. With this configuration, when the user grips the handle 216, the user may couple or separate the cleaner 200 to/from the cleaner station 100 only by simply moving the cleaner 200 in the direction parallel to the ground surface. As a result, it is possible to provide convenience for the user.

[0318] In addition, when the cleaner 200 is coupled to the cleaner station 100, the battery 240 may be disposed to be farther from the ground surface than is the dust bin through line a5. In this configuration, because the battery 240 pushes the main body 210 of the cleaner 200 by means of the weight of the battery 240, the cleaner 200 may be stably supported on the cleaner station 100.

[0319] FIG. 12 is a flowchart for explaining a step of operating the cleaner system 10 according to the embodiment of the present disclosure, and FIG. 12 is a view for explaining operations of motors over time in a method of controlling the cleaner system 10 according to the embodiment of the present disclosure.

[0320] A method of controlling the cleaner system 10 according to the present disclosure will be described with reference to FIGS. 11 and 12.

[0321] The method of controlling the cleaner system of the present disclosure includes a coupling checking step S10, a dust bin fixing step S20, a cover opening step S30, a door opening step S40, a dust collecting step S50, an additional dust collecting step S60, a door closing checking step S70, and a release step S80.

[0322] In the coupling checking step S10, whether the cleaner 200 is coupled to the coupling part 120 of the cleaner station 100 may be checked.

[0323] Specifically, in the coupling checking step S10, when the cleaner 200 is coupled to the coupling part 120, the coupling sensor 125 disposed on the guide protrusion 123 may come into contact with the battery housing 230, and the coupling sensor 125 may transmit a signal indicating that the cleaner 200 is coupled to the coupling part 120. Alternatively, according to the embodiment, the coupling sensor 125 of a noncontact sensor type disposed on the sidewall 124 may detect the presence of the dust bin 220, and the coupling sensor 125 may transmit a signal indicating that the cleaner 200 is coupled to the coupling part 120.

[0324] Therefore, in the coupling checking step S10, the control unit 400 may receive the signal generated by the coupling sensor 125 and determine that the cleaner 200 is coupled to the coupling part 120.

[0325] Meanwhile, in the coupling checking step S10 according to the present disclosure, the control unit 400 may determine whether the cleaner 200 is coupled at the exact position on the basis of whether the charging part 128 supplies power to the battery 240 of the cleaner 200. Therefore, in the coupling checking step S10, the control unit 400 may receive the signal, which indicates that the cleaner 200 is coupled, from the coupling sensor 125, and check whether the charging part 128 supplies power to the battery 240, thereby checking whether the cleaner 200 is coupled to the coupling part 120 of the cleaner station 100.

[0326] Specifically, when the cleaner 200 is coupled to the coupling part 120 and a corresponding terminal of the cleaner is electrically connected to a charging terminal of the cleaner station 100, the control unit 400 (401) transmits a pulse signal to the cleaner 200 through the corresponding terminal. In this case, the pulse signal may be a signal generated by turning on or off the application of a charging voltage for charging the cleaner 200 a preset number of times at a preset interval. The control unit, which transmits the pulse signal, may be the control unit 401 disposed in the cleaner station.

[0327] When the control unit 402 of the cleaner re-

ceives the pulse signal, the control unit 402 may operate the suction motor 214 after a preset waiting time has elapsed.

[0328] The control unit 400 (401) may adjust an opening angle of the door 141 to a preset angle before the suction motor 214 operates after the operation of the dust collecting motor 191 is completed. A preset angle may be smaller in magnitude than an angle by which the door 141 is opened while the dust collecting motor 191 operates. For example, the preset angle may be an angle β to a flow velocity change position Pc.

[0329] In the dust bin fixing step S20, when the cleaner 200 is coupled to the cleaner station 100, the fixing member 131 may hold and fix the dust bin 220.

[0330] Specifically, when the control unit 400 receives the signal, which indicates that the cleaner is coupled, from the coupling sensor 125, the control unit 400 may operate the fixing part motor 133 in the forward direction so that the fixing member 131 fixes the dust bin 220. In this case, when the fixing members 131 or the fixing part links 135 are moved to the dust bin fixing position FP1, the fixing detecting part 137 may transmit a signal indicating that the cleaner 200 is fixed. Therefore, the 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] On the contrary, the control unit 400 may stop the operation of the fixing part motor 133 after operating the fixing part motor 133 in the forward direction for a preset fixed time tf. For example, the control unit 400 may stop the operation of the fixing part motor 133 after operating the fixing part motor 133 in the forward direction for a period of time of 4 second or more and 5 seconds or less.

[0332] In the cover opening step S30, the control unit 400 may open the discharge cover 222 of the cleaner 200 when the dust bin 220 is fixed to the cleaner station 100.

[0333] When the control unit 400 receives a signal, which indicates that the dust bin 220 is fixed, from the fixing detecting part 137, the control unit 400 may open the discharge cover 222 by operating the cover opening motor 152 in the forward direction (S31).

[0334] Specifically, the control unit 400 may operate the cover opening motor 152 in the forward direction. As a result, the push protrusion 151 may depart from the initial position and move to the position at which the push protrusion 151 presses the coupling lever 222c. Therefore, the hook engagement between the discharge cover 222 and the dust bin main body 221 is released by the movement of the coupling lever 222c, and the discharge cover 222 is rotated in the direction away from the dust bin main body 221 by the restoring force of the torsion spring 222d, such that the discharge cover 222 may be separated.

[0335] Meanwhile, before the push protrusion 151 presses the coupling lever 222c, the cover opening detecting part 155f may transmit a signal indicating that the push protrusion 151 is at the initial position.

[0336] When the cover opening motor 152 operates and the push protrusion 151 begins to move to press the coupling lever 222c, the cover opening detecting part 155f may transmit a signal indicating that the push protrusion 151 departs from the initial position. Further, the control unit 400 may receive the signal and determine that the cover opening unit 150 normally operates.

[0337] In this case, the control unit 400 may use the timer (not illustrated) to measure the time taken after the cover opening motor 152 is operated in the forward direction or measure the time taken after the push protrusion 151 departs from the initial position.

[0338] In this case, the control unit 400 may set and store in advance the time taken until the push protrusion 151 presses the coupling lever 222c after departing from the initial position, based on a rotational speed of the cover opening motor 152 and a movement distance of the push protrusion 151. Therefore, the control unit 400 may operate the cover opening motor 152 in the forward direction for a cover opened time tc1 which is equal to or longer than the time taken until the coupling lever 222c is pressed. For example, the control unit 400 may operate the cover opening motor 152 in the forward direction for a period of time of 4 seconds or more and 5 seconds or less.

[0339] Further, after the cover opened time tc1 has elapsed, the control unit 400 may change the rotation direction of the cover opening motor 152 for a preset rotation direction change time tc2 (S32).

[0340] Further, after the rotation direction change time tc2 has elapsed, the control unit 400 may operate the cover opening motor 152 in the reverse direction. As a result, the push protrusion 151 may return back to the initial position again (S33).

[0341] The control unit 400 may operate the cover opening motor 152 until the cover opening detecting part 155f detects that the push protrusion 151 returns to the initial position. In this case, the control unit 400 may set and store in advance a protrusion return time tc3 taken until the push protrusion 151 returns back to the initial position after the push protrusion 151 pushes the coupling lever 222c. Therefore, the control unit 400 may operate the cover opening motor 152 in the reverse direction for the protrusion return time tc3. For example, the control unit 400 may operate the cover opening motor 152 in the reverse direction for a period of time of 4 seconds or more and 5 seconds or less.

[0342] Meanwhile, when the control unit 400 receives, from the cover opening detecting part 155f, the signal indicating that the push protrusion 151 is returned to the initial position, the control unit 400 may end the operation of the cover opening motor 152.

[0343] In the door opening step S40, the control unit 400 may open the door 141 when the dust bin 220 is

fixed to the cleaner station 100. Meanwhile, the door opening step S40 may be performed simultaneously with the cover opening step S30.

[0344] Specifically, when the control unit 400 receives a signal, which indicates that the dust bin 220 is fixed, from the fixing detecting part 137, and the control unit 400 may operate the door motor 142 in the forward direction, such that the door 141 may open the dust passage hole 121a while rotating. That is, in the door opening step S30, the control unit 400 may open the dust passage hole 121a by rotating the door 141.

[0345] Meanwhile, in the present embodiment, the control unit 400 may operate the door motor 142 in the forward direction when a preset time elapses after the control unit 400 receives a signal, which indicates that the dust bin 220 is fixed, from the fixing detecting part 137. For example, the control unit 400 may operate the door motor 142 when a period of time of 0.5 second or more and 1.5 seconds or less elapses after the dust bin 220 is fixed.

[0346] With this configuration, in the cover opening step S30, the control unit may open the door 141 after waiting the time required for the push protrusion 151 to begin to press the coupling lever 222c, or the control unit may open the discharge cover 222 and the door 141 in a similar timing. Therefore, it is possible to prevent a situation in which in a state in which the door 141 is rotated first and the dust passage hole 121a is opened, the door 141 and the discharge cover 222 strongly collide with each other as the discharge cover 222 is suddenly opened by the restoring force of the torsion spring 222d or a situation in which the door 141 is not opened, and the discharge cover 222 and the dust bin main body 221 are not separated even though the hook engagement between the discharge cover 222 and the dust bin main body 221 is released.

[0347] Meanwhile, the control unit 400 may open the dust passage hole 121a by rotating the door 141 in a stepwise manner. Specifically, the control unit 400 may rotate the door 141 by the preset angle $\theta 1$ (S41) and then stop the rotation of the door 141 for a preset time (S42). For example, the control unit 400 may rotate the door 141 by 25 degrees or more and 35 degrees or less and then stop the rotation of the door 141 for a period of time of 4 seconds or more and 5 seconds or less.

[0348] In this case, the rotation angle of the door 141 may mean an angle by which the door 141 rotates about a hinge shaft hingedly coupled to the housing 110 based on a position at which the door 141 blocks the dust passage hole 121a.

[0349] After the rotation of the door 141 is stopped for a preset time, the control unit 400 may further rotate the door 141 by a preset angle $\theta 2$. For example, the control unit 400 may further rotate the door 141 by 45 degrees or more and 55 degrees or less (S43).

[0350] As a result, when the cover opening step S30 and the door opening step S40 are performed, the discharge cover 222 of the dust bin 220 rotates such that the space in the dust bin main body 221 is opened, and the door 141 rotates such that the dust passage hole 121a is opened. Therefore, the internal space of the dust bin 220 may communicate with the flow path part 180 of the cleaner station 100.

[0351] Meanwhile, when the door arm 143 moves to the preset door opening position Po, the door opening/closing detecting part 144 may detect the movement and transmit a signal related to the movement. Therefore, the control unit 400 may determine that the door 141 is opened, and the control unit 400 may stop the operation of the door motor 142.

[0352] Alternatively, according to the embodiment, the control unit 400 may detect that the door 141 has been sufficiently rotated on the basis of an electric current value applied to the door motor 142. The control unit 400 may determine that the door 141 is opened on the basis of the detection result, and the control unit 400 may stop the operation of the door motor 142.

[0353] The dust collecting step S50, the control unit may operate the dust collecting motor 191 to collect the dust in the dust bin 220 when the discharge cover 222 is opened and the dust passage hole 121a is opened by the rotation of the door 141.

[0354] The control unit 400 may operate the dust collecting motor 191 when a preset dust collecting waiting time tw elapses after the dust bin 220 is fixed.

[0355] For example, the control unit 400 may begin to operate the dust collecting motor 191 when a period of time of 6 seconds or more and 7 seconds or less elapses after the dust bin is fixed. In this case, the control unit 400 may gradually increase a rotational speed of the dust collecting motor 191 to a preset third dust collecting speed Ws3 for a preset suction increase time tsi. For example, the control unit 400 may gradually increase the rotational speed of the dust collecting motor 191 to the third dust collecting speed Ws3 for a period of time of 3 seconds or more and 5 seconds or less. This is advantageous in protecting the dust collecting motor 191 and increasing the lifespan of the dust collecting motor 191 (S51).

[0356] In another example, the control unit 400 may begin to operate the dust collecting motor 191 when a period of time of 10 seconds or more and 11 seconds or less elapses after the dust bin is fixed. In this case, the control unit 400 may increase the suction force by increasing the rotational speed of the dust collecting motor 191 to the preset third dust collecting speed Ws3. This is advantageous in minimizing the operating time of the dust collecting motor 191, improving the energy efficiency, and minimizing the occurrence of noise.

[0357] In the dust collecting step S50, the control unit 400 may operate to rotate the dust collecting motor 191 at the third dust collecting speed Ws3 for a preset dust collecting time ts1. For example, in the dust collecting step S50, the control unit 400 may operate to rotate the dust collecting motor 191 at the third dust collecting speed Ws3 for a period of time of 14 seconds or more

and 16 seconds or less. However, the present disclosure is not limited thereto. The dust collecting time ts1 may be changed and set depending on the output of the dust collecting motor 191 and the amount of dust stored in the dust bin 220 (S52).

[0358] In the dust collecting step S50, the dust in the dust bin 220 may pass through the dust passage hole 121a and cleaner flow path part 181 and be collected in the dust collecting part 170. Therefore, the user may remove the dust in the dust bin 220 without a separate manipulation, and as a result, it is possible to provide convenience for the user.

[0359] Immediately after the dust collecting step S50, the control unit 400 may set a suction decrease time and gradually decrease the rotational speed of the dust collecting motor 191 from the third dust collecting speed Ws3.

[0360] In the dust collecting step S50, the control unit 400 may stop the dust collecting motor 191 when the dust collecting time ts1 elapses (S53).

[0361] In this case, the control unit 400 may gradually decrease the rotational speed of the dust collecting motor 191 from the third dust collecting speed Ws3 for the preset suction decrease time (not illustrated). For example, the control unit 400 may gradually decrease the rotational speed of the dust collecting motor 191 from the third dust collecting speed Ws3 for a period of time of 1 seconds or more and 3 seconds or less. This is advantageous in protecting the dust collecting motor 191 and increasing the lifespan of the dust collecting motor 191.

[0362] On the contrary, the control unit 400 may immediately cut off the power applied to the dust collecting motor 191. This is advantageous in minimizing the operating time of the dust collecting motor 191, improving the energy efficiency, and minimizing the occurrence of noise.

[0363] The additional dust collecting step S60 is a step of removing dust attached to the discharge cover 222 after the dust collecting step S50.

[0364] In the additional dust collecting step S60, a rotation angle of the door 141 changes. The rotation angle is defined as an angle defined between the discharge port of the dust bin 220 and the door 141 when viewed from one side. Specifically, the rotation angle of the door 141 varies between a first opening angle α and a second opening angle β smaller than the first opening angle α.

