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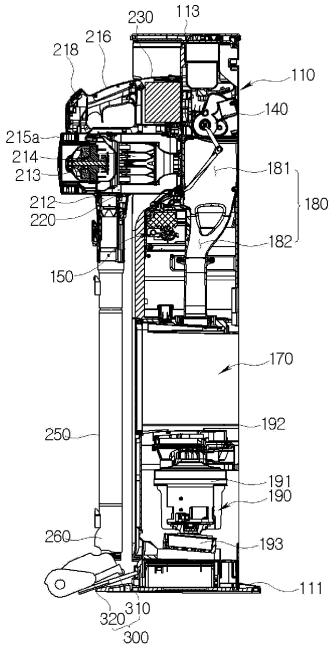
(54) **VACUUM CLEANER STATION, VACUUM CLEANER SYSTEM, AND CONTROL METHOD THEREFOR**

(57) The present disclosure relates to a method of controlling a cleaner system, the method including a differential pressure detection step of detecting a differential pressure between air before passing through a prefilter provided in a cleaner and air after passing through the prefilter, and a cleaner foreign substance removal step of cleaning the prefilter when the cleaner is coupled to the cleaner station when the differential pressure detected in the differential pressure detection step is equal to or higher than a preset reference differential pressure, such that when a degree of contamination of the prefilter is high regardless of the usage period, the degree of contamination may be automatically detected and notified to a user, and the prefilter may be automatically cleaned.

[FIG. 7]



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Description

[Technical Field]

[0001] The present disclosure relates to a cleaner station, and more particularly, to a cleaner station configured to capture dust stored in a dust bin of a cleaner and remove foreign substances remaining in a filter of the cleaner.

[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] However, because the handy cleaner or the stick 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.

[0009] 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.

[0010] In addition, if the residual dust is not removed from the dust bin or foreign substances such as hairs are trapped in a prefilter or a mesh net, there is a problem in that a suction force of the cleaner deteriorates.

[0011] 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.

[0012] As a patent document in the related art, Korean Patent No. 10-1151132 discloses a HEPA cleaner including a differential pressure meter.

[0013] The HEPA cleaner of the patent document in the related art may measure an accumulated state of dust and a filter replacement timing by measuring a differential pressure of the HEPA filter.

[0014] However, the HEPA cleaner may simply recognize a state of the filter on the basis of the differential pressure and allow an operator to manually replace the filter, but there is a limitation in that the HEPA cleaner cannot automatically clean the filter.

[0015] Meanwhile, Korean Patent Application Laid-Open No. 10-2020-0074001 discloses a cleaning apparatus including a vacuum cleaner and a docking station.

[0016] The cleaning apparatus disclosed in Korean Patent Application Laid-Open No. 10-2020-0074001 includes the vacuum cleaner including a dust collecting container for collecting foreign substances, and the docking station connected to the dust collecting container and configured to remove the foreign substances 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 foreign substances and inside air in the dust collecting container docked to the docking station.

[0017] In addition, the patent document includes the capturing part disposed in the docking station and configured to capture foreign substances.

[0018] However, according to Korean Patent Application Laid-Open No. 10-2020-0074001, there is a problem in that after stopping the suction operation, the suction device (a suction fan) cannot remove foreign substances that may be attached to a peripheral portion of the dust collecting container during the suction process.

[0019] In this case, a user inevitably handles foreign substances, which are exposed and attached to the peripheral portion of the dust collecting container, with his/her hand when the user uses the vacuum cleaner again after the process of sucking the foreign substances (hereinafter, referred to as residual dust) is ended. For this reason, the user suffers from the inconvenience of having to directly remove the residual dust using a wet tissue or the like.

[0020] Meanwhile, the patent document in the related art may have a flow rate change device. The flow rate change device is configured to increase a dust collecting force by increasing a flow rate in a dust collecting container by additionally supplying air into the dust collecting

container of the cleaner. That is, the flow rate change device of the patent document in the related art is configured to change a flow rate of air to be supplied into a dust bin.

[0021] The flow rate change device may strongly suck large dust by increasing a flow rate in the dust collecting container, but the flow rate change device has a limitation in removing dust or hairs stuck in or attached to a filter.

[Disclosure]

[Technical Problem]

[0022] The present disclosure has been made in an effort to solve the above-mentioned problem with a cleaner station, a cleaner system, and a method of controlling the same in the related art, and an object of the present disclosure is to provide a cleaner station capable of removing dust in a dust bin without a user's separate operation, thereby providing convenience for a user.

[0023] Another object of the present disclosure is to provide a cleaner station capable of removing an offensive odor caused by residual dust by preventing the residual dust from remaining in a dust bin.

[0024] Still another object of the present disclosure is to provide a cleaner station capable of preventing a deterioration in suction performance of a cleaner caused by foreign substances such as hairs trapped in a prefilter or a mesh net of the cleaner.

[0025] Yet another object of the present disclosure is to provide a cleaner station capable of removing foreign substances trapped in a prefilter without a user's separate operation, thereby providing convenience for a user.

[0026] Still yet another object of the present disclosure is to provide a cleaner station capable of eliminating an inconvenience of a user having to periodically disassemble a cleaner and clean a prefilter.

[0027] A further object of the present disclosure is to provide a cleaner station capable of automatically performing a cleaning operation by detecting a degree of contamination of a prefilter regardless of a usage period.

[0028] Another further object of the present disclosure is to provide a cleaner station capable of reducing the frequency with which a user increases an output of a suction motor to increase a suction force and uses the suction motor, thereby increasing a lifespan of a cleaner.

[Technical Solution]

[0029] In order to achieve the above-mentioned objects, a cleaner station according to the present disclosure may include: a housing; a coupling part disposed in the housing and including a coupling surface to which at least a part of a cleaner is coupled; a dust collecting part accommodated in the housing, disposed at a lower side of the coupling part, and configured to capture dust in a dust bin of the cleaner; a dust collecting motor accommodated in the housing, disposed below the dust collecting part, and configured to generate a suction force for sucking dust in the dust bin; and a suction port blocking part disposed in the housing and configured to open or close a suction port of the cleaner in a state in which the cleaner is coupled.

[0030] In this case, the cleaner may include a suction part having a suction flow path through which air flows, a dust separating part configured to separate dust from the air, a main body having a suction motor configured to generate a suction force for sucking the air along the suction part, and a dust bin configured to store the dust separated by the dust separating part.

[0031] In addition, the cleaner may include: a prefilter disposed in a flow path configured to connect the dust separating part and the suction motor, the prefilter being configured to filter out foreign substances contained in the air; and a differential pressure sensor configured to detect a differential pressure between air before passing through the prefilter and air after passing through the prefilter.

[0032] In this case, the suction port blocking part may block the suction port when the dust collecting motor operates.

[0033] The suction port blocking part may include: a blocking part main body coupled to the housing and disposed at a position that faces a cleaner nozzle of the cleaner; and a shutter provided on the blocking part main body and configured to rectilinearly reciprocate.

[0034] In this case, the shutter may move in a state in which the dust collecting motor operates.

[0035] The suction port blocking part may further include a suction port opening/closing motor configured to provide driving power for moving the shutter.

[0036] In this case, the suction port opening/closing motor may operate in a state in which the dust collecting motor operates.

[0037] Meanwhile, the shutter may be made of a material having elasticity. Therefore, when the dust collecting motor operates, the shutter may block the suction port while being curved.

[0038] Meanwhile, in order to achieve the above-mentioned objects, a method of controlling a cleaner station according to the present disclosure may include a differential pressure detection step of detecting a differential pressure between air before passing through a prefilter provided in the cleaner, and air after passing through the prefilter, a dust collecting step of collecting dust in a dust bin by operating a dust collecting motor, and a cleaner foreign substance removal step of blocking the suction port after the dust collecting step.

[0039] In this case, in the differential pressure detection step, the foreign substance removal step may be performed after the dust collecting step when the differential pressure is equal to or higher than a preset reference differential pressure.

[0040] In the differential pressure detection step, it may be determined that the prefilter is not present in the cleaner when the differential pressure is less than a preset

value.

[0041] In this case, in the foreign substance removal step, a shutter may be moved to block the suction port in a state in which the dust collecting motor operates.

[0042] In particular, the dust collecting motor may operate in a state in which the suction port of the cleaner is blocked when the cleaner is coupled to the cleaner station when the differential pressure detected by the differential pressure sensor is equal to or higher than the reference differential pressure.

[0043] In addition, in the cleaner foreign substance removal step, outside air may be introduced into the dust bin through the air discharge port.