[0365] Specifically, when the rotation angle of the door reaches the first opening angle, the door is stopped for a particular time or longer. Likewise, when the rotation angle of the door reaches the second opening angle, the door is stopped for a particular time or longer. Therefore, the flow of the air may be more assuredly changed in comparison with a case in which the door vibrates without being stopped.

[0366] With reference to FIGS. 15 and 16, the door 141 may be completely opened in the dust collecting step S50, and only a part of the door 141 may be opened in the additional dust collecting step S60 (S61). With reference to FIGS. 15B and 16B, in a complete door opening step S61, the dust passage hole 121a, which is formed in the coupling part and disposed between the dust bin 220 and the flow path part 180, is completely opened before the dust collecting step S50. With reference to FIGS. 15A and 16A, in a partial door opening step S61, only a part of the dust passage hole 121a is opened in the additional dust collecting step S60 after the dust collecting step S50.

[0367] In the complete opening step S61, the door 141 rotates to the opening position Po. The complete opening step S61, the rotation angle of the door 141 may be the first opening angle α. With reference to FIG. 16B, in the complete opening step S61, the air turns along the discharge cover 222, such that a larger amount of dust may move to the outside of the dust bin 220.

[0368] In the partial opening step S62, the door 141 rotates to the flow velocity change position Pc. In the partial opening step S62, the rotation angle of the door 141 may be the second opening angle β. With reference to FIG. 16A, in the partial opening step S62, the air collides with the discharge cover 222 and curves and moves downward. Therefore, air particles may apply impacts to dust attached to the discharge cover 222. Therefore, the dust attached to the discharge cover 222 may be separated from the discharge cover 222.

[0369] With reference to FIGS. 15A and 15B or FIGS. 16A and 16B, because the door 141 alternates between the first opening angle α or the second opening angle β, the air may or may not collide with the discharge cover 222. Therefore, complicated turbulent flows may be formed around the discharge port, and the dust attached to the discharge cover 222 may be easily separated by the turbulent flows.

[0370] Alternatively, with reference to FIGS. 15C and 16C, the door 141 may rotate by an angle larger than the first opening angle α. For example, the door 141 may be opened to a position having a right angle or a larger angle with respect to the discharge port. In this case, because a cross-sectional area of an air flow path is larger than the first opening angle α, such that a more complicated turbulent flow may be formed.

[0371] The door 141 opens or closes the dust passage hole 121a formed in the coupling part 140 and disposed between the dust bin 220 and the flow path part 180. The door 141 opens only a part of the dust passage hole 121a when the discharge cover 222 vibrates.

[0372] The door 141 may operate before at least any one of the suction motor 214 and the dust collecting motor 191 operates.

[0373] In the additional dust collecting step S60, the control unit 400 may rotate the door 141 by operating the door motor 142. In this case, the door 141 may rotate to a position at which the door 141 may change the flow velocity of the air to be sucked into the dust collecting motor 191 (S61).

[0374] The additional dust collecting step S60 may be divided into at least two steps. After a passage area of

the dust passage hole 121a is changed by the operation of the door unit 140 (S61), the suction motor 214 or the dust collecting motor 191 operates to separate the dust attached to the discharge cover 222 (S62).

[0375] The door opening step S40, which is performed before the dust collecting step S50, may be referred to as the complete door opening step S40 so as to be distinguished from the step S61. The step S61 may be referred to as the partial door opening step S61 so as to be distinguished from the complete opening step S40.

[0376] In the additional dust collecting step S60, the door may rotate while alternating between the first opening angle α and the second opening angle β. Therefore, turbulent flows may be formed as the airflow is complexly changed, such that the dust attached to the discharge cover 222 may be more effectively removed.

[0377] In the partial door opening step S61, a size of a passage area of the dust passage hole 121a is changed as the door 141 operates. Therefore, a flow velocity changes in the discharge port of the dust bin 220.

[0378] With reference to FIG. 15, the passage area is a region defined by the dust passage hole 121a and an outer peripheral surface of the door 141. The passage area has a triangular shape when viewed from one side. However, the passage area has an annular shape when viewed from the front or rear side.

[0379] The passage area may vary between a first passage area (area 1) and a second passage area (area 2). The first passage area (area 1) is a passage area at the first opening angle α. The second passage area (area 2) is a passage area at the second opening angle β. The second passage area (area 2) is smaller than the first passage area (area 1).

[0380] The passage area may be related to a flow velocity. For example, a flow velocity of air in the second passage area (area 2) is higher than a flow velocity of air in the first passage area (area 1).

[0381] In the additional dust collecting step S60, the passage area may continuously vary between the first passage area (area 1) and the second passage area (area 2). Therefore, turbulent flows may be formed as the airflow is complexly changed, such that the dust attached to the discharge cover 222 may be more effectively removed.

[0382] Specifically, when the passage area of the door 141 becomes the first passage area (area 1), the door 141 is stopped for a particular time. Likewise, when the passage area of the door 141 becomes the second passage area (area 2), the door 141 is stopped for a particular time. Therefore, the flow of the air may be more assuredly changed in comparison with a case in which the door 141 vibrates without being stopped.

[0383] When the door arm 143 moves to the preset flow velocity change position Pc, the door opening/closing detecting part 144 may detect the movement and transmit a signal related to the movement. Therefore, the control unit 400 may determine that the door 141 rotates to the position at which the door 141 may change the flow velocity of the air, and the control unit 400 may stop the operation of the door motor 142.

[0384] Alternatively, according to the embodiment, the control unit 400 may use the rotational speed of the door motor 142, the operating time of the door motor 142, and the like to determine whether the door 141 rotates to the position at which the door 141 may change the flow velocity of the air, and the control unit 400 may stop the operation of the door motor 142.

[0385] In the additional dust collecting step S60, the door 141 may rotate within an angle range of 10 degrees or more and 90 degrees or less based on a closing position Ps at which the dust passage hole 121a is closed.

[0386] Specifically, with reference to FIG. 15, in the door opening step S40, the door 141 may be rotated from the closing position Ps to an opening position Po and then stopped. In the dust collecting step S50, the door 141 may be kept at the opening position Po. In the additional dust collecting step S60, the door 141 may be rotated to the flow velocity change position Pc. In this case, an angle α from the closing position Pc to the opening position Po may be larger than an angle β from the closing position Ps to the flow velocity change position Pc. For example, the angle α from the closing position Pc to the opening position Po may be 70 degrees or more and 90 degrees or less, and the angle β from the closing position Ps to the flow velocity change position Pc may be 10 degrees or more and 35 degrees or less. That is, an angle (α-β) from the opening position Pc to the flow velocity change position Pc may be 10 degrees or more and 90 degrees or less based on the closing position Ps.

[0387] That is, with reference to FIG. 15, the discharge cover 222 may particularly vibrate at the flow velocity change position Pc.

[0388] In the additional dust collecting step S60, the discharge cover 222 may rotate in conjunction with the rotation of the door 141.

[0389] The discharge cover 222 may rotate from the opening position Po to the flow velocity change position Ps. In this case, a position of the discharge cover 222 may be expressed as an angle defined between one end of the dust bin main body 221 based on the longitudinal direction (an end based on the direction of the cleaner station) and the discharge cover 222 in a state in which the dust bin 220 is coupled to the cleaner station 100. Therefore, a position of the discharge cover 222 may be expressed as a cover closing position when the discharge cover 222 is coupled to the dust bin main body 221 and closes the dust bin 220. Further, because the discharge cover 222 may rotate together with the door 141 in conjunction with the rotation of the door 141 in the state in which the discharge cover 222 and the door 141 are in contact with each other, the description of the opening position Po and the flow velocity change position Pc of the door 141 may also be applied to the cover opening position and the cover flow velocity change position of the discharge cover 222.

[0390] Therefore, in the additional dust collecting step

S60, an angle of the discharge cover 222 at the cover flow velocity change position with respect to one end of the dust bin main body 221 based on the longitudinal direction may be smaller than an angle of the discharge cover 222 at the cover opening position with respect to one end of the dust bin main body 221 based on the longitudinal direction. For example, at the cover flow velocity change position Pc, the second rotation angle β defined between one end of the dust bin main body 221 based on the longitudinal direction and the discharge cover 222 may be 10 degrees or more and 35 degrees or less. At the cover opening position Po, the first rotation angle α defined between one end of the dust bin main body 221 based on the longitudinal direction and the discharge cover 222 may be 40 degrees or more and 60 degrees or less. Alternatively, the angle defined between one end of the dust bin main body 221 based on the longitudinal direction and the discharge cover 222 may temporarily be the first rotation angle α or more and 90 degrees or less.

[0391] Therefore, in the additional dust collecting step S60, the opening area of the dust passage hole 121a may be changed as the door 141 rotates before the suction motor 214 operates. In addition, in the additional dust collecting step S60, an area in which the internal space of the dust bin 220 is opened may be changed.

[0392] With this configuration, in the additional dust collecting step S60, the flow velocity of the air passing through the dust passage hole 121a may be changed. Specifically, the flow velocity of the air passing through the dust passage hole 121a in the additional dust collecting step S60 may be higher than the flow velocity of the air passing through the dust passage hole 121a in the dust collecting step S50. That is, in the present embodiment, the flow rate of the air in the dust passage hole 121a is maintained, whereas the opening area of the dust passage hole 121a is changed, such that the flow velocity of the air passing through the dust passage hole 121a is changed.

[0393] Before the dust collecting motor 191 operates in the dust collecting step S50, the door 141 may operate to completely open the dust passage hole 121a. In addition, before the dust collecting motor 191 or the suction motor 214 operates in the additional dust collecting step S60 after the dust passage hole 121a is completely opened, the door 141 may operate to open only a part of the dust passage hole 121a. In the dust collecting step S50, the dust passage hole 121a is completely opened. Therefore, a large amount of dust passes through the dust passage hole 121a and flows to the cleaner station 100. In contrast, only a part of the dust passage hole 121a is opened in the additional dust collecting step S60. Therefore, the dust is sucked by a high flow velocity, such that the dust attached to the discharge cover 222 may be more effectively separated.

[0394] In the additional dust collecting step S60, the discharge cover 222 receives a suction force from the dust collecting motor 191 in the direction in which the discharge port is opened. In addition, the discharge cover 222 receives an elastic force from the vibration spring 141d in the direction in which the discharge port is closed. The discharge cover 222 may be vibrated by the suction force and the elastic force, and the dust attached to the discharge cover 22 may be removed by the vibration of the discharge cover 222.

[0395] In the additional dust collecting step S60, at least any one of a suction force Fa of the suction motor 214 and a suction force Fb of the dust collecting motor 191 may be changed. Further, the discharge cover 222 is vibrated by the suction force of at least any one of the suction motor 214 and the dust collecting motor 191.

[0396] The additional dust collecting step S60 may include step S62 of operating the suction motor 214 and/or the dust collecting motor 191 after the partial door opening step S61 is performed (see FIG. 13).

[0397] In the additional dust collecting step S60, the dust collecting motor 191 may operate. The dust collecting motor 191 generates the suction force Fb for an additional dust collecting time ts2. The suction force Fb generated by the dust collecting motor 191 generates an airflow. The suction force Fb generated by the dust collecting motor 191 is provided to the dust bin 220, sucks the dust collected in the dust bin 220, and moves the dust to the dust collecting part 170 through the flow path part 180. The suction force Fb generated by the dust collecting motor 191 is provided to the discharge cover 222 and moves the discharge cover 222 in the direction in which the dust bin 220 is opened. The direction in which the dust bin 220 is opened corresponds to a counterclockwise direction in FIG. 9.

[0398] In this case, the control unit 400 may gradually increase a rotational speed of the dust collecting motor 191 to a preset dust collecting speed for a preset suction increase time (not illustrated). This is advantageous in protecting the dust collecting motor 191 and increasing the lifespan of the dust collecting motor 191.

[0399] In this case, the control unit 400 gradually decreases a rotational speed of the dust collecting motor 191 for a preset suction decrease time tsd. This is advantageous in protecting the dust collecting motor 191 and increasing the lifespan of the dust collecting motor 191. On the contrary, the control unit 400 may immediately cut off the power applied to the dust collecting motor 191. This is advantageous in minimizing the operating time of the dust collecting motor 191, improving the energy efficiency, and minimizing the occurrence of noise.

[0400] In the additional dust collecting step S60, the suction motor 214 may operate. The suction motor 214 generates the suction force Fa for the additional dust collecting time ts2. The suction force Fa generated by the suction motor 214 generates an airflow. The suction force Fa generated by the suction motor 214 may be provided to the dust bin 220 and recover the dust, which remains around the discharge port of the dust bin 220, into the dust bin 220. The suction force Fa generated by the suction motor 214 is provided to the discharge cover

222 and moves the discharge cover 222 in a direction in which the dust bin 220 is closed. The direction in which the dust bin 220 is closed corresponds to a clockwise direction CW in FIG. 9.

[0401] In this case, the control unit 400 may gradually increase a rotational speed of the suction motor 214 to a preset suction speed for a preset suction increase time (not illustrated). This is advantageous in protecting the suction motor 214 and increasing the lifespan of the suction motor 214.

[0402] In this case, the control unit 400 gradually decreases a rotational speed of the suction motor 214 for the preset suction decrease time tsd. This is advantageous in protecting the suction motor 214 and increasing the lifespan of the suction motor 214. On the contrary, the control unit 400 may immediately cut off the power applied to the suction motor 214. This is advantageous in minimizing the operating time of the suction motor 214, improving the energy efficiency, and minimizing the occurrence of noise.

[0403] In the additional dust collecting step S60, the door motor 142 may operate. The door motor 142 may operate the door 141 and change the area of the dust passage hole 121a. The reduction in area of the dust passage hole 121a increases the flow velocity, which allows the remaining dust to easily move.

[0404] The door motor 142 may operate when the additional dust collecting step S60 starts. The door motor 142 may be stopped before the suction motor 214 and the dust collecting motor 191 operate. However, unlike the illustration in FIG. 12, the door motor 142 may operate while the suction motor 214 or the dust collecting motor 191 operates.

[0405] Meanwhile, the method of controlling the cleaner station 100 according to the embodiment of the present disclosure may further include a door closing checking step S70 of opening at least a part of the dust passage hole 121a and then closing the dust passage hole 121a again by rotating the door 141 after the operation of the dust collecting motor 191 ends.

[0406] Specifically, when a preset suction end time tse elapses after the operation of the dust collecting motor 191 ends, the control unit 400 may rotate the door motor 142 in the forward direction and then rotate the door motor 142 in the reverse direction again.

[0407] For example, when a period of time of 3 seconds or more and 11 seconds or less, particularly 9 seconds or more and 11 seconds or less elapses after the operation of the dust collecting motor 191 ends, the control unit 400 may operate the door motor 142 in the forward direction and rotate the door 141 to the flow velocity change position Pc. Thereafter, the control unit 400 may operate the door motor 142 in the reverse direction and rotate the door 141 to the closing position Ps.