[0044] In particular, in the cleaner foreign substance removal step, outside air may be introduced into the prefilter through the air discharge port. Therefore, foreign substances remaining in the prefilter may be discharged to the dust bin, such that the foreign substances may be removed.

[0045] In addition, in the cleaner foreign substance removal step, a flow rate of air passing through the air discharge port may be higher than a flow rate of air passing through the cleaner nozzle.

[0046] In addition, a flow rate of air passing through the air discharge port in the cleaner foreign substance removal step may be higher than a flow rate of air passing through the air discharge port in the dust collecting step.

[0047] Meanwhile, in order to achieve the above-mentioned objects, in a method of controlling a cleaner station according to another embodiment of the present disclosure, in the cleaner foreign substance removal step, an output of the dust collecting motor may be changed in the state in which the shutter blocks the suction port. Therefore, it is possible to change the flow rate of the air for sucking the residual dust in the dust bin and provide an effect similar to an effect of sweeping the dust bin.

[0048] Meanwhile, in order to achieve the above-mentioned objects, in a method of controlling a cleaner station according to still another embodiment of the present disclosure, in the cleaner foreign substance removal step, the shutter may repeatedly reciprocate in a state in which the operation of the dust collecting motor is maintained. Therefore, it is possible to continuously change the flow of the air flowing in the dust bin while maintaining the flow rate of the air flowing in the dust bin. Therefore, it is possible to remove foreign substances remaining in the dust bin by creating vortices.

[Advantageous Effects]

[0049] According to the cleaner station, the cleaner system, and the method of controlling the same according to the present disclosure, it is possible to eliminate the inconvenience of the user having to empty the dust bin all the time.

[0050] In addition, the degree of contamination of the prefilter is determined by measuring the pressure difference (differential pressure) of the air passing through the prefilter, which may eliminate an inconvenience of the user having to periodically disassemble the cleaner and clean the prefilter.

[0051] In addition, in case that a degree of contamination of the prefilter is high regardless of the usage period, the degree of contamination may be automatically detected and notified to the user, and the prefilter may be automatically cleaned.

[0052] In addition, because the prefilter is automatically cleaned, which may prevent the decrease in the suction force of the cleaner and reduce the frequency with which the user increases an output of the suction motor to increase the suction force and uses the suction motor. As a result, it is possible to increase the lifespan of the cleaner.

[0053] In addition, the state in which no prefilter is present when the differential pressure is extremely low may be detected without a separate sensor configured to detect the presence of the prefilter.

[0054] In addition, in the state in which the suction port of the cleaner is blocked, the dust collecting motor operates to suck the air through the air discharge port of the cleaner, foreign substances such as hairs, which are trapped in the prefilter and the mesh net of the cleaner during the cleaning process, may flow in the reverse direction, and foreign substances, which are not discharged even by the dust collecting process of the cleaner station, may be removed.

[0055] In addition, in the state in which the suction port of the cleaner is blocked, the dust collecting motor operates to allow the air to flow from the dust separating part toward the inner peripheral surface of the dust bin, such that vortices may occur in the dust bin, and the residual dust attached to the periphery of the dust bin by static electricity or the like may be removed.

[Description of Drawings]

[0056]

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.

FIG. 2 is a schematic view for explaining the cleaner according to the embodiment of the present disclosure.

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

FIG. 4 is a cross-sectional view for explaining an internal structure of the cleaner according to the embodiment of the present disclosure.

FIG. 5 is a cross-sectional view for explaining an internal structure of a cleaner according to another embodiment of the present disclosure.

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

FIG. 7 is a schematic view illustrating a configuration of the cleaner system according to the embodiment of the present disclosure.

FIG. 8 is a view for explaining a coupling part of a cleaner station according to the embodiment of the present disclosure.

FIG. 9 is an exploded perspective view for explaining a fixing unit of the cleaner station according to the embodiment of the present disclosure.

FIGS. 10 and 11 are views for explaining a relationship between the cleaner and a door unit in the cleaner station according to the embodiment of the present disclosure.

FIG. 12 is a view for explaining a relationship between the cleaner and a cover opening unit in the cleaner station according to the embodiment of the present disclosure.

FIG. 13 is a view for explaining a relationship between the cleaner and a suction port blocking part in the cleaner station according to the embodiment of the present disclosure.

FIG. 14 is a view for explaining a relationship between a cleaner and a suction port blocking part in a cleaner station according to another embodiment of the present disclosure.

FIG. 15 is a block diagram for explaining a control configuration in the cleaner station according to the embodiment of the present disclosure.

FIG. 16 is a flowchart for explaining a process of blocking a suction port of a cleaner nozzle in the cleaner station according to the embodiment of the present disclosure.

FIG. 17 is a flowchart for explaining a process of blocking a suction port of a cleaner nozzle in a cleaner station according to another embodiment of the present disclosure.

FIG. 18 is a view for explaining one embodiment that controls a motor over time.

FIG. 19 is a view for explaining another embodiment that controls the motor over time.

FIG. 20 is a view for explaining still another embodiment that controls the motor over time.

FIG. 21 is a view for explaining a state in which the suction port of the cleaner is not blocked by a shutter in the cleaner station according to the embodiment of the present disclosure.

FIG. 22 is a view for explaining a state in which the suction port of the cleaner is blocked by the shutter in the cleaner station according to the embodiment of the present disclosure.

FIG. 23 is a view for explaining a process of removing foreign substances remaining in a cleaner main body in the cleaner station according to the embodiment of the present disclosure.

FIG. 24 is a view for explaining a process of removing foreign substances remaining in the cleaner main body in the cleaner station according to another embodiment of the present disclosure.

FIG. 25 is a graph for explaining a change in differential pressure and a change in suction force of the cleaner in accordance with the use of the cleaner in the cleaner according to the embodiment of the present disclosure.

[Mode for Invention]

[0057] Hereinafter, exemplary embodiments of the present disclosure will be described in detail with reference to the accompanying drawings.

[0058] 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.

[0059] 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.

[0060] 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.

[0061] 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. 7 is a schematic view illustrating a configuration of the cleaner system according to the embodiment of the present disclosure.

[0062] With reference to FIGS. 1 and 7, a cleaner system 10 according to an embodiment of the present specification may include a cleaner station 100 and a cleaner 200.

[0063] The cleaner system 10 may include the cleaner station 100. The cleaner 200 may be coupled to the cleaner station 100. Specifically, the main body of the cleaner 200 may be coupled to the lateral surface of the cleaner station 100. The cleaner station 100 may remove dust from a dust bin 220 of the cleaner 200.

[0064] Meanwhile, FIGS. 2 and 3 are views for explaining the cleaner of the cleaner system according to the embodiment of the present disclosure, FIG. 4 is a cross-sectional view for explaining an internal structure of the cleaner according to the embodiment of the present disclosure, and FIG. 6 is a view for explaining a lower side of the dust bin of the cleaner according to the embodiment

of the present disclosure.

[0065] First, a structure of the cleaner 200 will be described below with reference to FIGS. 1 to 7.

[0066] 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.

[0067] 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.

[0068] Meanwhile, in the embodiment of the present disclosure, directions of the cleaner 200 may be defined on the basis of when a bottom surface (lower surface) of the dust bin 220 and a bottom surface (lower surface) of a battery housing 230 are placed on the ground surface.

[0069] In this case, a forward direction may mean a direction in which a suction part 212 is disposed based on a suction motor 214, and a rearward direction may mean a direction in which a handle 216 is disposed based on the suction motor 214. Further, based on a state in which the suction part 212 is viewed from the suction motor 214, a rightward direction may refer to a direction in which a component is disposed at the right, and a left direction may refer to a direction in which a component is disposed at the left. In addition, in the embodiment of the present disclosure, upper and lower sides may be defined in a direction perpendicular to the ground surface based on the state in which the bottom surface (lower surface) of the dust bin 220 and the bottom surface (lower surface) of the battery housing 230 are placed on the ground surface.

[0070] 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.

[0071] 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.

[0072] 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.

[0073] Meanwhile, in the present embodiment, an imaginary line may be defined to penetrate the inside of the suction part 212 having a cylindrical shape.

[0074] 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.

[0075] For example, the dust separating part 213 may have one or more cyclone parts capable of separating dust by 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.

[0076] 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.

[0077] 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.

[0078] 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.

[0079] Meanwhile, the dust separating part 213 may be surrounded by a mesh net 213a. The mesh net 213a may serve to prevent foreign substances, which have relatively large sizes among foreign substances contained in air having passed through the suction part 212, from being introduced into the dust separating part 213. That is, the mesh net 213a may be formed in a cylindrical shape, and a plurality of holes may be formed along an outer peripheral surface of the mesh net 213a.

[0080] The suction motor 214 may generate a suction force for sucking air. The suction motor 214 may be accommodated in the main body housing 211. The suction motor 214 may generate the suction force while rotating. For example, the suction motor 214 may be formed in a shape similar to a cylindrical shape.

[0081] Meanwhile, in the present embodiment, an imaginary suction motor axis may be formed by extending a rotation axis of the suction motor 214.

[0082] 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 215c may be accommodated in the air discharge cover 215.

[0083] 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.

[0084] 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.

[0085] Meanwhile, a flow path, through which the air having passed through the inside of the dust bin 220, may be formed in the main body housing 211. Specifically, the flow path may include a flow path configured to guide the air so that the air flows from the dust separating part 213 to the suction motor 214, and a flow path configured to guide the air, which has passed through the suction motor 214, so that the air flows to the air discharge port 215a.

[0086] Further, a prefilter 215b may be disposed in the flow path configured to connect the dust separating part 213 and the suction motor 214, and the HEPA filter 215c may be disposed in the flow path configured to connect the suction motor 214 and the air discharge port 215a. The prefilter 215b may refer to a filter configured to filter out foreign substances (dust), such as fur, lint, and hair, having relatively large sizes. Further, the HEPA filter 215c may refer to a filter configured to filter out fine dust having relatively small sizes.

[0087] Meanwhile, as illustrated in FIG. 4, in the cleaner 200 according to the embodiment of the present disclosure, the prefilter 215b may be disposed above the suction motor 214 (disposed to be close to the air discharge cover 215). With this configuration, dust is moved downward by gravity, such that an effect of separating dust may be improved.

[0088] On the contrary, as illustrated in FIG. 5, in a cleaner 200' according to another embodiment of the present disclosure, a prefilter 215b' may be disposed below the suction motor 214'. In this case, the prefilter 215b' may be disposed between a dust separating part 213' and the suction motor 214'. With this configuration, a flow path, which connects the dust separating part 213' and the suction motor 214', and a flow path, which connects the suction motor 214' and an air discharge port 215a', may be formed to be short.

[0089] Meanwhile, the cleaner 200 or 200' of the present disclosure may be equipped with a differential pressure sensor 500 or 500'. The differential pressure sensor 500 or 500' may refer to a sensor configured to detect a pressure difference of air. The differential pressure sensor 500 or 500' will be described below in detail.

[0090] Meanwhile, in case that the cleaner 200 is coupled to the cleaner station 100, outside air may be introduced through the air discharge port 215a by a suction force of a dust collecting motor 191 of the cleaner. A detailed process related to the above-mentioned configuration will be described below.

[0091] The handle 216 may be gripped by the user. The handle 216 may be disposed rearward of the suction motor 214. For example, the handle 216 may be formed in a shape similar to a cylindrical shape. Alternatively, the handle 216 may be formed in a curved cylindrical shape. The handle 216 may be disposed at a predetermined angle with respect to the main body housing 211, the suction motor 214, or the dust separating part 213.

[0092] The handle 216 may include a grip portion formed in a column shape so that the user may grasp the grip portion, a first extension portion connected to one end of the grip portion based on the longitudinal direction (axial direction) of the grip portion and extending toward the suction motor 214, and a second extension portion connected to the other end of the grip portion based on the longitudinal direction (axial direction) of the grip portion and extending toward the dust bin 220.

[0093] Meanwhile, in the present embodiment, an imaginary grip portion through line may be formed to extend in the longitudinal direction of the grip portion (the axial direction of the column) and penetrate the grip portion.

[0094] For example, the grip portion through line 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.

[0095] 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.

[0096] The first extension portion may extend from the grip portion toward the main body housing 211 or the suction motor 214. At least a part of the first extension portion may extend in a horizontal direction.

[0097] The second extension portion may extend from the grip portion toward the dust bin 220. At least a part of the second extension portion may extend in the horizontal direction.

[0098] 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.

[0099] 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.

[0100] 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).

[0101] 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.

[0102] Meanwhile, in the present embodiment, an imaginary dust bin through line may be formed to penetrate the inside (internal space) of the dust bin main body 221 and extend in the longitudinal direction of the dust bin main body 221 (that means the axial direction of the cylindrical dust bin main body 221).

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

[0107] 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.

[0108] 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.

[0109] The dust bin 220 may include the dust bin compression lever 223 (see FIG. 4). The dust bin compression lever 223 may be disposed outside the dust bin 220 or the dust separating part 213. The dust bin compression lever 223 may be disposed outside the dust bin 220 or the dust separating part 213 so as to be movable upward and downward. The dust bin compression lever 223 may be connected to the compression member (not illustrated). When the dust bin compression lever 223 is moved downward by an external force, the compression member (not illustrated) may also be moved downward. Therefore, it is possible to provide convenience for the user. The compression member (not illustrated) and the dust bin compression lever 223 may return back to original positions by an elastic member (not illustrated). Specifically, when the external force applied to the dust bin compression lever 223 is eliminated, the elastic member may move the dust bin compression lever 223 and the compression member (not illustrated) upward.

[0110] 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.

[0111] 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.

[0112] The battery housing 230 may include an accommodation portion opened downward. The battery 240 may be attached or detached through the accommodation portion of the battery housing 230.

[0113] The cleaner 200 may include the battery 240.

[0114] 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.

[0115] 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.

[0116] The battery 240 may supply power to the suction motor 214 of the cleaner 200. The battery 240 may be disposed below the handle 216. The battery 240 may be disposed at a rear side of the dust bin 220.

[0117] 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.

[0118] 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.

[0119] The cleaner 200 may include the extension tube 250. The extension tube 250 may communicate with a cleaner nozzle 260. The extension tube 250 may communicate with the main body 210. The extension tube 250 may communicate with the suction part 212 of the main body 210. The extension tube 250 may be formed in a long cylindrical shape.

[0120] The main body 210 may be connected to the extension tube 250. The main body 210 may be connected to the cleaner nozzle 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 cleaner nozzle 260 through the extension tube 250. The outside dust may be introduced into the main body 210 through the cleaner nozzle 260 and the extension tube 250.

[0121] The cleaner 200 may include the cleaner nozzle 260. The cleaner nozzle 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 cleaner nozzle 260 and the extension tube 250 by the suction force generated in the main body 210 of the cleaner 200.

[0122] For example, the cleaner nozzle 260 may be a suction nozzle. In this case, the suction nozzle may refer to a device configured to come into contact with the floor and directly suck dust and air. Therefore, the suction force, which is generated by the suction motor 214 mounted in the main body 210 of the cleaner, is transmitted to the suction nozzle, and dust and air are sucked into the suction nozzle by the suction force.

[0123] An agitator may be installed in the suction nozzle. The agitator serves to scrape dust on the floor or dust in a carpet while rotating, thereby improving cleaning performance.

[0124] Meanwhile, the cleaner nozzle 260 includes a nozzle body 261 and a suction port 262.

[0125] The nozzle body 261 may be detachably coupled to the extension tube 250 or the main body 210 of the cleaner. In addition, a flow path, through which air and dust may flow, may be formed in the nozzle body 261.

[0126] The suction port 262 may mean a space formed in a bottom surface of the nozzle body 261 (a surface facing the ground surface) so that outside air and dust are introduced into the space. The suction port 262 is formed to communicate with the flow path formed in the nozzle body 261. Therefore, when the suction motor 214 operates, outside air and dust may be introduced into the main body 210 of the cleaner through the suction port 262 by the suction force of the suction motor 214.

[0127] Meanwhile, when the dust collecting motor 191 operates in the state in which the cleaner 200 is coupled to the cleaner station 100, outside air may be introduced into the dust bin 220 of the cleaner and the cleaner station 100 through the suction port 262 by the suction force of the dust collecting motor 191. This configuration will be described below in detail.

[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 of the user having to empty the dust bin all the time. In addition, it is possible to prevent the dust from scattering when emptying the dust bin.

[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.

[0130] The cleaner station 100 of the present disclosure will be described below with reference to FIGS. 1 and 7.

[0131] The cleaner 200 may be disposed in the cleaner station 100. The cleaner 200 may be coupled to a lateral side of the cleaner station 100. Specifically, the main body of the cleaner 200 may be coupled to the lateral surface of the cleaner station 100. The cleaner station 100 may remove dust from a 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 a space capable of accommodating the dust collecting part 170 configured to store dust therein, and a dust suction module 190 configured to generate a flow force for collecting the dust in the dust collecting part 170.