[0408] This is to prevent the dust passage hole 121a from being finely opened by a negative pressure generated by the operation of the dust collecting motor 191 because the dust collecting motor 191 operates in the additional dust collecting step S60 in the state in which the dust passage hole 121a is closed. Therefore, in the door closing checking step S70, the door 141 blocks the dust passage hole 121a once again after the operation of the dust collecting motor 191 ends, which may prevent a reverse flow of dust that may be present in the flow path part 180.

[0409] In the release step S80, when the door 141 is closed, the fixing part motor 133 may be operated, such that the fixing member 131 may release the dust bin 220.

[0410] Specifically, the control unit 400 may release the dust bin 220 when the control unit 400 receives a signal, which indicates that the door 141 closes the dust passage hole 121a, from the door opening/closing detecting part 144.

[0411] That is, when the door arm 143 moves to the preset door closing position DP2, the door opening/closing detecting part 144 may detect the movement and transmit a signal related to the movement. Therefore, the control unit 400 may determine that the door 141 closes the dust passage hole 121a, and the control unit 400 may operate the fixing part motor 133 in the reverse direction to release the dust bin 220.

[0412] Alternatively, according to the embodiment, the control unit 400 may detect that the door 141 has been rotated to sufficiently close the dust passage hole 121a on the basis of the electric current value applied to the door motor 142. The control unit 400 may determine that the door 141 has closed the dust passage hole 121a on the basis of the detection result, and the control unit 400 may operate the fixing part motor 133 in the reverse direction to release the dust bin 220.

[0413] In this case, when the fixing member 131 or the fixing part link 135 is moved to the releasing position FP2, the fixing detecting part 137 may transmit a signal indicating that the cleaner 200 is released.

[0414] Therefore, the control unit 400 may receive the signal, which indicates that the cleaner 200 is released, from the fixing detecting part 137 and determine that the cleaner 200 is released.

[0415] When the control unit 400 determines that the cleaner 200 is released, the control unit 400 may stop the operation of the fixing part motor 133.

[0416] On the contrary, according to the embodiment, the control unit 400 may operate the door motor 142 for a preset time. For example, the control unit 400 may operate the door motor 142 in the reverse direction for a period of time of 4 seconds or more and 5 seconds or less and then stop the operation of the door motor 142.

[0417] Hereinafter, the components, which operate in the additional dust collecting step S60, will be described in detail.

[0418] With reference to FIG. 6, the vibration spring 141d is one of the components that provide the discharge cover 222 with forces that vibrate the discharge cover 222.

[0419] The vibration spring 141d may have a sufficiently low elastic modulus. The elastic modulus may be set

so that the elastic force Fc provided to the discharge cover 222 by the vibration spring 141d is equal to the suction force Fb provided to the discharge cover 222 by the dust collecting motor 191. In this case, because the elastic force Fc and the suction force Fb applied to the discharge cover 222 are equal to each other, the discharge cover 222 may be vibrated by a fine change of the airflow in the flow path part 180 even though the dust collecting motor 191 is not controlled.

[0420] The vibration spring 141d is disposed in the door 141 and provides the elastic force Fc to the discharge cover 222 in the direction in which the discharge port is closed. With this arrangement, the vibration spring 141d is maximally compressed in case that the dust collecting motor 191 provides the high suction force Fb to the discharge cover 222, such that the discharge cover 222 may collide with the door 141, and the dust attached to the discharge cover 222 may be separated by the collision.

[0421] When the door 141 is formed in a shape similar to a circular shape, the vibration spring 141d is disposed at a center of the circle.

[0422] The door 141 has an insertion groove into which at least a part of the vibration spring 141d is inserted. The vibration spring 141d is inserted into the insertion groove, such that the position of the vibration spring 141d is fixed. A part of the vibration spring 141d may be inserted into the insertion groove, and the remaining part of the vibration spring 141d may protrude to the outside of the door 141.

[0423] A cover of the vibration spring 141d is disposed at an outer end of the vibration spring 141d. The cover of the vibration spring 141d may be formed in a cup shape. The cover of the vibration spring 141d is opened at one side, and at least a part of the vibration spring 141d is inserted into the cover of the vibration spring 141d.

[0424] The other side end of the vibration spring 141d is disposed adjacent to the discharge cover 222. More specifically, the other side end of the vibration spring 141d faces the vibration spring support member 222e of the discharge cover 222.

[0425] The vibration spring 141d is disposed to be inserted into the door 141. When the vibration spring 141d is maximally inserted into the door 141, an end of the vibration spring 141d may be disposed on a straight line together with an inner surface of the door 141.

[0426] The dust collecting motor 191 provides the discharge cover 222 with the suction force Fb in the direction in which the discharge port is opened. The direction in which the dust bin 220 is opened corresponds to a counterclockwise direction CCW in FIG. 9. According to the embodiment, the discharge cover 222 may be vibrated by the vibration spring 141d and the dust collecting motor 191. With reference to FIG. 9, the dust collecting motor 191 provides the discharge cover 222 with the suction force Fb in the counterclockwise direction, and the vibration spring 141d provides the discharge cover 222 with the elastic force Fc in the clockwise direction. Therefore, in case that the suction force Fb of the dust collecting motor 191 increases, the vibration spring 141d is compressed, and the discharge cover 222 rotates counterclockwise. In case that the suction force Fb of the dust collecting motor 191 decreases, the vibration spring 141d is stretched, and the discharge cover 222 rotates clockwise. Therefore, when the suction force Fb of the dust collecting motor 191 repeatedly increases and decreases, the discharge cover 222 vibrates. As the discharge cover 222 vibrates, the dust attached to the discharge cover 222 is separated, and the dust is captured in the dust collecting part 170 by the suction force Fb of the dust collecting motor 191.

[0427] The suction motor 214 provides the discharge cover 222 with the suction force Fa in the direction in which the discharge port is closed. The direction in which the dust bin 220 is closed corresponds to the clockwise direction CW in FIG. 9. According to the embodiment, when the discharge cover 222 vibrates, a vibration degree may be changed by the suction motor 214. With reference to FIG. 9, the suction motor 214 provides the discharge cover 222 with the suction force Fa in the clockwise direction that is opposite to the direction of the suction force Fa provided by the dust collecting motor 191. Therefore, in case that the suction force Fa of the suction motor 214 increases, the vibration spring 141d is stretched, and the discharge cover 222 rotates clockwise. In case that the suction force Fa of the suction motor 214 decreases, the vibration spring 141d is compressed, and the discharge cover 222 rotates clockwise. Therefore, when the suction force Fa of the suction motor 214 repeatedly increases and decreases, the discharge cover 222 vibrates. When the discharge cover 222 vibrates, the suction force Fa of the suction motor 214 is applied to an inner surface of the discharge cover 222, such that the dust attached to the discharge cover 222 may be more easily separated.

[0428] The torsion spring 222d is disposed on the hinge part 222b of the discharge cover 222 and provides the discharge cover 222 with the elastic force Fd in the direction in which the discharge port is opened. According to the embodiment, when the discharge cover 222 vibrates, a vibration degree may be changed by the torsion spring 222d. With reference to FIG. 9, the torsion spring 222d provides the discharge cover 222 with the elastic force Fd in the counterclockwise direction CCW that is opposite to the direction of the elastic force Fc provided by the vibration spring 141d. Therefore, the torsion spring 222d offsets the elastic force Fd of the vibration spring 141d to some extent, such that a sufficient vibration width may be ensured even though a range of fluctuation of the suction force Fb of the dust collecting motor 191 is small.

[0429] According to the embodiment different from the above-mentioned embodiment, the discharge cover 222 may be vibrated by the torsion spring 222d and the suction motor 214. That is, the torsion spring 222d provides

the discharge cover 222 with the elastic force Fd in the direction in which the discharge port is opened, and the suction motor 214 provides the discharge cover 222 with the suction force Fa in the direction in which the discharge port is closed. With reference to FIG. 9, the suction motor 214 provides the discharge cover 222 with the suction force Fa in the clockwise direction, and the torsion spring 222d provides the discharge cover 222 with the elastic force Fd in the counterclockwise direction. Therefore, in case that the suction force Fa of the suction motor 214 increases, the torsion spring 222d is compressed, and the discharge cover 222 rotates clockwise. In case that the suction force Fa of the suction motor 214 decreases, the torsion spring 222d is stretched, and the discharge cover 222 rotates counterclockwise. Therefore, when the suction force Fa of the suction motor 214 repeatedly increases and decreases, the discharge cover 222 vibrates. Therefore, as the discharge cover 222 vibrates, the dust attached to the discharge cover 222 may be separated.

[0430] According to the embodiment different from the above-mentioned embodiment, the discharge cover 222 may be vibrated by the suction motor 214 and the dust collecting motor 191. That is, the direction of the suction force Fa provided to the discharge cover 222 by the suction motor 214 is opposite to the direction of the suction force Fb provided to the discharge cover 222 by the dust collecting motor 191. With reference to FIG. 9, the dust collecting motor 191 provides the discharge cover 222 with the suction force Fb in the counterclockwise direction, and the suction motor 214 provides the discharge cover 222 with the suction force Fa in the clockwise direction. Therefore, in case that the suction force Fb of the dust collecting motor 191 is higher than the suction force Fa of the suction motor 214, the discharge cover 222 rotates counterclockwise. In case that the suction force Fb of the dust collecting motor 191 is lower than the suction force Fa of the suction motor 214, the discharge cover 222 rotates clockwise. Therefore, the discharge cover 222 vibrates as the suction force of the dust collecting motor 191 and the suction force of the suction motor 214 are changed. Therefore, as the discharge cover 222 vibrates, the dust attached to the discharge cover 222 may be separated, and the dust may be captured in the dust collecting part 170 by the suction force Fb of the dust collecting motor 191.

[0431] At least any one of the suction motor 214 and the dust collecting motor 191 may be controlled by changing the rotational speeds. The method of controlling the suction motor 214 and/or the dust collecting motor 191 will be described for each embodiment.

[0432] A rotational speed value of the dust collecting motor 191 may include a first dust collecting speed Ws1 and a second dust collecting speed Ws2. In this case, the second dust collecting speed Ws2 is lower in magnitude than the first dust collecting speed Ws1.

[0433] The additional dust collecting step S60 according to a first embodiment will be described with reference to FIG. 17.

[0434] With reference to FIG. 17, the first dust collecting speed Ws1 and the second dust collecting speed Ws2 of the dust collecting motor 191 may be alternately implemented. In this case, when the rotational speed changes, the rotational speed continuously changes for a predetermined time.

[0435] The control unit 400 may gradually change the rotational speed of the dust collecting motor 191 between the first dust collecting speed Ws1 and the second dust collecting speed Ws2 for a preset time tb. For example, the control unit 400 may gradually decrease the rotational speed of the dust collecting motor 191 from the first dust collecting speed Ws1 to the second dust collecting speed Ws2. On the contrary, the control unit 400 may gradually increase the rotational speed of the dust collecting motor 191 from the second dust collecting speed Ws2 to the first dust collecting speed Ws1. This is advantageous in protecting the dust collecting motor 191 and increasing the lifespan of the dust collecting motor 191.

[0436] Unlike the illustration in FIG. 17A, with reference to FIG. 17B, the suction motor 214 may also operate while the dust collecting motor 191 operates. In this case, the rotational speed of the suction motor 214 may be lower than the first dust collecting speed Ws1. In the case of FIG. 17B, the flow direction of the air is changed as the suction motor 214 operates, such that the dust attached to the discharge cover 222 may be more effectively separated.

[0437] Hereinafter, the additional dust collecting step S60 according to a second embodiment will be described with reference to FIG. 18.

[0438] The above-mentioned description of the additional dust collecting step S60 according to the first embodiment may be applied to the additional dust collecting step S60 according to the second embodiment as long as these steps do not conflict with each other. Hereinafter, the description will be focused on a difference between the additional dust collecting step S60 according to the second embodiment and the additional dust collecting step S60 according to the first embodiment.

[0439] With reference to FIG. 18, the first dust collecting speed Ws1 and the second dust collecting speed Ws2 of the dust collecting motor 191 may be alternately implemented. In this case, when the rotational speed is changed, the motor is turned off for a predetermined time.

[0440] With reference to FIG. 18A, the rotational speed value of the dust collecting motor 191 may include the first dust collecting speed Ws1 and the second dust collecting speed Ws2. In this case, the second dust collecting speed Ws2 is higher in magnitude than the first dust collecting speed Ws1. The first dust collecting speed Ws1 and the second dust collecting speed Ws2 of the dust collecting motor 191 are alternately implemented, and the dust collecting motor 191 may be turned off for a predetermined time before the rotational speed is changed.

[0441] According to the second embodiment, because

the dust collecting motor 191 is stopped or operates at the first dust collecting speed Ws1 or the second dust collecting speed Ws2, the suction force Fb of the dust collecting motor 191 three-dimensionally varies in at least three steps, such that the dust attached to the discharge cover 222 may be efficiently separated.

[0442] Unlike the illustration in FIG. 18A, with reference to FIG. 18B, the suction motor 214 may operate while the suction motor 214 is turned off. In FIG. 18A, no external force is applied to the dust attached to the discharge cover 222 while the dust collecting motor 191 is stopped. However, in FIG. 18B, an external force is applied in the opposite direction to the attached dust while the dust collecting motor 191 is stopped, such that the dust attached to the discharge cover 222 may be more effectively separated.

[0443] Hereinafter, the additional dust collecting step S60 according to a third embodiment will be described with reference to FIG. 19.

[0444] The above-mentioned description of the additional dust collecting step S60 according to the first and second embodiments may be applied to the additional dust collecting step S60 according to the third embodiment as long as these steps do not conflict with each other. Hereinafter, the description will be focused on a difference between the additional dust collecting step S60 according to the third embodiment and the additional dust collecting step S60 according to the first and second embodiments.

[0445] According to the third embodiment, the dust collecting motor 191 may consistently operate, and the suction motor 214 may be controlled by being turned on or off. That is, the suction motor 214 may operate intermittently. Therefore, according to the third embodiment, the discharge cover 222 may vibrate as the suction motor 214 is controlled by being turned on or off.

[0446] Further, the rotational speed of the suction motor 214 is higher than the rotational speed of the dust collecting motor 191, and the suction force Fa of the suction motor 214 is higher than the suction force Fb of the dust collecting motor 191. Therefore, when the suction motor 214 and the dust collecting motor 191 operate simultaneously, the flow direction changes to the direction toward the dust bin 220 from the cleaner station 100. That is, because the flow direction of the air is changed as the suction motor 214 is turned on or off, the dust attached to the discharge cover 222 may be more effectively separated.

[0447] With reference to FIG. 19, when the operation mode is changed, the suction motor 214 may begin to operate after the dust collecting motor 191 operates. Alternatively, unlike FIG. 19, when the operation mode is changed, the suction motor 214 may operate before the dust collecting motor 191 operates. The change in operation mode refers to a configuration in which the dust collecting step S50 ends, and the additional dust collecting step S60 starts.