[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 190 based on the gravitational direction. That is, the bottom surface 111 may support a lower side of the dust collecting motor 191 of

the dust suction module 190.

[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 191 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 be formed in a shape that prevents the cleaner station 100 from falling down and increases 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] 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.

[0145] 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.

[0146] 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.

[0147] 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.

[0148] Meanwhile, a structure for mounting various types of cleaner nozzles 260 used for the cleaner 200 may be additionally provided on the first outer wall surface 112a.

[0149] 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.

[0150] 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.

[0151] As another example, the structure for mounting various types of cleaner nozzles 260 used for the cleaner 200 may be additionally provided on the second outer wall surface 112b.

[0152] 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.

[0153] 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.

[0154] Meanwhile, the structure for mounting various types of cleaner nozzles 260 used for the cleaner 200 may be additionally provided on the third outer wall surface 112c or the fourth outer wall surface 112d.

[0155] 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.

[0156] 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.

[0157] 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.

[0158] 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.

[0159] Meanwhile, according to the embodiment, the upper surface 113 may be separable from the outer wall surface 112. In this case, when the upper surface 113 is separated, the battery separated from the cleaner 200 may be accommodated in the internal space surrounded by the outer wall surface 112, and a terminal (not illustrated) capable of charging the separated battery may be provided in the internal space.

[0160] FIG. 8 is a view for explaining the coupling part of the cleaner station according to the embodiment of the present disclosure, FIG. 9 is a view for explaining a fixing unit of the cleaner station according to the embodiment of the present disclosure, FIGS. 10 and 11 are views for explaining a relationship between the cleaner and a door unit in the cleaner station according to the embodiment of the present disclosure, and FIG. 12 is a view for explaining a relationship between the cleaner and a cover opening unit in the cleaner station according to the embodiment of the present disclosure.

[0161] The coupling part 120 of the cleaner station 100 according to the present disclosure will be described below with reference to FIGS. 7 and 8.

[0162] 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.

[0163] 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.

[0164] The cleaner 200 may be accommodated in the coupling surface 121. The coupling surface 121 may be disposed at a position that faces the lower surface of the dust bin 220 of the cleaner 200 and the lower surface of the battery housing 230. 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. 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 or spaced apart from the lower surface of the dust bin 220 and the lower surface of the battery housing 230.

[0165] 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.

[0166] 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.

[0167] The coupling surface 121 may have a dust passage hole 121a through which air present outside the housing 110 may be introduced into the housing 110. The dust passage hole 121a may be formed in the form of a hole corresponding to the shape of the dust bin 220 so that the dust in the dust bin 220 may be introduced into the dust collecting part 170. The dust passage hole 121a may be formed to correspond to the shape of the discharge cover 222 of the dust bin 220. The dust passage hole 121a may be formed to communicate with a first flow path 181 to be described below.

[0168] The coupling part 120 may include dust bin guide surfaces 122. The dust bin guide surface 122 may be disposed on the first outer wall surface 112a. The dust bin guide surfaces 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.

[0169] 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.

[0170] Meanwhile, a protrusion moving hole 122a may be formed in the dust bin guide surface 122, and a push protrusion 151 to be described below may rectilinearly move along the protrusion moving hole 122a. In addition, a gearbox 155 may be provided below the dust bin guide surface 122 based on the gravitational direction and accommodate a gear or the like of a cover opening unit 150

to be described below. In this case, a guide space 122b, through which the push protrusion 151 may move, may be formed between the dust bin guide surface 122, the lower surface, and the upper surface of the gearbox 155. Further, the guide space 122b may communicate with the first flow path 181 through a bypass hole 122c. That is, the protrusion moving hole 122a, the guide space 122b, the bypass hole 122c, and the first flow path 181a may define one bypass flow path (see FIG. 10). With this configuration, when the dust collecting motor 191 operates in the state in which the dust bin 220 is coupled to the coupling part 120, the dust or the like, which remains in the dust bin 220 and remains on the dust bin guide surface 122, may be sucked through the bypass flow path.

[0171] 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.

[0172] 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.

[0173] 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.

[0174] 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.

[0175] 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.

[0176] The coupling sensor 125 may face the dust bin 220 or the battery housing 230 of the cleaner 200.

[0177] 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.

[0178] 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.

[0179] 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.

[0180] 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.

[0181] The fixing unit 130 according to the present disclosure will be described below with reference to FIGS. 7, 9, and 15.

[0182] The cleaner station 100 according to the present disclosure may include the fixing unit 130. The fixing unit 130 may be disposed on the sidewall 124. In addition, at least a part of the fixing unit 130 may be disposed on a back surface to the coupling surface 121. The fixing unit 130 may fix the cleaner 200 coupled to the coupling surface 121. Specifically, the fixing unit 130 may fix the dust bin 220 and the battery housing 230 of the cleaner 200 coupled to the coupling surface 121.

[0183] 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.

[0184] 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.

[0185] 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.

[0186] The fixing part motor 133 may provide power for moving the fixing member 131.

[0187] The fixing part links 135 may convert a rotational force of the fixing part motor 133 into the reciprocations of the fixing members 131.

[0188] 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.

[0189] 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.

[0190] 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.

[0191] 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.

[0192] 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.

[0193] A door unit 140 according to the present disclosure will be described below with reference to FIGS. 7, 10, 11, and 15.

[0194] 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.

[0195] The door unit 140 may include a door 141, a door motor 142, and a door arm 143.

[0196] The door 141 may be hingedly coupled to the coupling surface 121 and may open or close the dust passage hole 121a. The door 141 may include a door main body 141a.

[0197] The door main body 141a may be provided in the form of a rotary body 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. As another example, the door main body 141a may be formed in a rectangular plate shape.

[0198] Based on a state in which the door main body 141a blocks the dust passage hole 121a, the hinge part may be disposed at an upper side of the door main body 141a, and an arm coupling part 141b may be disposed at a lower side of the door main body 141a.

[0199] The door main body 141a may be formed in a shape capable of sealing the dust passage hole 121a. For example, an outer surface of the door main body 141a, which is exposed to the outside of the cleaner station 100, is formed to have a diameter corresponding to a diameter of the dust passage hole 121a, and an inner surface of the door main body 141a, which is disposed in the cleaner station 100, is formed to have a diameter greater than the diameter of the dust passage hole 121a. In addition, a level difference may be defined between the outer surface and the inner surface. Meanwhile, one or more reinforcing ribs may protrude from the inner surface of the door main body 141a in order to connect the hinge part and the arm coupling part 141b and reinforce a supporting force of the door main body 141a.

[0200] The hinge part may be a means by which the door 141 is hingedly coupled to the coupling surface 121. The hinge part may be disposed at an upper end of the door main body 141a and coupled to the coupling surface 121.

[0201] The arm coupling part 141b may be a means to which the door arm 143 is rotatably coupled. The arm coupling part 141b may be disposed at a lower side of the door main body 141a and rotatably coupled to the door main body 141a, and the door arm 143 may be rotatably coupled to the arm coupling part 141b.

[0202] With this configuration, when the door arm 143 pulls the door main body 141a in the state in which the door 141 closes the dust passage hole 121a, the door main body 141a is rotated about the hinge part toward the inside of the cleaner station 100, such that the dust passage hole 121a may be opened. Meanwhile, when the door arm 143 pushes the door main body 141a in the state in which the dust passage hole 121a is opened, the door main body 141a is rotated about the hinge part 141b toward the outside of the cleaner station 100, such that the dust passage hole 121a may be closed.

[0203] Meanwhile, the door 141 may be in contact with the discharge cover 222 in the state in which the cleaner 200 is coupled to the cleaner station 100 and the discharge cover 222 is separated from the dust bin main body 210. Further, when the door 141 rotates, the discharge cover 222 may rotate in conjunction with the door 141.

[0204] 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.

[0205] 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.

[0206] 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.

[0207] The door unit 140 may further include door opening/closing detecting parts 144. The door opening/closing detecting parts 144 may be provided in the housing 110 and may detect whether the door 141 is in an opened state.

[0208] 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.

[0209] Therefore, when the door arm 143 is moved to a preset door opening position DP1 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.

[0210] 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.

[0211] 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.

[0212] 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.

[0213] The door unit 140 may be opened when the discharge cover 222 of the cleaner 200 is opened. In addition, when the door unit 140 is closed, the discharge cover 222 of the cleaner 200 may also be closed in conjunction with the door unit 140.

[0214] When the dust in the dust bin 220 of the cleaner 200 is removed, the door motor 142 may rotate the door 141, thereby coupling the discharge cover 222 to the dust bin main body 221. Specifically, the door motor 142 may rotate the door 141 to rotate the door 141, and the rotating door 141 may push the discharge cover 222 toward the dust bin main body 221.

[0215] The cover opening unit 150 according to the present disclosure will be described below with reference to FIGS. 7, 12, and 15.

[0216] 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.

[0217] 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.

[0218] The push protrusion 151 may move to press the coupling lever 222c when the cleaner 200 is coupled.

[0219] 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.

[0220] When the cleaner 200 is coupled, the push protrusion 151 may be disposed at a position at which the push protrusion 151 may push the coupling lever 222c. That is, the coupling lever 222c may be disposed on the protrusion moving hole. In addition, the coupling lever 222c may be disposed in a movement region of the push protrusion 151.

[0221] 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.

[0222] 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.

[0223] 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.

[0224] In this case, the discharge cover 222 may have the torsion spring 222d. The discharge cover 222 may be rotated by a predetermined angle or more and supported in the rotated position by an elastic force of the torsion spring 222d. Therefore, the discharge cover 222 may be opened, and the dust passage hole 121a and the inside of the dust bin 220 may communicate with each other.

[0225] 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.

[0226] 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.

[0227] 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.

[0228] 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.

[0229] 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 first cleaner, and as a result, it is possible to improve convenience.

[0230] 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.

[0231] Meanwhile, the dust collecting part 170 will be described below with reference to FIGS. 7 and 15.

[0232] The cleaner station 100 may include the dust collecting part 170. The dust collecting part 170 may be disposed in the housing 110. The dust collecting part 170 may be disposed at the lower side of the coupling part 120 based on the gravitational direction.

[0233] 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.

[0234] The dust collecting part 170 may be detachably coupled to the housing 110.

[0235] 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.

[0236] When the suction force is generated by the dust collecting motor 191, a volume of the dust bag is increased, such that the dust may be accommodated in the dust bag.

[0237] 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.

[0238] 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.

[0239] On the contrary, the dust bag may be made of a permeable material. For example, the dust bag may include a roll vinyl film (not illustrated). With this configuration, the dust bag is sealed or joined, which may prevent dust or offensive odor captured in the dust bag from leaking to the outside from the dust bag. In this case, the dust bag may be mounted in the housing 110 by means of a dust bag cartridge (not illustrated). As necessary, the dust bag may be replaced by means of the dust bag cartridge.

[0240] Meanwhile, the flow path part 180 will be described below with reference to FIG. 7.

[0241] The cleaner station 100 may include the flow path part 180.

[0242] The flow path part 180 may connect the dust bin 220 of the cleaner 200 and the dust collecting part 170. The flow path part 180 may be disposed at a rear side of the coupling surface 121. The flow path part 180 may mean a space between the dust bin 220 of the cleaner 200 and the dust collecting part 170. The flow path part 180 may be a space formed at a rear side of the dust passage hole 121a. The flow path part 180 may be a flow path bent downward from the dust passage hole 121a, and the dust and the air may flow through the flow path part 180.

[0243] Specifically, the flow path part 180 may include the first flow path 181 and a second flow path 182. When the cleaner 200 is coupled to the cleaner station 100 and the dust passage hole 121a is opened, the first flow path 181 communicates with the internal space of the dust bin 220, and the second flow path 182 is connected to the first flow path 181 allows the first flow path 181 to communicate with the internal space of the dust collecting part 170.

[0244] For example, the first flow path 181 may be disposed to be substantially parallel to an axis of the suction motor 214 or an imaginary through line that penetrates the dust bin 220. In this case, the axis of the suction motor 214 or the through line of the dust bin 220 may penetrate

the first flow path 181.

[0245] In this case, the second flow path 182 may be provided at a predetermined angle with respect to the first flow path 181. For example, an angle between the first flow path 181 and the second flow path 181 may be a right angle. With this configuration, it is possible to minimize an overall volume of the cleaner station 100.

[0246] The second flow path 182 may extend downward from the first flow path 181. The second flow path 182 may communicate with the first flow path 181 and guide the air, which has passed through the first flow path 181, to the dust collecting part 170.

[0247] The second flow path 182 may be disposed in a direction parallel to an axis C of the dust collecting motor 191. With this configuration, it is possible to minimize a decrease in the suction force of the dust collecting motor 191 in the first flow path 181 and the second flow path 182.

[0248] 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.

[0249] Meanwhile, the dust suction module 190 will be described below with reference to FIGS. 7 and 15.

[0250] 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 193.

[0251] 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.

[0252] 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.

[0253] Meanwhile, in the present embodiment, an imaginary dust collecting motor axis may be formed by extending a rotation axis of the dust collecting motor 191. For example, the dust collecting motor axis may be disposed to be perpendicular to the ground surface.

[0254] 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.

[0255] The second filter 193 may be disposed between the dust collecting motor 191 and the outer wall surface 112. The second filter 193 may be an HEPA filter. Foreign substances contained in the air, which have passed through the dust collecting part 170, may be removed by the first filter 192 and the second filter 193, and the air, from which dust is removed, may be discharged to the outside of the cleaner station 100.

[0256] 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.

[0257] 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.

[0258] Meanwhile, with reference to FIGS. 7 and 13, the cleaner station 100 of the present disclosure may further include a suction port blocking part 300.

[0259] The suction port blocking part 300 may be disposed in the housing 110 and open or close the suction port 262 of the cleaner 200 in the state in which the cleaner 200 is coupled.

[0260] The suction port blocking part 300 includes a blocking part main body 310, a shutter 320, and a suction port opening/closing actuator 330.

[0261] The blocking part main body 310 is coupled to the housing 110 and disposed at a position that faces the cleaner nozzle 260 of the cleaner 200.

[0262] The blocking part main body 310 may be coupled to the first outer wall surface 112a. Specifically, the blocking part main body 310 may be disposed at a front lower side of the cleaner station 100. In this case, the blocking part main body 310 may be disposed to be able to come into contact with a lower side of the cleaner nozzle 260.

[0263] The blocking part main body 310 may accommodate the shutter 320 and the suction port opening/closing actuator 330 therein. In this case, the shutter 320 may be coupled to be movable relative to the blocking part main body 310. The shutter 320 may be coupled to reciprocate from the blocking part main body 310.

[0264] For example, the blocking part main body 310 may be formed in a hexahedral shape. A shutter inlet/outlet port, through which the shutter 320 may pass in accordance with the movement of the shutter 320, may be formed in one surface of the blocking part main body 310.

[0265] The shutter 320 may be provided on the blocking part main body 310 and configured to rectilinearly reciprocate. That is, the shutter 320 may be accommodated in the blocking part main body 310 and rectilinearly moved to the outside from the blocking part main body 310 by the operation of the suction port opening/closing actuator 330.

[0266] For example, the shutter 320 may be formed in a quadrangular plate shape.

[0267] The shutter 320 may be moved to be extended from the blocking part main body 310 by the operation of the suction port opening/closing actuator 330. Specifically, the shutter 320 may be moved to the outside of the blocking part main body 310 in the state in which the dust collecting motor 191 operates. In this case, the shutter 320 may be moved to a position that faces the suction port 262 of the cleaner nozzle 260.

[0268] Therefore, when the shutter 320 is moved in the state in which the cleaner 200 is coupled to the cleaner

station 100, the shutter 320 may block the suction port 262 of the cleaner nozzle 260.

[0269] Meanwhile, the shutter 320 may be made of a material having elasticity. Therefore, when the dust collecting motor 191 operates, the shutter 320 may block the suction port 262 while being curved.

[0270] The suction port opening/closing actuator 330 may provide driving power for moving the shutter 320. For example, the suction port opening/closing actuator 330 may be a motor. In this case, the suction port opening/closing actuator 330 may be connected to the shutter 320 through at least one gear. Therefore, the shutter 320 may reciprocate in accordance with the operation of the suction port opening/closing actuator 330.

[0271] The control of the suction port opening/closing actuator 330 will be described below.

[0272] Meanwhile, FIG. 14 illustrates another embodiment of a suction port blocking part 300'.

[0273] As illustrated in FIG. 14, in the suction port blocking part 300' according to another embodiment, a lower surface of a blocking part main body 310' may be disposed to face the ground surface, and an upper portion of the blocking part main body 310' may be disposed to face the cleaner nozzle 260.

[0274] Further, a shutter 320' may reciprocate in the upward/downward direction relative to the blocking part main body 310'.

[0275] In this case, the shutter 320' may be configured to block the suction port 262 by being moved upward and inserted into the suction port 262 of the cleaner nozzle 260. For example, a width of an upper end of the shutter 320' based on the forward/rearward direction may be smaller than a width of a lower end of the shutter 320' based on the forward/rearward direction. With this configuration, the sealability with respect to the suction port 262 may be improved.