[0448] With reference to FIG. 19, the suction motor 214 may operate in the form of a pulse. In this case, the control unit 400 may control and turn on or off the suction motor 214 by applying a voltage in the form of a pulse to the suction motor 214.

[0449] Hereinafter, the additional dust collecting step S60 according to a fourth embodiment will be described with reference to FIG. 20.

[0450] The above-mentioned description of the additional dust collecting step S60 according to the first to third embodiments may be applied to the additional dust collecting step S60 according to the fourth embodiment as long as these steps do not conflict with each other. Hereinafter, the description will be focused on a difference between the additional dust collecting step S60 according to the fourth embodiment and the additional dust collecting step S60 according to the first to third embodiments.

[0451] According to the fourth embodiment, the dust collecting motor 191 may be controlled by being turned on or off, and the suction motor 214 may consistently operate. That is, the dust collecting motor 191 may intermittently operate. Therefore, according to the fourth embodiment, the discharge cover 222 may vibrate as the dust collecting motor 191 is controlled by being turned on or off.

[0452] Further, when the dust collecting motor 191 does not operate, the flow direction changes to the direction toward the dust bin 220 from the cleaner station 100. That is, because the flow direction of the air is changed as the dust collecting motor 191 is turned on or off, the dust attached to the discharge cover 222 may be more effectively separated.

[0453] With reference to FIG. 20, when the operation mode is changed, the suction motor 214 may begin to operate after the dust collecting motor 191 operates. Alternatively, unlike FIG. 20, when the operation mode is changed, the suction motor 214 may begin to operate before the dust collecting motor 191 operates.

[0454] With reference to FIG. 20, the dust collecting motor 191 may operate in the form of a pulse. In this case, the control unit 400 may control and turn on or off the dust collecting motor 191 by applying a voltage in the form of a pulse to the dust collecting motor 191.

[0455] Hereinafter, the cleaner system 10 according to another embodiment will be described. The above-mentioned description may be applied to the cleaner system 10 to be described below within a range in which the cleaner systems do not conflict with each other. Hereinafter, the cleaner system 10 according to the present disclosure will be described.

[0456] The cleaner system 10 according to the present embodiment includes the cleaner 200 and the cleaner station 100 to which the cleaner 200 is coupled. The cleaner 200 includes the dust bin 220 configured to collect dust and having the discharge port formed at one side thereof. The cleaner station 100 includes the flow path part 180 disposed in the internal space of the housing 110 and configured to communicate with the dust bin

220. The cleaner station 100 includes the door 141 configured to open or close the dust passage hole 121a formed in the coupling part 120 and disposed between the dust bin 220 and the flow path part 180. The door 141 alternates between the complete opening step and the partial opening step.

[0457] The complete opening step and the partial opening step are as described above. That is, the door 141 moves while rotating to the opening position Po in the complete opening step, and the door moves while moving to the flow velocity change position Pc in the partial opening step.

[0458] In the present embodiment, the additional dust collecting step S60 may include both the complete opening step and the partial opening step and alternately perform the complete opening step and the partial opening step. Therefore, because the airflow is irregularly changed in the flow path part 180, the dust attached to the discharge cover 222 may be effectively removed. On the contrary, the additional dust collecting step S60 may include only the partial opening step.

[0459] In the present embodiment, the cleaner station 100 may further include the vibration spring 141d. The vibration spring 141d is disposed at one side of the discharge cover 222 configured to cover the discharge port of the dust bin 220 and provides the elastic force Fc to the discharge cover 222 in one direction. The above-mentioned one direction refers to the direction in which the discharge port is closed. According to the present embodiment, the discharge cover 222 may be vibrated by providing the elastic force Fc to the discharge cover 222 when the door 141 moves between the opening position Po and the flow velocity change position Pc.

[0460] According to the present embodiment, the cleaner 200 includes the torsion spring 222d. The torsion spring 222d is disposed at one side of the discharge cover 222 and provides the discharge cover 222 with the elastic force Fd in the direction opposite to the elastic force Fc provided by the vibration spring 141d. According to the present embodiment, the torsion spring 222d offsets the elastic force Fc of the vibration spring 141d to some extent, such that a sufficient vibration width may be ensured even though a change in pressure of the flowing air is small.

[0461] The pressure of the air in the flow path part 180 may be determined by the dust collecting motor 191 and the suction motor 214. The dust collecting motor 191 is disposed in the cleaner station 100 and provides the suction force Fb to the discharge cover 222 in a direction identical to the direction of the elastic force Fd of the torsion spring 222d. The suction motor 214 is disposed in the cleaner and provides the suction force Fa to the discharge cover 222 in a direction identical to the direction of the elastic force Fc of the vibration spring 141d. That is, the suction force Fb of the dust collecting motor 191 and the suction force Fa of the suction motor 214 are independently changed, and the pressure of the air flowing in the flow path part 180 may be determined on the basis of a difference between the suction force Fb of the dust collecting motor 191 and the suction force Fa of the suction motor 214. In other words, the pressure of the air flowing in the flow path part 180 may be determined on the basis of a difference between the rotational speed of the dust collecting motor 191 and the rotational speed of the suction motor 214.

[0462] 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.

[0463] 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 system comprising:

a cleaner configured to suck and collect dust; and

a cleaner station to which the cleaner is coupled,

wherein the cleaner comprises a dust bin configured to collect the sucked dust and having a discharge port formed at one side and configured to discharge the dust,

wherein the cleaner station comprises:

a housing having a coupling part to which the cleaner is coupled, the housing having an internal space configured to accommodate a flow path part through which the dust in the dust bin flows;

a dust passage hole formed in the coupling part and having an outlet end connected to the flow path part, the dust passage hole having an inlet end connected to the discharge port of the dust bin when the cleaner is coupled; and

a door hingedly coupled to the coupling part and configured to open or close the dust passage hole,

wherein the door is stopped for a particular time or longer when a rotation angle of the door from the discharge port reaches a first opening angle, and

wherein the door is stopped for a particular time or longer when the rotation angle reaches a second opening angle smaller than the first opening angle.

2. The cleaner system of claim 1, wherein an upper end of the door is hingedly coupled to the coupling part.

3. The cleaner system of claim 1, wherein the door alternately performs a rotation to the first opening angle and a rotation to the second opening angle.

4. The cleaner system of claim 1, wherein the cleaner comprises a discharge cover configured to cover the discharge port of the dust bin, and
wherein the cleaner station comprises a vibration spring configured to vibrate the discharge cover by providing an elastic force to the discharge cover.

5. The cleaner system of claim 4, wherein the vibration spring is disposed in the door and provides an elastic force to the discharge cover in a direction in which the discharge port is closed.

6. The cleaner system of claim 4, wherein the cleaner comprises a torsion spring disposed at one side of the discharge cover and configured to provide an elastic force to the discharge cover in a direction in which the discharge port is opened.

7. The cleaner system of claim 4, wherein the discharge cover vibrates when the door is rotated by the second opening angle.

8. The cleaner system of claim 4, wherein the cleaner station comprises a dust collecting motor disposed at a downstream side of the flow path part and configured to provide a suction force to the discharge cover in a direction in which the discharge port is opened.

9. The cleaner system of claim 4, wherein a suction force of the dust collecting motor is changed as a rotational speed is changed, and
wherein the rotational speed comprises a first dust collecting speed and a second dust collecting speed lower than the first dust collecting speed.

10. The cleaner system of claim 9, wherein the first dust collecting speed and the second dust collecting speed of the dust collecting motor are alternately implemented, and
wherein the rotational speed is continuously changed for a predetermined time when the rotational speed is changed.

11. The cleaner system of claim 10, wherein the first dust collecting speed and the second dust collecting speed of the dust collecting motor are alternately implemented, and
wherein the dust collecting motor is turned off for a predetermined time when the rotational speed is changed.

12. The cleaner system of claim 4, wherein the cleaner comprises a suction motor configured to generate a suction force so that air containing dust is introduced into the dust bin,

wherein the suction motor provides the suction force to the discharge cover in a direction in which the discharge port is closed, and
wherein the suction force is changed as a rotational speed is changed.

13. A cleaner system comprising:

a cleaner configured to suck and collect dust; and
a cleaner station to which the cleaner is coupled,
wherein the cleaner comprises a dust bin configured to collect the sucked dust and having a discharge port formed at one side thereof and configured to discharge the dust,
wherein the cleaner station comprises:

a housing having a coupling part to which the cleaner is coupled, the housing having an internal space configured to accommodate a flow path part through which the dust in the dust bin flows;
a dust passage hole formed in the coupling part and having an outlet end connected to the flow path part, the dust passage hole having an inlet end connected to the discharge port of the dust bin when the cleaner is coupled;
a door configured to open or close the dust passage hole; and
a passage area defined by the dust passage hole and an outer peripheral surface of the door,
wherein the door is stopped for a particular time or longer when the passage area becomes a first passage area, and
wherein the door is stopped for a particular time or longer when the passage area becomes a second passage area smaller than the first passage area.

14. The cleaner system of claim 13, wherein the door is hingedly coupled to the coupling part, and
wherein the passage area is changed as the door rotates.

15. A cleaner system comprising:

a cleaner configured to collect dust; and
a cleaner station to which the cleaner is coupled,
wherein the cleaner comprises a dust bin configured to collect dust and having a discharge port formed at one side,

wherein the cleaner station comprises:

a housing having a coupling part to which the cleaner is coupled, the housing having an internal space;
a flow path part disposed in the internal space of the housing and configured to communicate with the dust bin; and
a door configured to open or close a dust passage hole formed in the coupling part and disposed between the dust bin and the flow path part, and
wherein the door alternately performs a complete opening step in which the door opens the dust passage hole to an opening position and is stopped for a particular time or longer and a partial opening step in which the door opens the dust passage hole to a flow velocity change position, which is smaller than the opening position, and is stopped for a particular time or longer.

16. The cleaner system of claim 15, wherein the cleaner station comprises a vibration spring disposed at one side of a discharge cover configured to cover the discharge port of the dust bin, and the vibration spring provides an elastic force to the discharge cover in one direction.

17. The cleaner system of claim 16, wherein the cleaner station comprises a torsion spring disposed at one side of the discharge cover, and the torsion spring provides the discharge cover with an elastic force in a direction opposite to the elastic force provided by the vibration spring.

18. The cleaner system of claim 17, wherein the cleaner station comprises a dust collecting motor configured to provide a suction force to the discharge cover in a direction opposite to a direction of the elastic force provided by the vibration spring, and
wherein the cleaner comprises a suction motor configured to provide a suction force to the discharge cover in a direction opposite to a direction of the elastic force provided by the torsion spring.

19. A method of controlling a cleaner system comprising a cleaner including a dust bin configured to collect dust and having a discharge port configured to discharge the collected dust, and a cleaner station including a housing having a coupling part to which the cleaner is coupled, the housing having an internal space configured to accommodate a flow path part through which the dust in the dust bin flows, and a dust passage hole formed in the coupling part and having an outlet end connected to the flow path part, the dust passage hole having an inlet end connected to the discharge port of the dust bin when the cleaner is coupled, the method comprising:

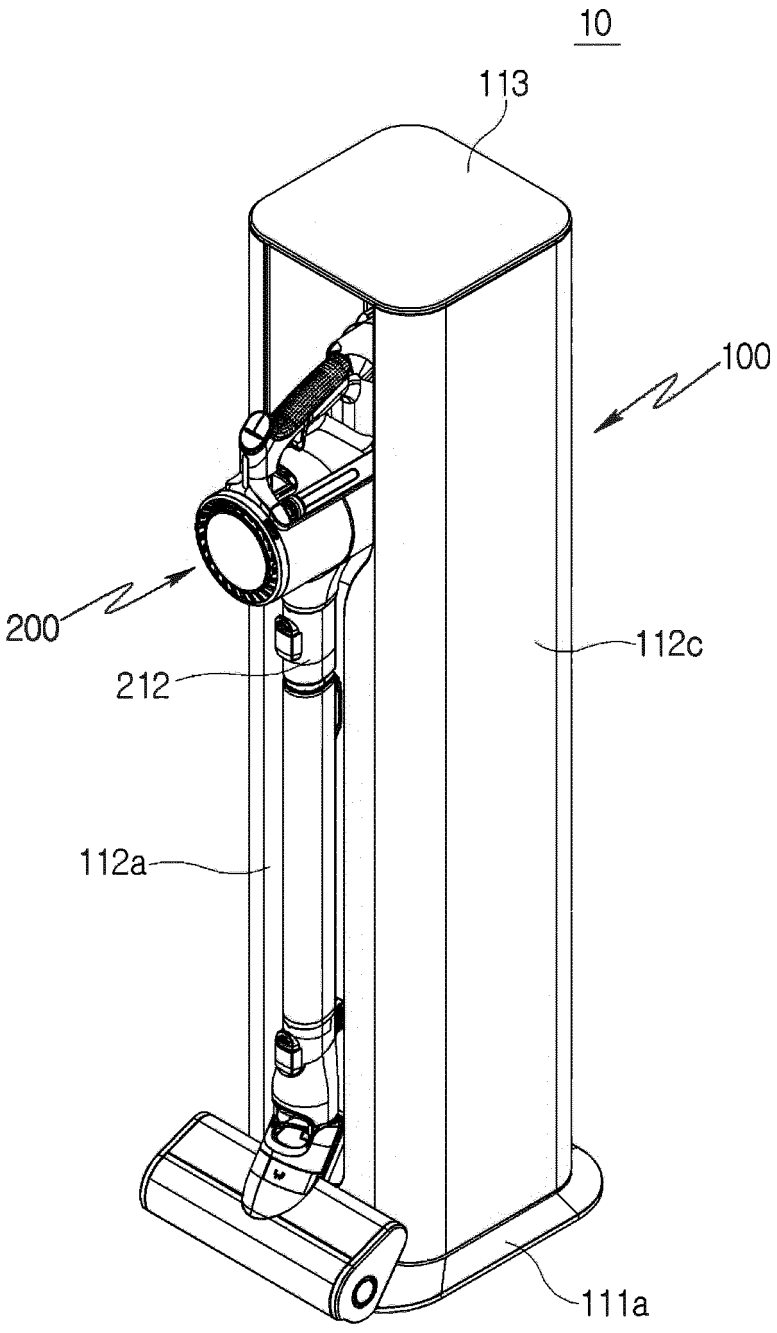
a dust collecting step of opening a door, which is hingedly coupled to the coupling part and configured to open or close the dust passage hole, to a first opening angle from the discharge port and sucking the dust in the dust bin into the cleaner station; and
an additional dust collecting step of opening the door from the discharge port to a second opening angle, which is smaller than the first opening angle, and removing dust attached to the discharge cover.