[0276] Meanwhile, with reference to FIGS. 4 and 5, the cleaner station 100 of the present disclosure may further include the differential pressure sensor 500 or 500'.

[0277] The differential pressure sensor 500 or 500' may refer to a sensor configured to detect a pressure difference of air.

[0278] The differential pressure sensor 500 or 500' may detect the differential pressure between the air before passing through the prefilter 215b or 215b', and the air after passing through the prefilter 215b or 215b'.

[0279] For example, the differential pressure sensor 500 or 500' includes a first differential pressure sensor 510 or 510' disposed in a flow path configured to connect the dust separating part 213 or 213' and the prefilter 215b or 215b', and a second differential pressure sensor 520 or 520' disposed in a flow path configured to connect the prefilter 215b or 215b' and the suction motor 214 or 214'.

[0280] In this case, the first differential pressure sensor 510 or 510' may measure the pressure of the air flowing in the flow path configured to connect the dust separating part 213 or 213' and the prefilter 215b or 215b'. Further, the second differential pressure sensor 520 or 520' may measure the pressure of the air flowing in the flow path configured to connect the prefilter 215b or 215b' and the suction motor 214 or 214'. Further, the differential pressure sensor 500 or 500' may calculate the differential pressure on the basis of the pressure measured by the first differential pressure sensor 510 or 510' and the pressure measured by the second differential pressure sensor 520 or 520'.

[0281] The differential pressure sensor 500 or 500' may transfer information on the calculated differential pressure to a control unit 400 of the cleaner station 100 and/or a control unit (not illustrated) of the cleaner 200.

[0282] Meanwhile, FIG. 15 is a block diagram for explaining a control configuration of the cleaner station according to the embodiment of the present disclosure.

[0283] The control configuration of the cleaner station 100 of the present disclosure will be described below with reference to FIG. 15.

[0284] The cleaner station 100 according to the embodiment of the present disclosure may further include the control unit 400 configured to control the coupling part 120, the fixing unit 130, the door unit 140, the cover opening unit 150, the dust collecting part 170, the flow path part 180, the dust suction module 190, and the suction port blocking part 300.

[0285] The control unit 400 may include a printed circuit board and elements mounted on the printed circuit board.

[0286] 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.

[0287] 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.

[0288] 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.

[0289] When the fixing members 131 or the fixing part links 135 are moved to a predetermined fixing position 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.

[0290] Meanwhile, when the operation of emptying the dust bin 220 is ended, the control unit 400 may rotate the fixing part motor 133 in the reverse direction to release the cleaner 200.

[0291] 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.

[0292] When the door 141 or the door arm 143 reaches the predetermined opening position DP1, 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.

[0293] Meanwhile, when the operation of emptying the dust bin 220 is ended, the control unit 400 may rotate the door motor 142 in the reverse direction to close the door 141.

[0294] 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.

[0295] When a 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.

[0296] The control unit 400 may receive information on a temperature in the dust collecting part 170. For example, the control unit 400 may receive information on the temperature in the dust collecting part 170 by means of a temperature sensor 175. The control unit 400 may control the temperature in the dust collecting part 170 on the basis of the temperature information received from the temperature sensor 175.

[0297] The control unit 400 may operate the dust collecting motor 191 to suck the dust in the dust bin 220. In addition, the control unit 400 may raise a temperature in the dust collecting part 170 by operating the dust collecting motor 191 and using heat generated from the dust collecting motor 191.

[0298] The control unit 400 may open or close the suction port 262 of the cleaner 200 by operating the suction port blocking part 300. Specifically, the control unit 400 may move the shutter 320 by operating the suction port opening/closing actuator 330. The control unit 400 may operate the suction port opening/closing actuator 330 in one direction to allow the shutter 320 to block the suction port 262. Further, the control unit 400 may perform control to operate the suction port opening/closing actuator 330 in a direction opposite to one direction so that the shutter 320 may enter the inside of the blocking part main body 310.

[0299] The control unit 400 may be connected to the differential pressure sensor 500 or 500' so as to transmit or receive signals therebetween. For example, the control unit 400 may be connected to the cleaner 200 through the charging part 128 so as to transmit or receive electrical signals therebetween. The control unit 400 may transmit or receive electrical signals to or from the differential pressure sensor 500 or 500'. As another example, the control unit 400 may be connected to the differential pressure sensor 500 or 500' through wireless communication. In this case, the wireless communication includes short-range communication and long-range communication that are known in the art.

[0300] The control unit 400 may receive, from the differential pressure sensor 500 or 500', information on the pressure difference (differential pressure) between the air before passing through the prefilter 215b or 215b', and the air after passing through the prefilter 215b or 215b'.

[0301] The control unit 400 may operate a display part 410 to display a dust bin emptied situation and a charged situation of the cleaner 200.

[0302] Meanwhile, the cleaner station 100 according to the present disclosure may include the display part 410.

[0303] 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.

[0304] 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.

[0305] 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. For example, the memory 430 may store data related to a reference differential pressure that is a criterion for the prefilter 215b or 215b' to remove foreign substances.

[0306] 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.

[0307] FIG. 16 is a flowchart for explaining a process of blocking the suction port of the cleaner nozzle in the cleaner station according to the embodiment of the present disclosure, FIG. 18 is a view for explaining an operation of controlling the motor over time in a method of controlling the cleaner station according to the embodiment of the present disclosure, FIG. 21 is a view for explaining a state in which the shutter does not block the

suction port of the cleaner in the cleaner station according to the embodiment of the present disclosure, FIG. 22 is a view for explaining a state in which the shutter blocks the suction port of the cleaner in the cleaner station of according to the embodiment of the present disclosure, FIG. 23 is a view for explaining a process of removing foreign substances remaining in the cleaner main body according to the embodiment of the present disclosure, and FIG. 24 is a view for explaining a process of removing foreign substances remaining in the cleaner main body according to another embodiment of the present disclosure.

[0308] The method of controlling the cleaner station according to the embodiment of the present disclosure will be described below with reference to FIGS. 13 to 16, 18, and 21 to 24.

[0309] The method of controlling the cleaner station according to the embodiment 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, a cleaner foreign substance removal step S60, a door closing step S70, and a release step S80.

[0310] 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.

[0311] 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.

[0312] 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.

[0313] Meanwhile, in the coupling checking step S10 according to the present disclosure, the control unit 400 may check 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.

[0314] Therefore, in the coupling checking step S10, the control unit 400 may receive a signal from the coupling sensor 125, the signal indicating that the cleaner 200 is coupled. Alternatively, in the coupling checking step S10, the control unit 400 may 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.

[0315] 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.

[0316] 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.

[0317] 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.

[0318] 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.

[0319] 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).

[0320] 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.

[0321] 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.

[0322] 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.

[0323] 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 di-

rection or measure the time taken after the push protrusion 151 departs from the initial position.

[0324] 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.

[0325] 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).

[0326] 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).

[0327] 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.

[0328] 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.

[0329] 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.

[0330] 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.

[0331] 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.

[0332] 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.

[0333] Meanwhile, the control unit 400 may open the dust passage hole 121a by rotating the door 141 in a stepwise manner. 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.

[0334] 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. For example, the control unit 400 may further rotate the door 141 by 45 degrees or more and 55 degrees or less.

[0335] 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.

[0336] Meanwhile, when the door arm 143 moves to the preset door opening position DP1, 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.

[0337] 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.

[0338] 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.

[0339] 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.

[0340] 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 dust collecting speed Ws 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 dust collecting speed Ws 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.

[0341] 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 dust collecting speed Ws. This is advantageous in minimizing the operating time of the dust collecting motor 191, improving the energy efficiency, and minimizing the occurrence of noise.

[0342] In the dust collecting step S50, the control unit 400 may operate to rotate the dust collecting motor 191 at the dust collecting speed Ws for a preset dust collecting time ts2.

[0343] In the dust collecting step S50, the dust in the dust bin 220 may pass through the dust passage hole 121a and the flow path part 180 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.

[0344] Meanwhile, foreign substances may still remain in the cleaner 200 after the dust collecting step S50. That is, hairs and the like may be contained in the air that has passed through the suction part 212 by the suction force of the suction motor 214 during the process in which the cleaner 200 cleans the floor surface, and the hairs may be trapped in the holes formed in the mesh net 213a during the process in which the air flows toward the dust separating part 213.

[0345] In addition, foreign substances may remain by being attached to the dust bin 220 by static electricity or the like generated on an inner peripheral surface of the dust bin 220.