20. The method of claim 19, wherein in the additional dust collecting step, the door alternately performs a rotation to the first opening angle and a rotation to the second opening angle.

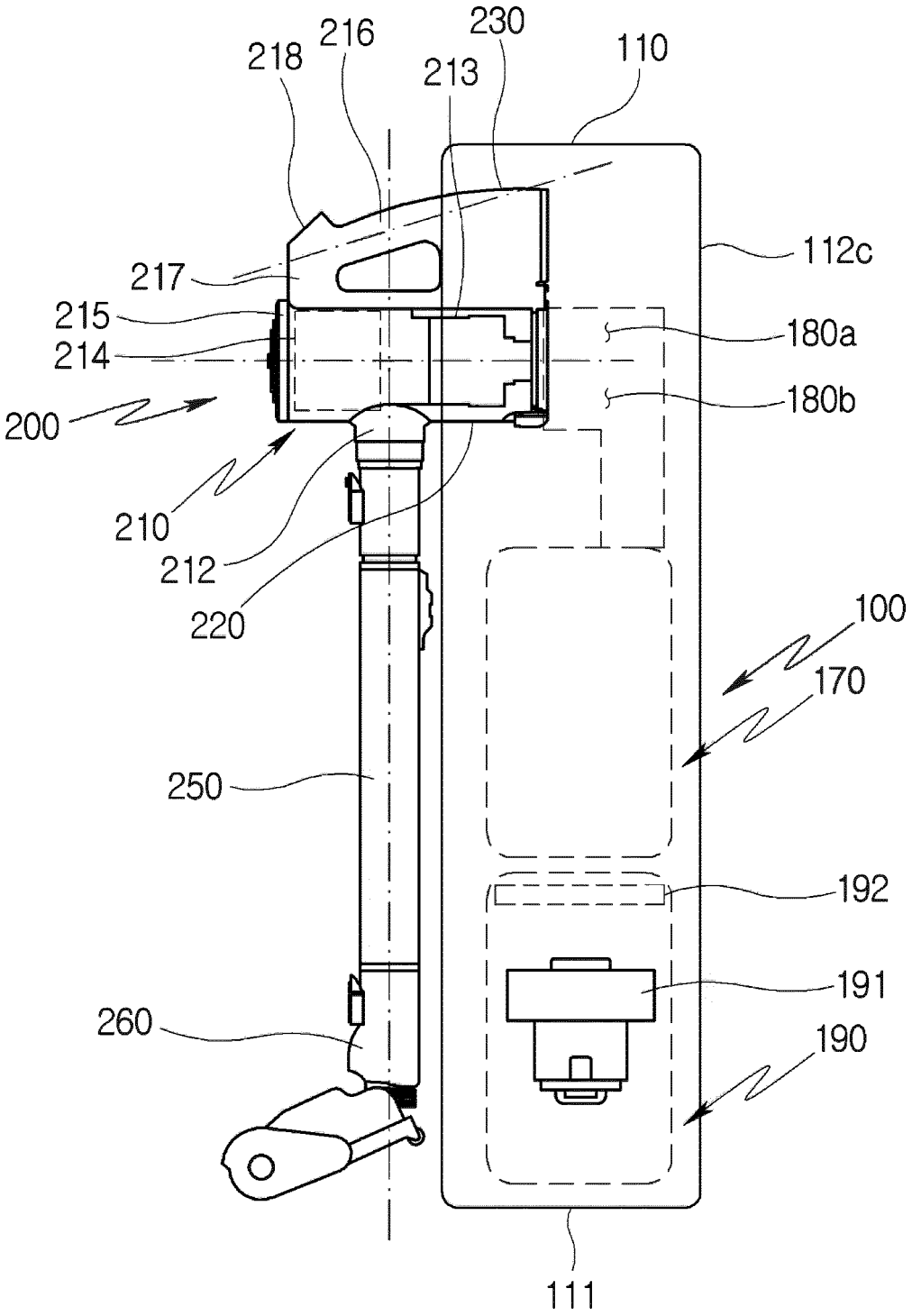
21. The method of claim 20, wherein the door is stopped for a particular time or longer when the door reaches at least one of the first opening angle and the second opening angle.

22. The method of claim 20, wherein in the additional dust collecting step, the discharge cover is vibrated by a dust collecting motor, which provides a suction force to the discharge cover in a direction in which the discharge port is opened, or a vibration spring that provides an elastic force to the discharge cover in a direction in which the discharge port is closed.

[FIG. 1]



[FIG. 2]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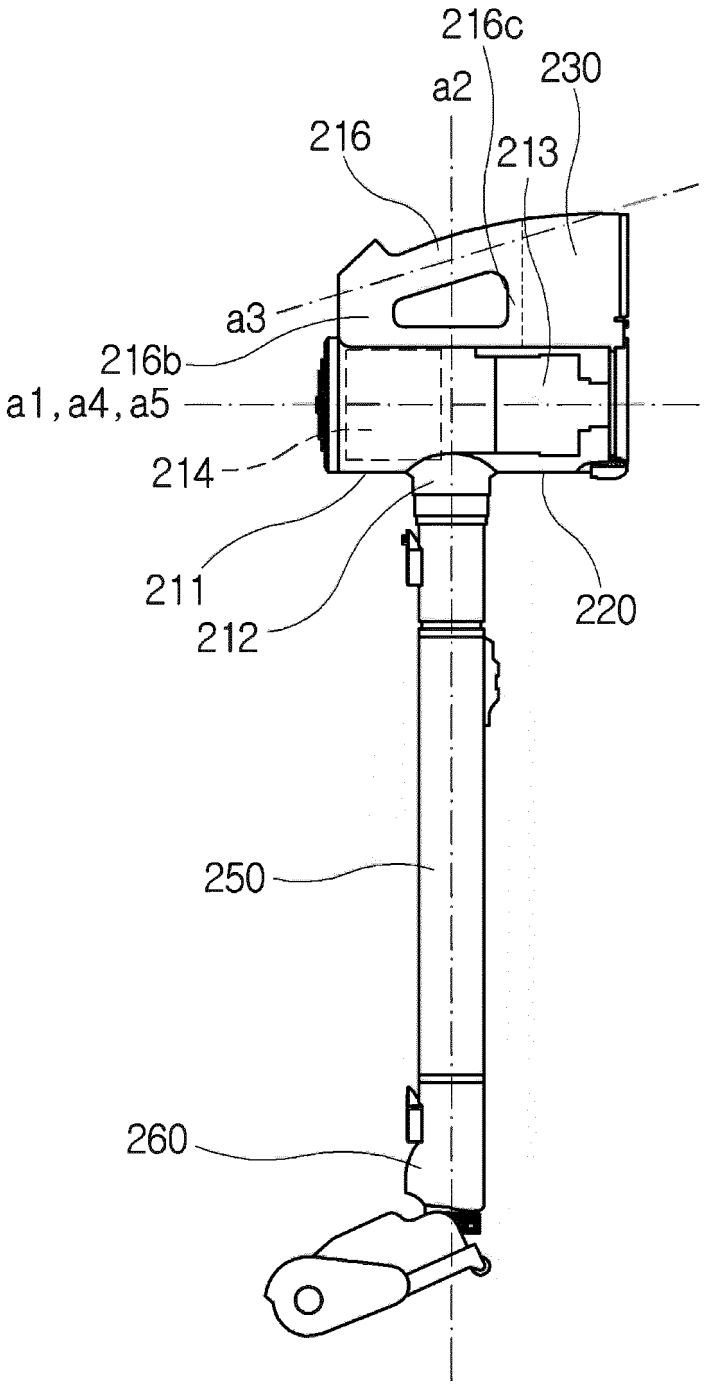
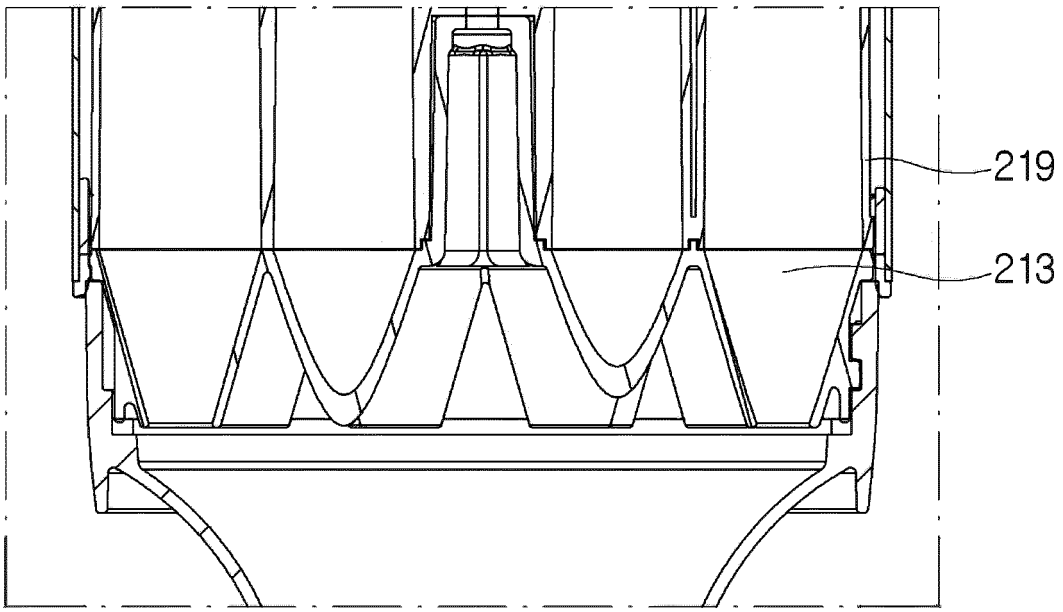
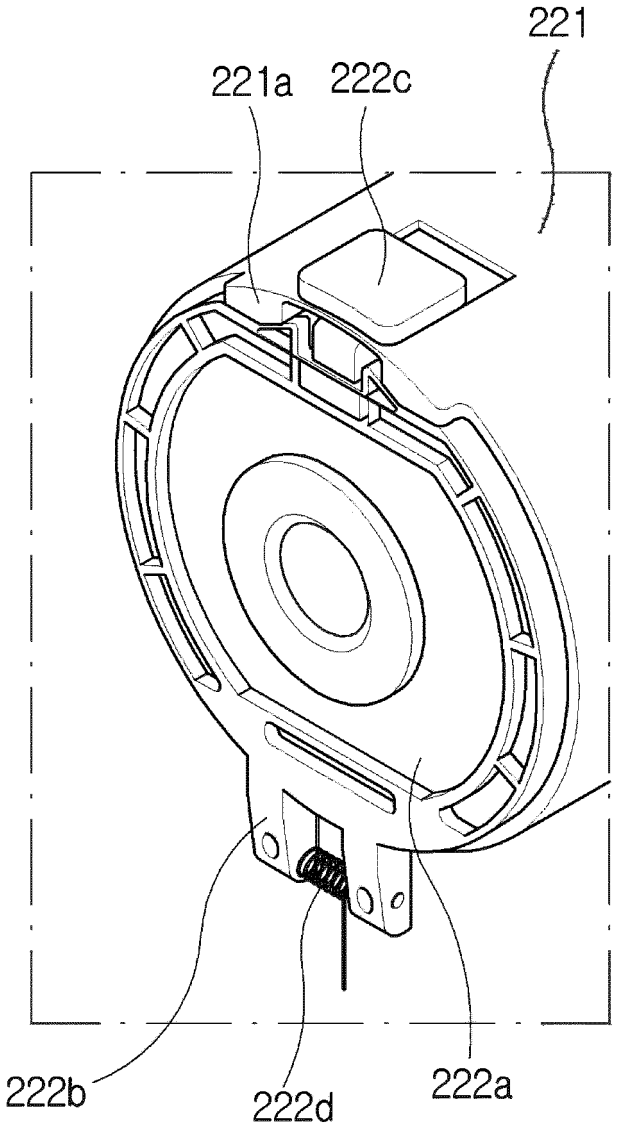
[FIG. 3]



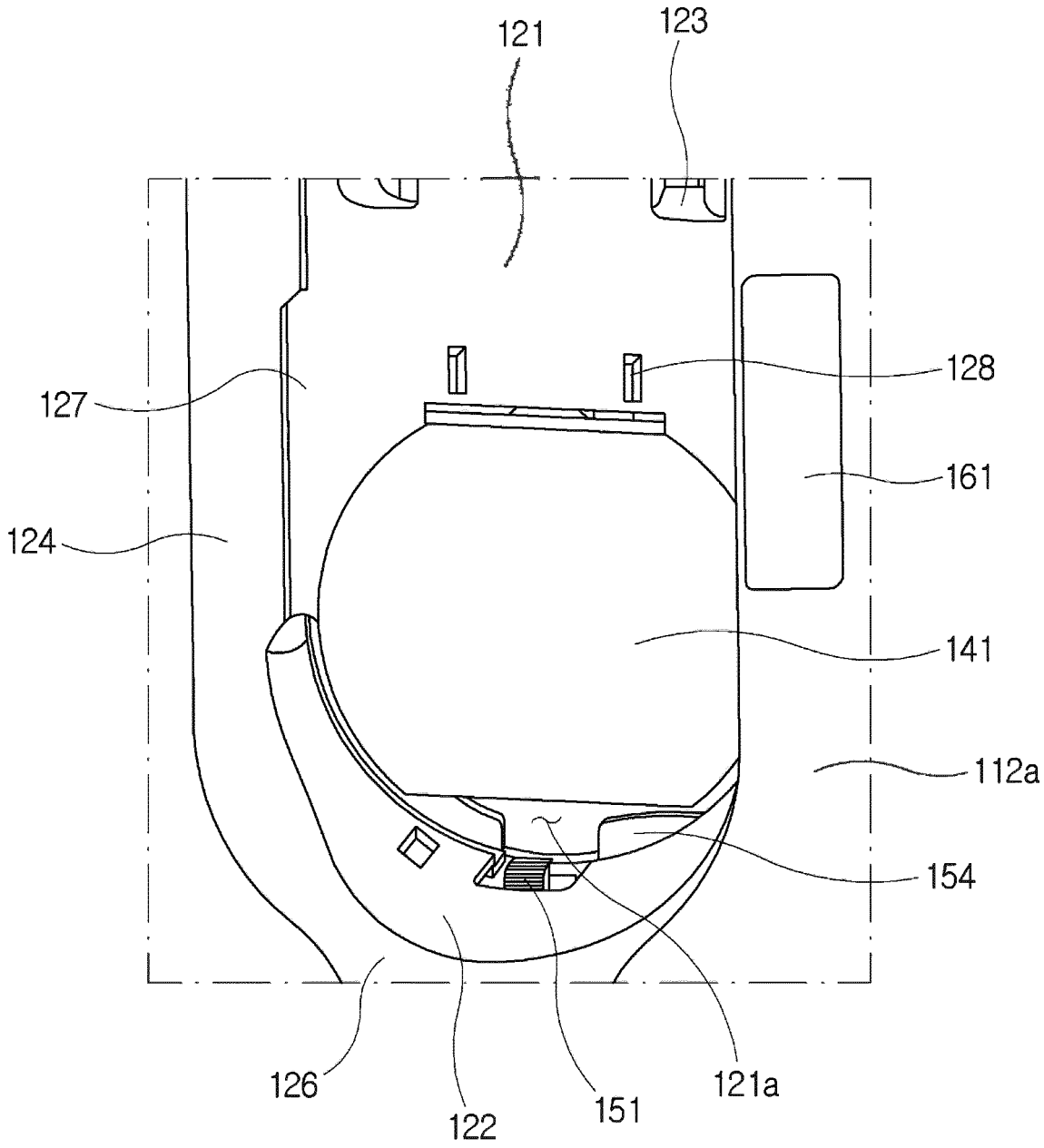
[FIG. 4]



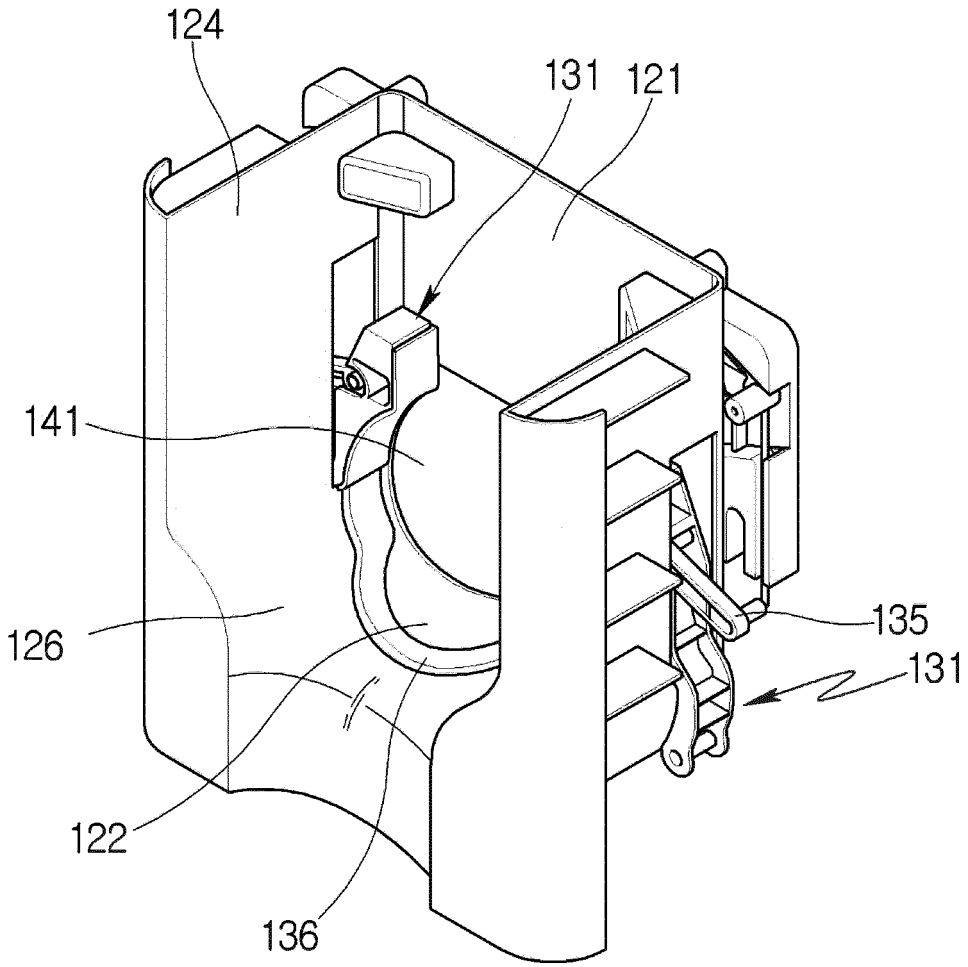
[FIG. 5]



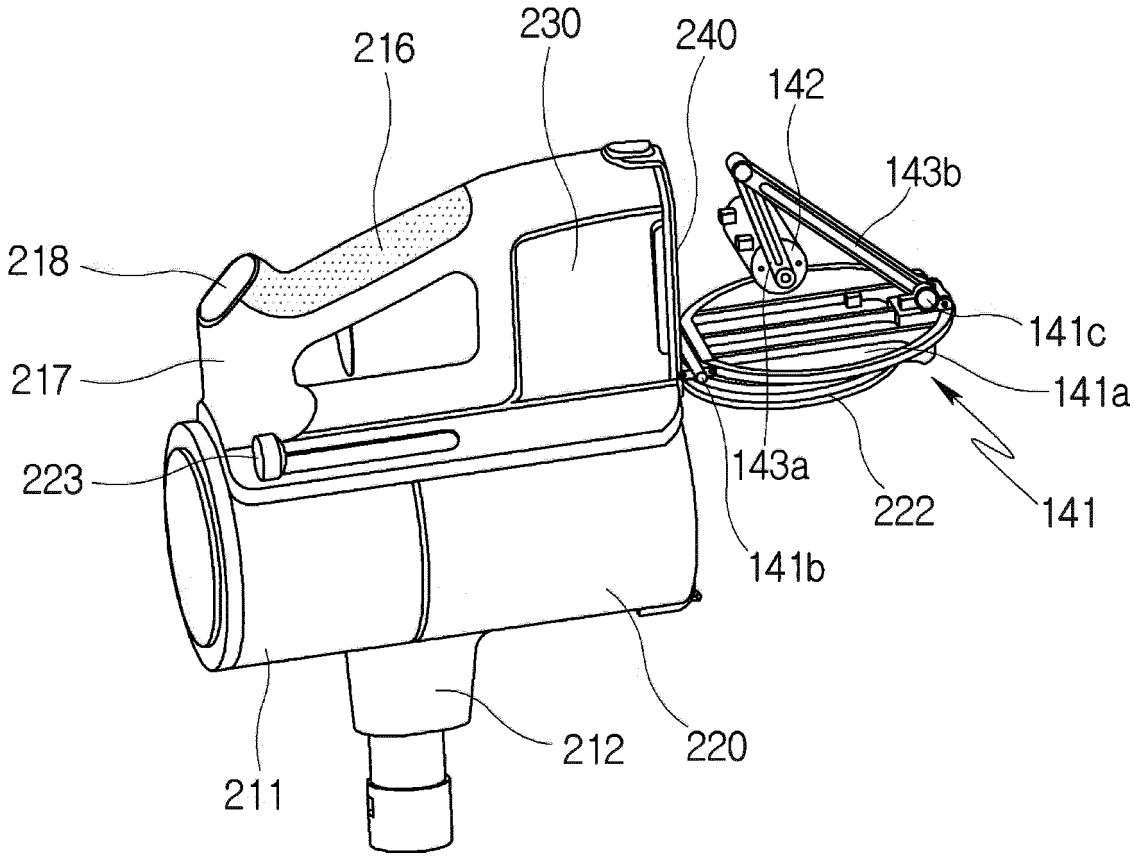
[FIG. 6]



[FIG. 7]



[FIG. 8]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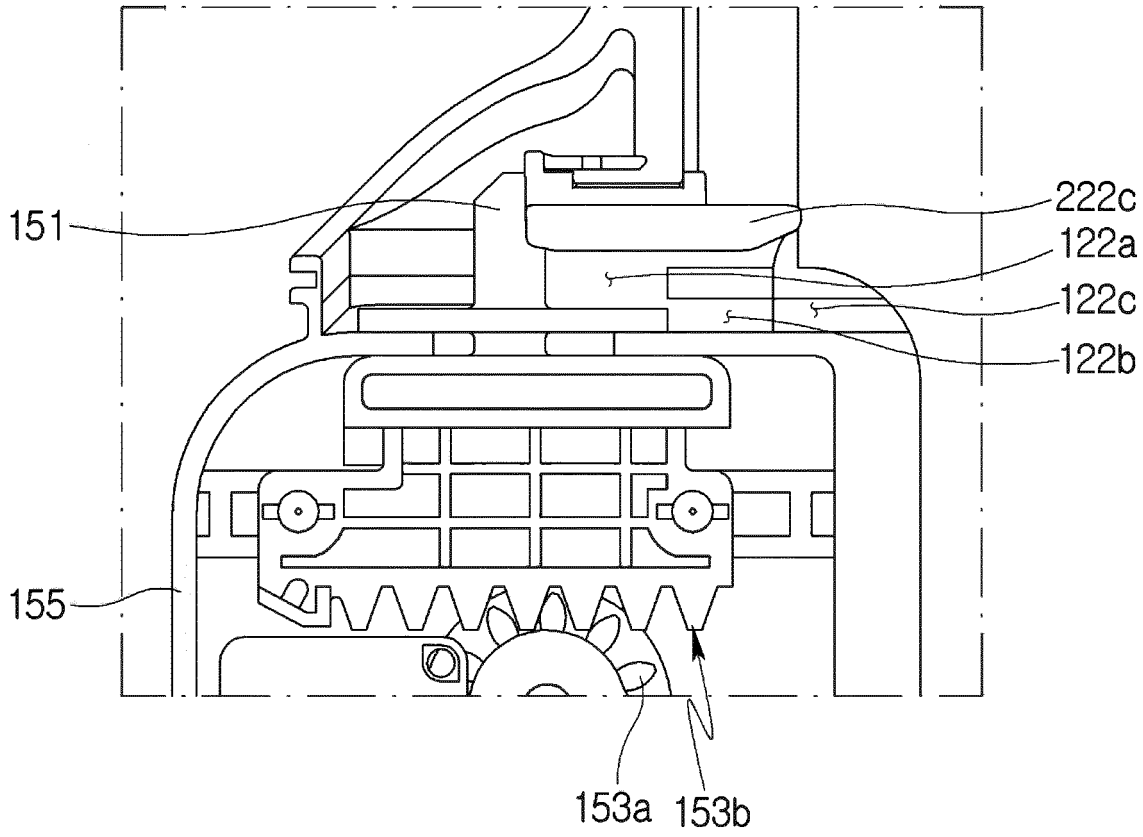
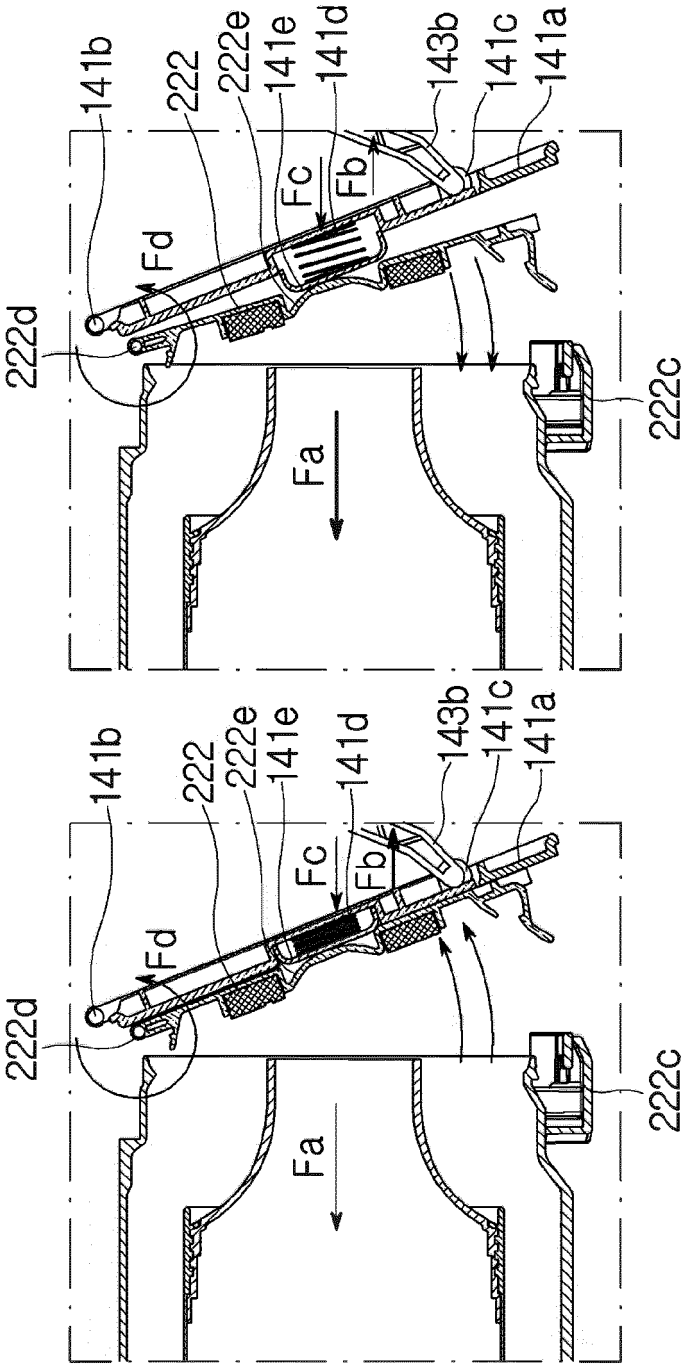
220
211