[0346] In order to solve the problem, in the present disclosure, the cleaner foreign substance removal step S60 is further provided.

[0347] In the cleaner foreign substance removal step S60, the control unit 400 may block the suction port 262 of the cleaner nozzle 260 in the state in which the dust collecting motor 191 operates after the dust collecting step S50.

[0348] Specifically, in the cleaner foreign substance removal step S60, the control unit 400 may control the suction port opening/closing actuator 330 to move the shutter 320 or 320' in the state in which the dust collecting motor 191 operates.

[0349] Therefore, in the cleaner foreign substance removal step S60, the suction port opening/closing actuator 330 operates in the state in which the dust collecting motor 191 operates. Further, the shutter 320 may be moved at least once by the operation of the suction port opening/closing actuator 330.

[0350] For example, when the suction port opening/closing actuator 330 operates, the shutter 320, which is accommodated in the blocking part main body 310, may be moved to the outside of the blocking part main body 310 and moved to the position at which the shutter 320 covers the suction port 262 of the cleaner nozzle 260. When the suction force of the dust collecting motor 191 is transmitted to the shutter 320 in this situation, the shutter 320 having elasticity may block the suction port 262, thereby preventing the air from being introduced into the cleaner 200 and the cleaner station 100 through the suction port 262.

[0351] As another example, when the suction port opening/closing actuator 330 operates, the shutter 320', which is accommodated in the blocking part main body 310', may be moved upward to the outside of the blocking part main body 310' and moved to the position at which the shutter 320' is inserted into the suction port 262 of the cleaner nozzle 260. Therefore, it is possible to prevent the air from being introduced into the cleaner 200 and the cleaner station 100 through the suction port 262.

[0352] Further, in the cleaner foreign substance removal step S60, the suction port 262 may be blocked for a preset suction port blocking time ts2. That is, the control unit 400 may continuously operate the dust collecting motor 191 in the state in which the shutter 320 or 320' blocks the suction port 262 for the suction port blocking time ts2.

[0353] In the cleaner foreign substance removal step S60, a flow of air to be introduced into the cleaner 200 is changed by the control in comparison with the dust collecting step S50.

[0354] When the dust collecting motor 191 operates in the state in which the cleaner 200 is coupled to the cleaner station 100, as in the dust collecting step S50, outside air is introduced through the space, which communicates with the main body 210 and the dust bin 220 of the cleaner, by the suction force of the dust collecting motor 191. Specifically, the main body 210 and the dust bin 220 of the cleaner may communicate with the suction port 262 and the air discharge port 215a, such that the air may be introduced. At least one of the filters 215b and 215c is disposed in the flow path connected to the air discharge port 215a in the dust bin 220, such that resistance occurs

on the flow of air. Therefore, the most part (90% or more) of air is introduced into the main body 210 and the dust bin 220 of the cleaner through the suction port 262 (see FIG. 21).

[0355] However, in case that the suction port 262 is blocked, as in the cleaner foreign substance removal step S60, the most part (90% or more) of air is introduced into the main body 210 and the dust bin 220 of the cleaner through the air discharge port 215a, unlike the dust collecting step S50.

[0356] Therefore, in the cleaner foreign substance removal step S60, outside air may be introduced into the dust bin 220 through the air discharge port 215a. Further, in the cleaner foreign substance removal step S60, a flow rate of the air passing through the air discharge port 215a may be higher than a flow rate of the air passing through the cleaner nozzle 260 (see FIG. 22).

[0357] Further, a flow rate of the air passing through the air discharge port 215a in the cleaner foreign substance removal step S60 may be higher than a flow rate of the air passing through the air discharge port 215a in the dust collecting step S50.

[0358] An effect implemented by a change in the flow of air will be described below. FIG. 19 is a view illustrating a flow of air introduced into the air discharge port 215a and a flow of air introduced into the suction port 262.

[0359] First, the air introduced from the suction port 262 passes through the flow path in the cleaner nozzle 260, passes through the extension tube 250, and then passes through the suction part 212. Thereafter, the most part of the air having passed through the suction part 212 may pass through the mesh net 213a from the outside of the mesh net 213a, flow through the inside of the mesh net 213a, and then be introduced into the dust passage hole 121a (see the one-dot chain line in FIG. 23).

[0360] The effect of the flow of air, which removes hairs trapped in the mesh net 213a or wipes out foreign substances around the dust bin 220 including the inner peripheral surface of the dust bin 220, is insufficient.

[0361] In contrast, the air introduced from the air discharge port 215a may pass through the HEPA filter 215c or 215c', the motor 214 or 214', and the prefilter 215b or 215b' and then remove foreign substances, such as fur or hairs, trapped in the prefilter 215b or 215b' and the mesh net 213a or 213a' while flowing to the outside of the mesh net 213a or 213a' from the inside of the mesh net 213a or 213a' (see the dotted lines in FIGS. 23 and 24).

[0362] In addition, the air, which flows from the inside of the mesh net 213a or 213a' to the outside of the mesh net 213a or 213a', may create vortices while rubbing the inner peripheral surface of the dust bin 220 or 220', thereby wiping out foreign substances remaining around the dust bin 220 or 220'.

[0363] Therefore, in the cleaner foreign substance removal step S60 of the present disclosure, foreign substances such as hairs, which are trapped in the filter 215b, 215c, 215b', or 215c' and the mesh net 213a or 213a' of the cleaner during the cleaning process, may flow in a reverse direction to the direction in which the air is sucked during the cleaning process, such that foreign substances, which are not discharged even in the dust collecting step S50, may be removed.

[0364] In addition, in the cleaner foreign substance removal step S60 of the present disclosure, the air may flow from the dust separating part 213 or 213' toward the inner peripheral surface of the dust bin 220, and the flowing air may create vortices in the dust bin 220 or 220', such that the residual dust attached to the periphery of the dust bin 220 by static electricity or the like may be removed.

[0365] Meanwhile, according to the embodiment, the suction port 262 may be opened when the preset suction port blocking time ts2 elapses in the cleaner foreign substance removal step S60. That is, after the shutter 320 blocks the suction port 262 for the suction port blocking time ts2, the control unit 400 may control the suction port opening/closing actuator 330 to move the shutter 320 into the blocking part main body 310.

[0366] Meanwhile, the control unit 400 may stop the dust collecting motor 191 when the suction port blocking time ts2 elapses in the foreign substance removal step S60.

[0367] In this case, the control unit 400 may gradually decrease the rotational speed of the dust collecting motor 191 from the dust collecting speed Ws for the preset suction decrease time tsd. For example, the control unit 400 may gradually decrease the rotational speed of the dust collecting motor 191 from the dust collecting speed Ws 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.

[0368] 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.

[0369] Meanwhile, as illustrated in FIG. 19, in the cleaner foreign substance removal step S60 according to another embodiment of the present disclosure, the shutter 320 may repeatedly reciprocate. Specifically, in the cleaner foreign substance removal step S60, the control unit 400 may operate the suction port opening/closing actuator 330 at a predetermined time interval. In this case, the control unit 400 may operate the suction port opening/closing actuator 330 while changing the directions in which the suction port opening/closing actuator 330 operates.

[0370] Therefore, in the cleaner foreign substance removal step S60, the shutter 320 may repeatedly reciprocate in the state in which the operation of the dust collecting motor 191 is maintained, and an area of the suction port 262 blocked by the shutter 320 may be changed.

[0371] Therefore, the amount of air to be introduced

into the dust bin 220 through the suction port 262 may be changed, and the amount of air to be introduced into the dust bin 220 through the air discharge port 215a may also be changed.

[0372] Therefore, it is possible to continuously change the flow of the air flowing in the dust bin 220 while maintaining the flow rate of the air flowing in the dust bin 220. Further, it is possible to remove foreign substances remaining in the dust bin 220 by creating vortices in accordance with the change in the flow of the air.

[0373] Meanwhile, as illustrated in FIG. 20, in the cleaner foreign substance removal step S60 according to still another embodiment of the present disclosure, an output of the dust collecting motor 191 may be changed in the state in which the shutter 320 blocks the suction port 262. Specifically, the control unit 400 may allow the shutter 320 to block the suction port 262 by operating the suction port opening/closing actuator 330 and operate the dust collecting motor 191 at a predetermined time interval.

[0374] Therefore, in the cleaner foreign substance removal step S60, the suction force generated by the dust collecting motor 191 may be changed in the state in which the suction port 262 is blocked by the shutter 320.

[0375] Therefore, the amount of air to be introduced into the dust bin 220 through the air discharge port 215a may be changed by the change in the suction force of the dust collecting motor 191.