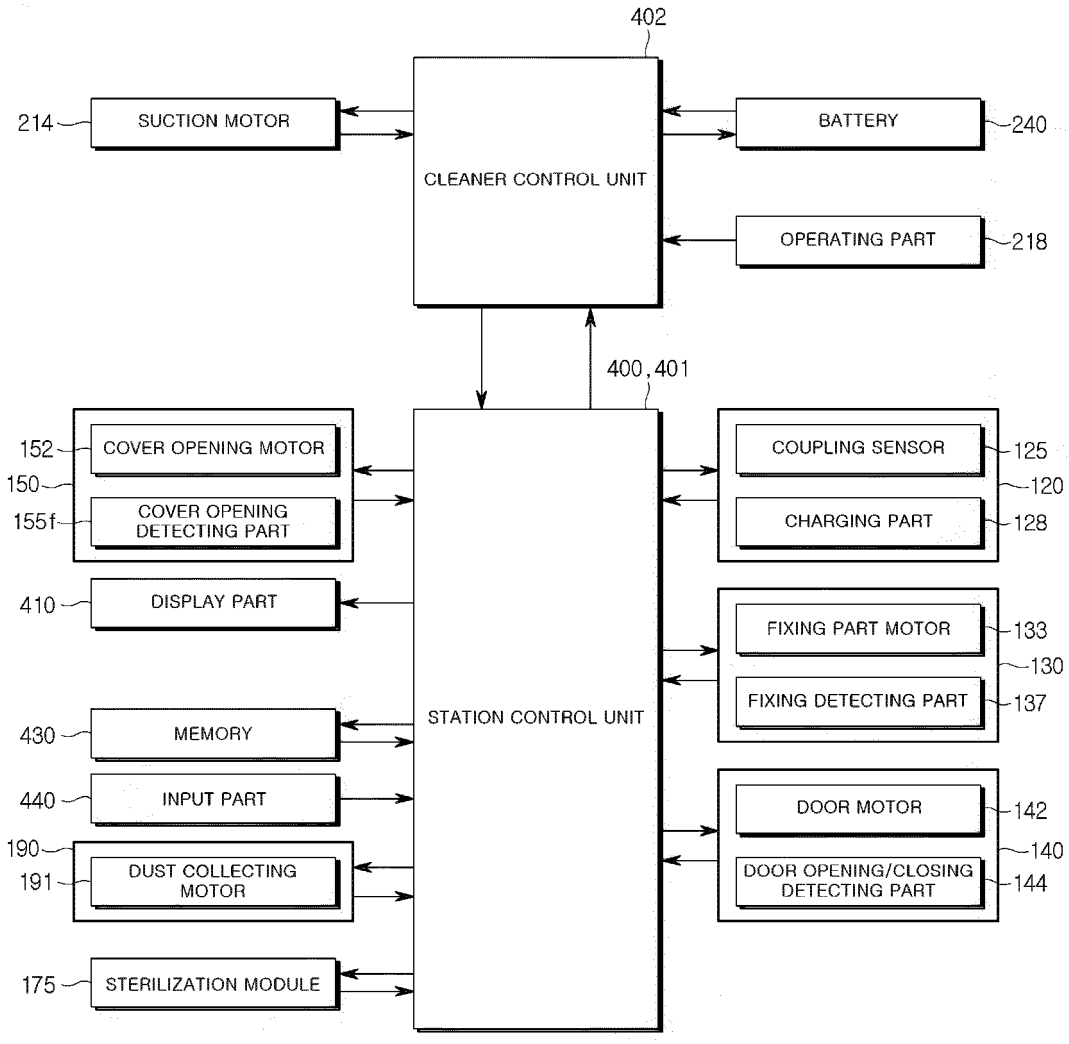
[FIG. 9]



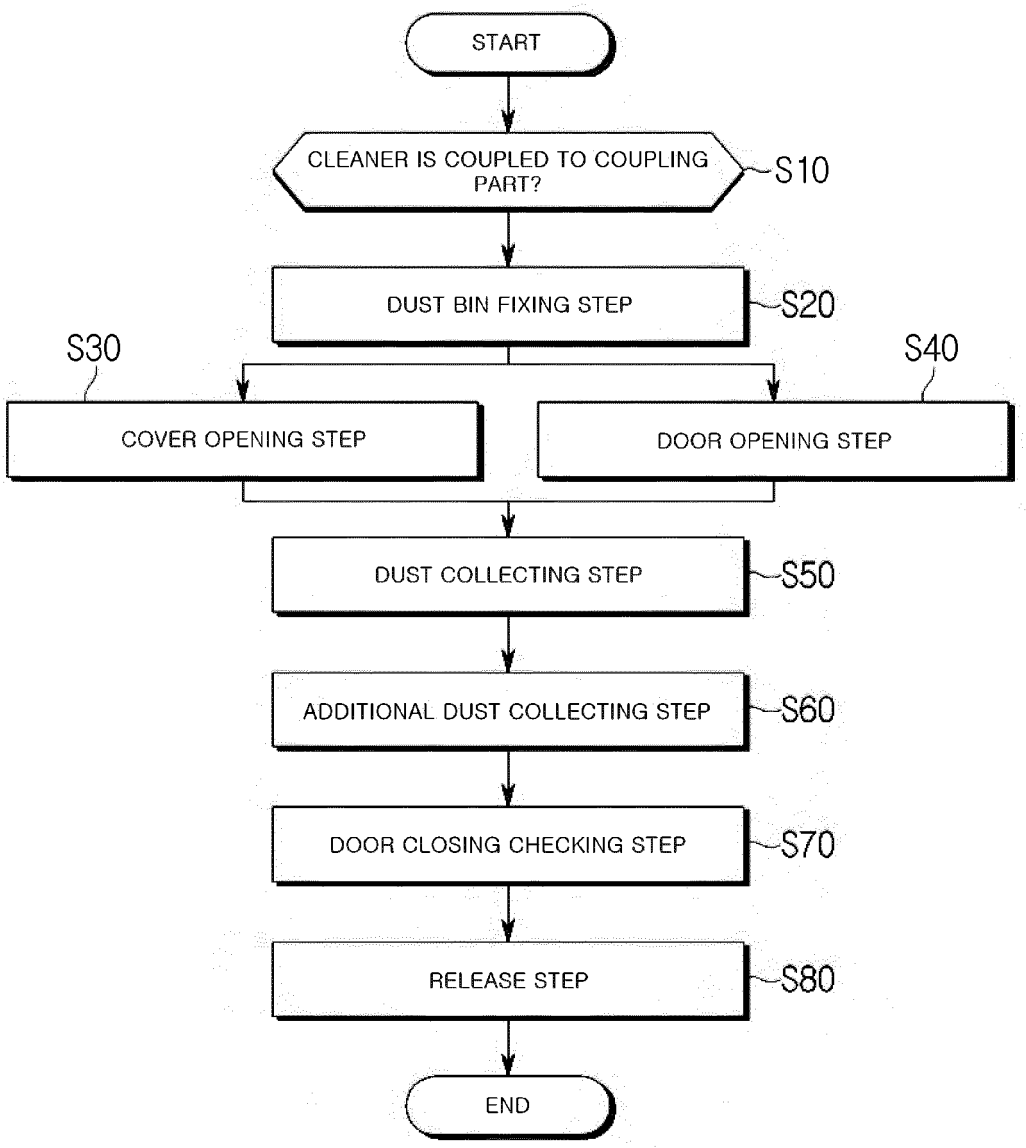
[FIG. 10]


141b
222
222e
141e
141d
143b
141c
141a
Fc
Fb
Fd
222d
222c
Fa
141b
222
222e
141e
141d
143b
141c
141a
Fc
Fb
Fd
222d
222c
Fa

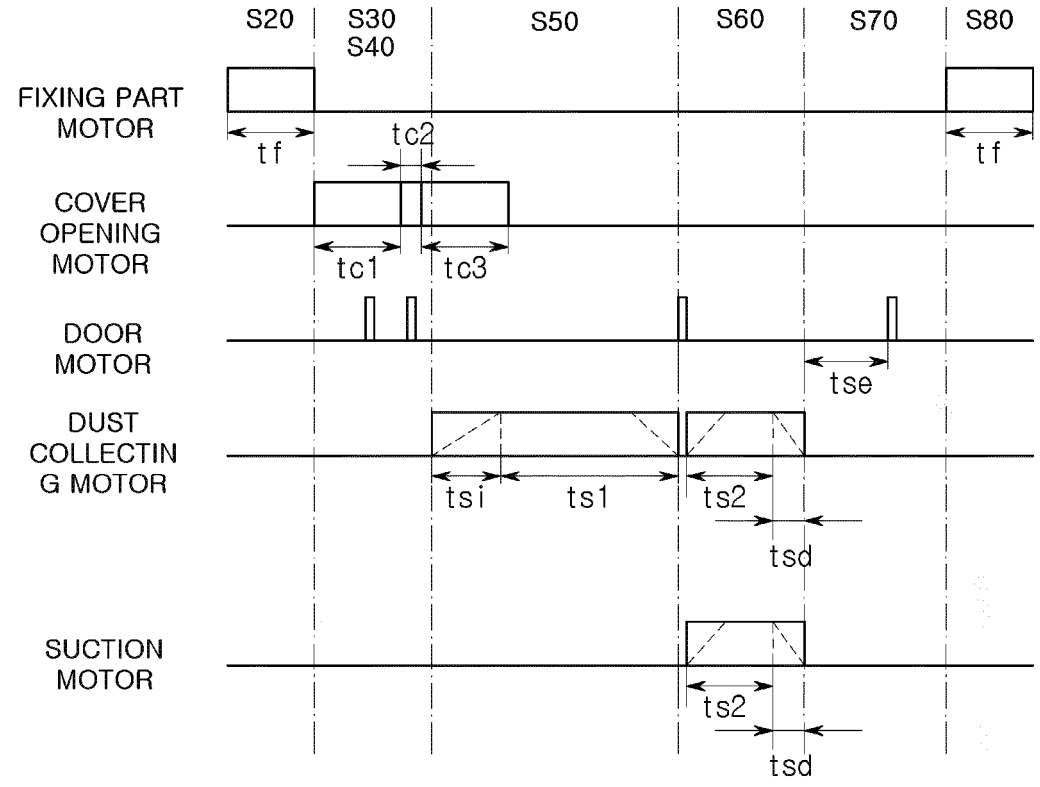
[FIG. 11]


402
214
SUCTION MOTOR
CLEANER CONTROL UNIT
BATTERY
240
OPERATING PART
218
400, 401
152
COVER OPENING MOTOR
150
155f
COVER OPENING DETECTING PART
410
DISPLAY PART
430
MEMORY
440
INPUT PART
190
191
DUST COLLECTING MOTOR
175
STERILIZATION MODULE
STATION CONTROL UNIT
COUPLING SENSOR
125
120
CHARGING PART
128
FIXING PART MOTOR
133
130
FIXING DETECTING PART
137
DOOR MOTOR
142
140
DOOR OPENING/CLOSING DETECTING PART
144

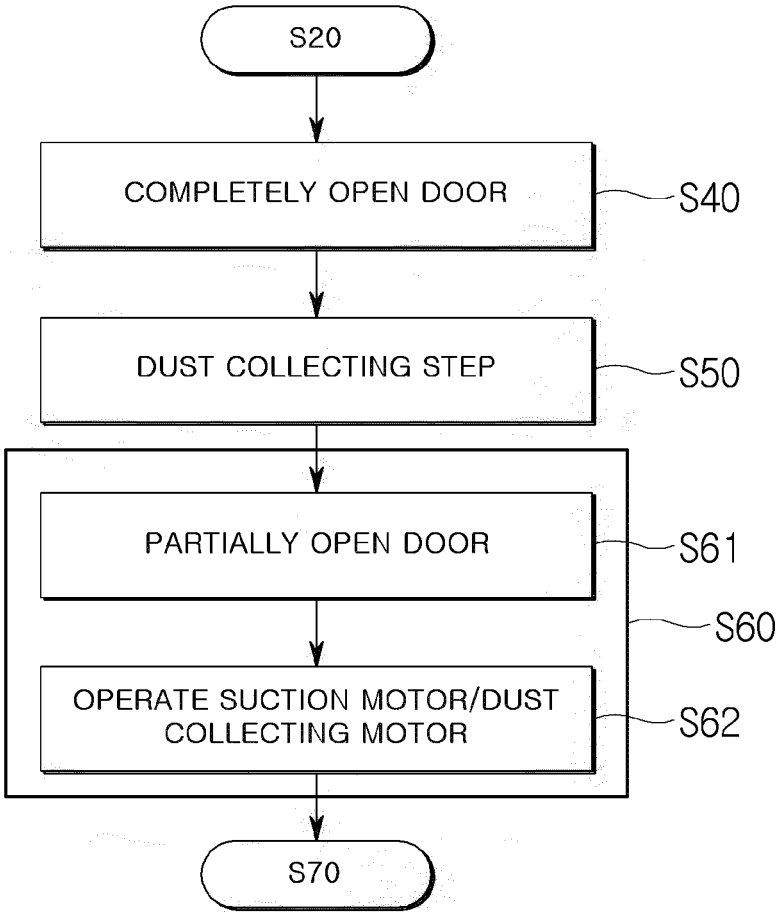
[FIG. 12]


START
CLEANER IS COUPLED TO COUPLING PART?
S10
DUST BIN FIXING STEP
S20
S30
S40
COVER OPENING STEP
DOOR OPENING STEP
DUST COLLECTING STEP
S50
ADDITIONAL DUST COLLECTING STEP
S60
DOOR CLOSING CHECKING STEP
S70
RELEASE STEP
S80
END

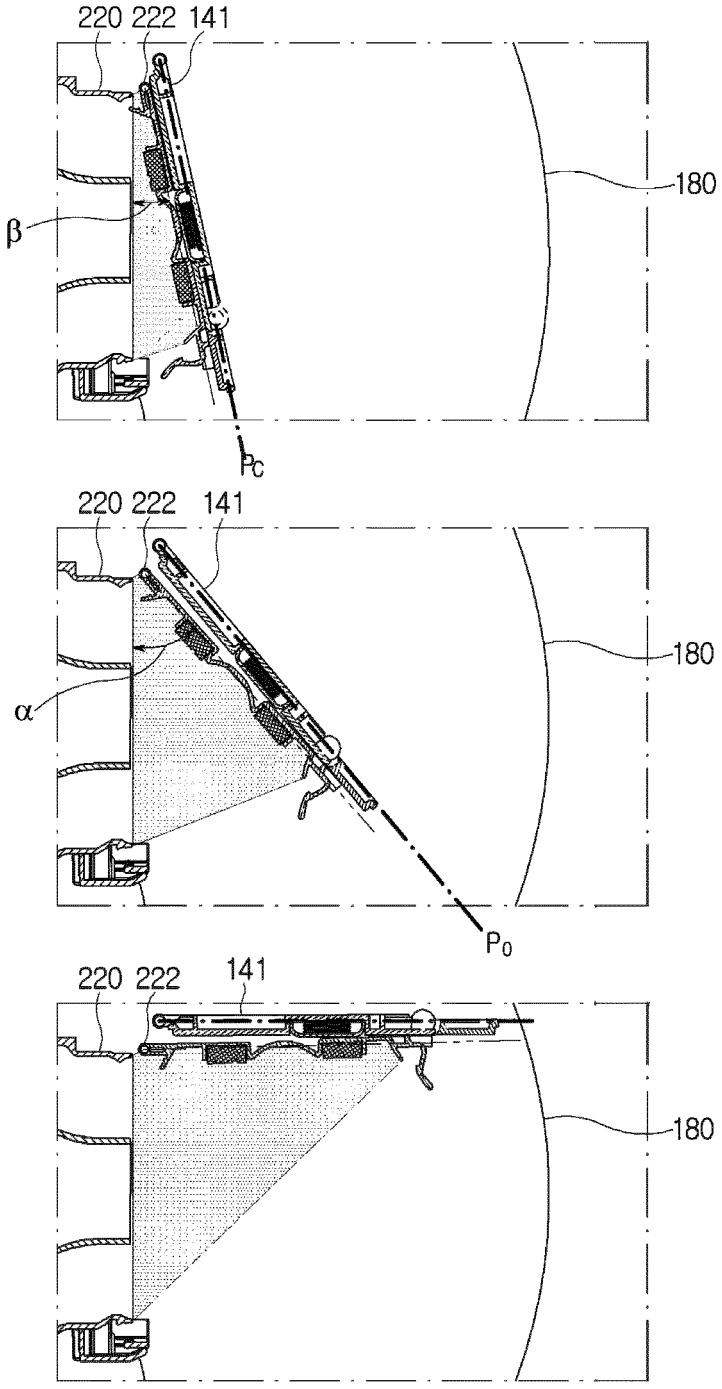
[FIG. 13]


S20
S30
S40
S50
S60
S70
S80
FIXING PART MOTOR
tf
tc2
tf
COVER OPENING MOTOR
tc1
tc3
DOOR MOTOR
tse
DUST COLLECTING MOTOR
tsi
ts1
ts2
tsd
SUCTION MOTOR
ts2
tsd

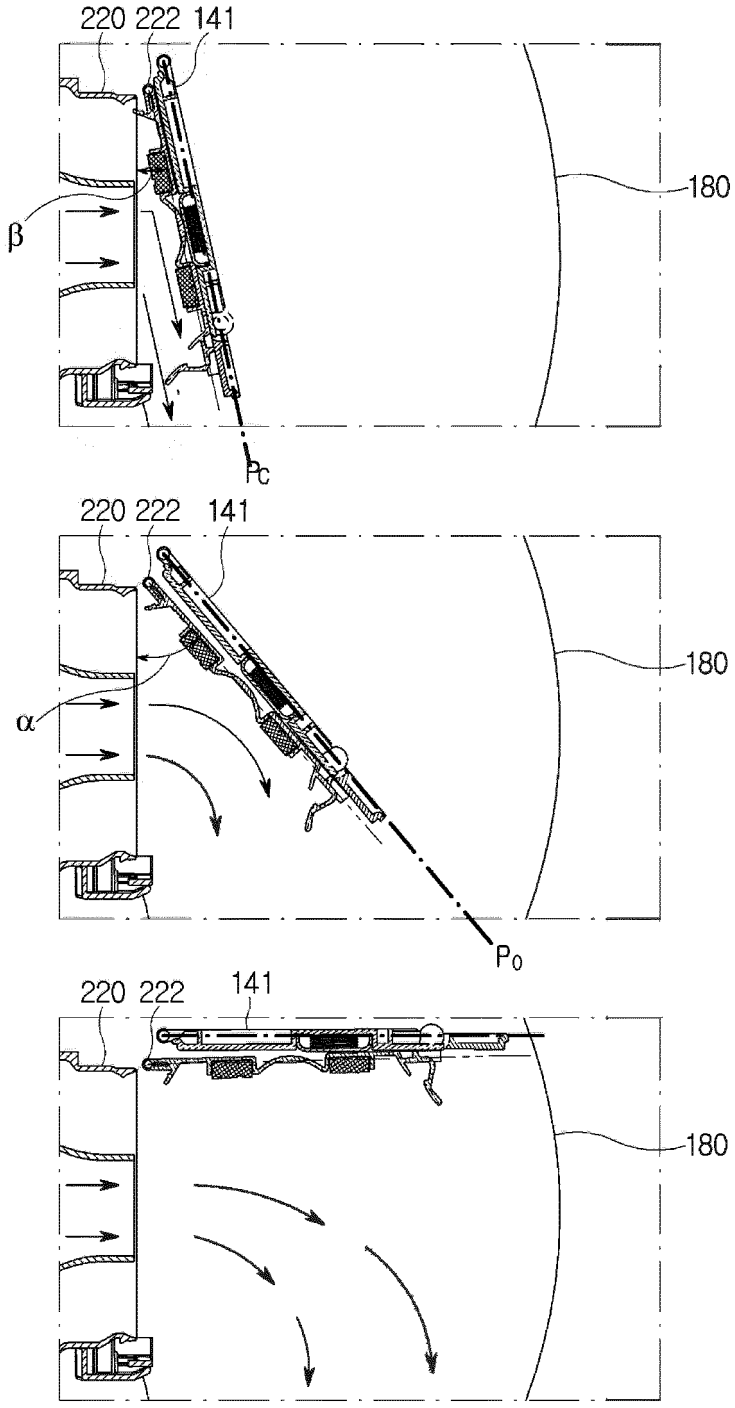
[FIG. 14]


S20
COMPLETELY OPEN DOOR
S40
DUST COLLECTING STEP
S50
PARTIALLY OPEN DOOR
S61
S60
OPERATE SUCTION MOTOR/DUST COLLECTING MOTOR
S62
S70

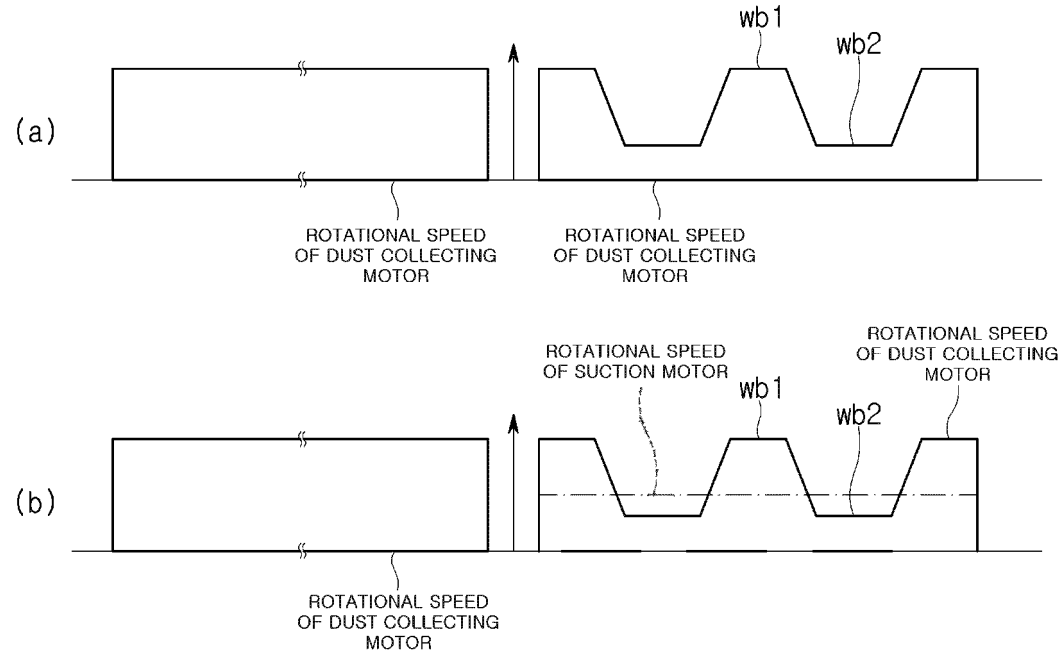
[FIG. 15]



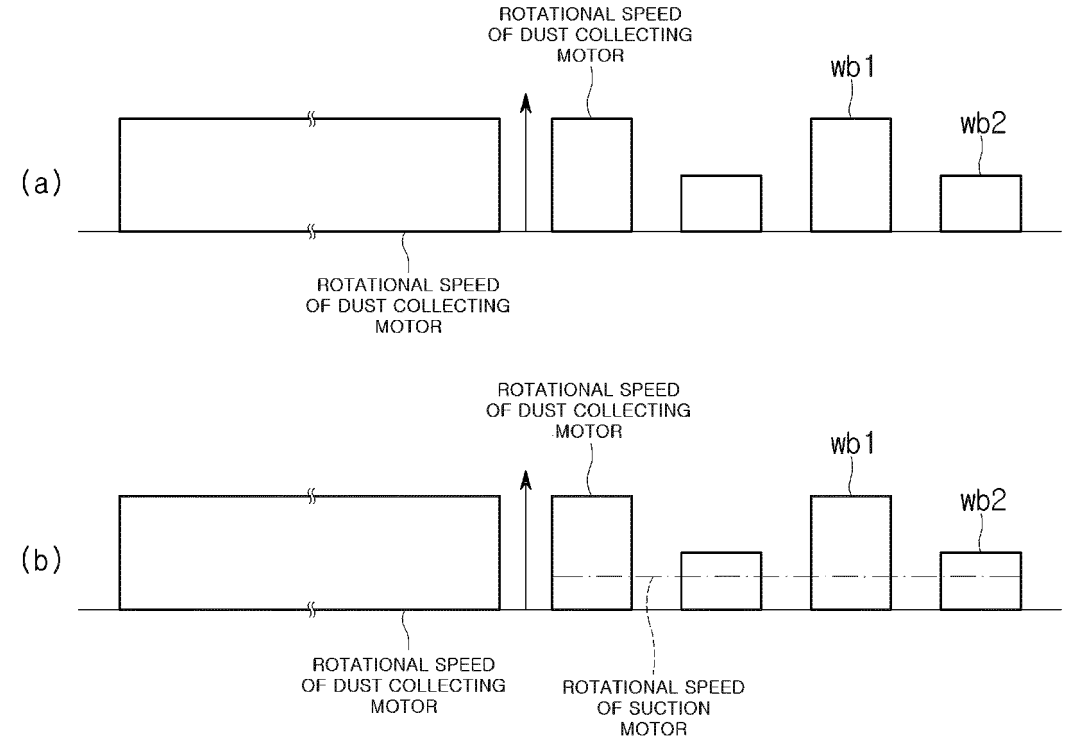
[FIG. 16]



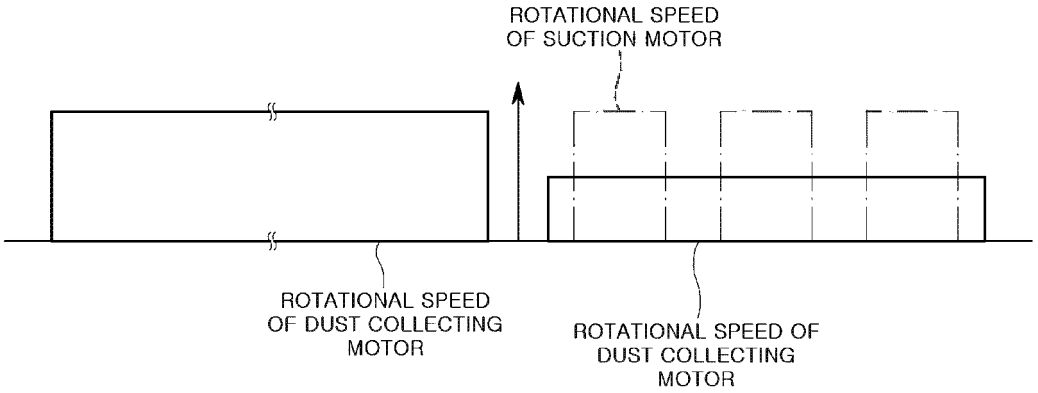
[FIG. 17]


(a)
wb1
wb2
ROTATIONAL SPEED OF DUST COLLECTING MOTOR
ROTATIONAL SPEED OF DUST COLLECTING MOTOR
(b)
ROTATIONAL SPEED OF SUCTION MOTOR
wb1
wb2
ROTATIONAL SPEED OF DUST COLLECTING MOTOR
ROTATIONAL SPEED OF DUST COLLECTING MOTOR

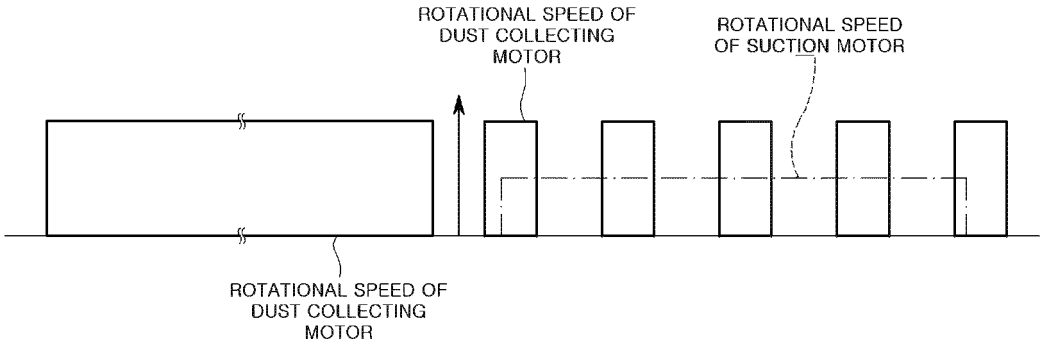
[FIG. 18]


(a)
ROTATIONAL SPEED OF DUST COLLECTING MOTOR
wb1
wb2
ROTATIONAL SPEED OF DUST COLLECTING MOTOR
(b)
ROTATIONAL SPEED OF DUST COLLECTING MOTOR
wb1
wb2
ROTATIONAL SPEED OF DUST COLLECTING MOTOR
ROTATIONAL SPEED OF SUCTION MOTOR

[FIG. 19]


ROTATIONAL SPEED OF SUCTION MOTOR
ROTATIONAL SPEED OF DUST COLLECTING MOTOR
ROTATIONAL SPEED OF DUST COLLECTING MOTOR

[FIG. 20]


ROTATIONAL SPEED OF DUST COLLECTING MOTOR
ROTATIONAL SPEED OF SUCTION MOTOR
ROTATIONAL SPEED OF DUST COLLECTING MOTOR

INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2022/013670

A. CLASSIFICATION OF SUBJECT MATTER

A47L 9/28(2006.01)i; **A47L 9/16**(2006.01)i; **A47L 9/00**(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 9/28(2006.01); A47L 5/22(2006.01); A47L 9/02(2006.01); A47L 9/10(2006.01); A47L 9/16(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), 커버(cover), 정지(stop), 개방(open), 폐쇄(close), 진동스프링(vibration spring), 도어(door)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	KR 10-2021-0019940 A (LG ELECTRONICS INC.) 23 February 2021 (2021-02-23) See paragraphs [0112]-[0323], [0465], [0468] and [0499] and figures 1-10.	1-3,13-15,19-21
A		4-12,16-18,22
Y	KR 10-2021-0033463 A (SAMSUNG ELECTRONICS CO., LTD.) 26 March 2021 (2021-03-26) See paragraphs [0138], [0150]-[0176] and [0218]-[0226], claim 6 and figures 1-10 and 16-18.	1-3,13-15,19-21
A	KR 10-2021-0033968 A (SAMSUNG ELECTRONICS CO., LTD.) 29 March 2021 (2021-03-29) See claims 1-5 and figures 1-16.	1-22
A	CN 109758031 A (VORWERK CO. INTERHOLDING GMBH) 17 May 2019 (2019-05-17) See claims 1-10 and figures 1-3.	1-22

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

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"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
04 January 2023	**04 January 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.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2022/013670

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN 211911489 U (JIANGSU MIDEA CLEANING APPLIANCES CO., LTD. et al.) 13 November 2020 (2020-11-13) See claims 1-15 and figures 7-9.	1-22

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

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/KR2022/013670

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/KR2022/013670

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				WO	2021-045436	A1	11 March 2021
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