[0376] Therefore, it is possible to change the flow rate of the air for sucking the residual dust in the dust bin 220 and provide an effect similar to an effect of sweeping the dust bin 220.

[0377] Therefore, according to the present embodiment, the air may be introduced through the air discharge port 215a, and the flow rate of the air for removing dust may be changed, which may improve the effect of removing the residual dust.

[0378] Meanwhile, the method of controlling the cleaner station according to the embodiment of the present disclosure may further include a door closing step S70 of closing the dust passage hole 121a by rotating the door 141 after the operation of the dust collecting motor 191 ends.

[0379] Specifically, when a preset suction end time tse elapses after the operation of the dust collecting motor 191 ends, the control unit 400 may operate the door motor 142 in the reverse direction and rotate the door 141 to a closing position Ps.

[0380] 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.

[0381] 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.

[0382] 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.

[0383] 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.

[0384] 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.

[0385] 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.

[0386] 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.

[0387] 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.

[0388] Meanwhile, FIG. 17 is a flowchart for explaining a method of controlling the cleaner system according to another embodiment of the present disclosure.

[0389] The method of controlling the cleaner system according to the present embodiment includes a differential pressure detection step S5, the coupling checking step S10, the dust bin fixing step S20, the cover opening step S30, the door opening step S40, the dust collecting step S50, the cleaner foreign substance removal step S60, the door closing step S70, and the release step S80.

[0390] Meanwhile, unless otherwise specified, in order to avoid repeated descriptions, the description of the method of controlling the cleaner system according to the present embodiment may be replaced with the description of the method of controlling the cleaner station according to the embodiment of the present disclosure.

[0391] That is, the coupling checking step S10, the dust bin fixing step S20, the cover opening step S30, the door opening step S40, the dust collecting step S50, the cleaner foreign substance removal step S60, the door closing step S70, and the release step S80 of the control method according to the present embodiment are identical in configurations and effects to those of the method of controlling the cleaner station according to the embodiment of the present disclosure. Therefore, the description of the control method may be replaced.

[0392] The differential pressure detection step S5 of the present embodiment may be performed while the suction motor 214 or 214' operates. For example, the differential pressure detection step S5 may be performed while the cleaner 200 performs the cleaning operation.

[0393] The differential pressure detection step S5 of the present embodiment may be performed before the coupling checking step S10.

[0394] In case that the suction motor 214 or 214' operates, outside air, which is introduced into the dust bin 220 or 220' through the suction part 212 or 212', flows in a cyclone manner in the dust separating part 213 or 213' and then is discharged to the outside through the flow path, which connects the dust separating part 213 or 213' and the suction motor 214 or 214', and the flow path that connects the suction motor 214 or 214' and the air discharge port 215a or 215a'.

[0395] In this case, the differential pressure sensor 500 or 500' detects the differential pressure between the air before passing through the prefilter 215b or 215b' provided in the cleaner 200, and the air after passing through the prefilter 215b or 215b'.

[0396] In this case, the first differential pressure sensor 510 or 510' may measure the pressure of the air flowing in the flow path configured to connect the dust separating part 213 or 213' and the prefilter 215b or 215b'. Further, the second differential pressure sensor 520 or 520' may measure the pressure of the air flowing in the flow path configured to connect the prefilter 215b or 215b' and the suction motor 214 or 214'. Further, the differential pressure sensor 500 or 500' may calculate the differential pressure ΔP on the basis of the pressure measured by the first differential pressure sensor 510 or 510' and the pressure measured by the second differential pressure sensor 520 or 520'.

[0397] The differential pressure ΔP may mean a difference (P2-P1) between a pressure P2, which is measured by the second differential pressure sensor 520 or 520', and a pressure P1 measured by the first differential pressure sensor 510 or 510'. Therefore, it is possible to calculate a decrease in the suction force of the cleaner 200, and a degree of contamination of the prefilter 215b or 215b' may be calculated.

[0398] That is, a degree of contamination of the prefilter 215b or 215b' may increase in proportion to the usage time of the cleaner 200, and the differential pressure ΔP may gradually increase as the degree of contamination of the prefilter 215b or 215b' increases. Further, the suction force of the cleaner 200 may decrease as the differential pressure ΔP increases.

[0399] In particular, in case that the differential pressure ΔP is equal to or higher than a predetermined reference differential pressure, a rate of change in the differential pressure ΔP over time may rapidly increase (see FIG. 25). Further, the rapid change in the differential pressure ΔP may mean a rapid decrease in the suction force of the cleaner 200.

[0400] Therefore, in case that the differential pressure ΔP is equal to or higher than a predetermined reference differential pressure Pr, the operation of removing foreign substances from the prefilter 215b or 215b' needs to be performed.

[0401] Therefore, in case that the differential pressure ΔP is equal to or higher than the predetermined reference differential pressure Pr, the differential pressure sensor 500 or 500' may transfer information on the calculated differential pressure ΔP to the control unit 400 of the cleaner station 100 and/or the control unit (not illustrated) of the cleaner 200.

[0402] Specifically, in case that the calculated differential pressure ΔP is equal to or higher than the preset reference differential pressure Pr, the differential pressure sensor 500 or 500' may transmit a control instruction, which indicates that the operation of removing foreign substances from the prefilter 215b or 215b' of the cleaner 200 needs to be performed, to the control unit 400 of the cleaner station 100. In this case, when the cleaner 200 is coupled to the cleaner station 100, the control unit 400 instructs the cleaner 200 to perform the cleaner foreign substance removal step S60 after the dust collecting step S50. Further, the control unit 400 may display, on the display part 410, that the operation of cleaning the filter needs to be performed.

[0403] Alternatively, the differential pressure sensor 500 or 500' may transfer information on the calculated differential pressure to the control unit 400 of the cleaner station 100. The control unit 400 compares the received information on the differential pressure ΔP with the reference differential pressure Pr, and the control unit 400 may perform control to remove foreign substances from the prefilter 215b or 215b' when the received differential pressure ΔP is equal to or higher than the reference differential pressure Pr. Further, the control unit 400 may display, on the display part 410, that the operation of cleaning the filter needs to be performed.

[0404] Further, the differential pressure sensor 500 or 500' may transmit a control instruction, which indicates that the operation of removing foreign substances from the prefilter 215b or 215b' needs to be performed, to the control unit (not illustrated) provided in the cleaner 200. In this case, the control unit (not illustrated) of the cleaner 200 may display information, which indicates that the filter needs to be cleaned, on a display (not illustrated) disposed on the main body 210 of the cleaner.

[0405] Therefore, it is possible to eliminate an inconvenience of the user having to periodically disassemble the cleaner 200 or 200' and clean the prefilter 215b or 215b'.

[0406] In addition, in case that a degree of contamination of the prefilter 215b or 215b' is high regardless of the usage period, the degree of contamination may be automatically detected and notified to the user, and the prefilter 215b or 215b' may be automatically cleaned.

[0407] In addition, because the prefilter 215b or 215b' is automatically cleaned, which may prevent the decrease in the suction force of the cleaner 200 or 200' and

reduce the frequency with which the user increases an output of the suction motor 214 or 214' to increase the suction force and uses the suction motor 214 or 214'. As a result, it is possible to increase the lifespan of the cleaner 200 or 200'.

[0408] Meanwhile, in case that the differential pressure ΔP calculated by the differential pressure sensor 500 or 500' is less than a predetermined value, it may be determined that the prefilter 215b or 215b' is not present. For example, in case that the differential pressure ΔP calculated by the differential pressure sensor 500 or 500' is lower than - 100 Pa, there is no pressure drop caused by the presence of the prefilter 215b or 215b'. Therefore, it may be determined that the prefilter 215b or 215b' is not present in the cleaner 200, and the determination result may be notified to the user through the display (not illustrated). It is possible to reduce the number of separate sensors (e.g., Hall sensors) configured to detect the presence of the prefilter 215b or 215b' through the above-mentioned control.

[0409] 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.

[0410] 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 including:

a cleaner comprising a suction part having a suction flow path through which air flows, a dust separating part configured to separate dust from the air, a main body having a suction motor configured to generate a suction force for sucking the air along the suction part, and a dust bin configured to store the dust separated by the dust separating part; and
a cleaner station comprising a coupling part including a dust bin guide surface to which an outer peripheral surface of the dust bin is coupled, a dust collecting part disposed below the coupling part and configured to capture dust in the dust bin, a dust collecting motor disposed below the dust collecting part and configured to generate a suction force for sucking the dust in the dust bin to the dust collecting part, and a housing having the dust collecting part and the dust collecting motor therein,
wherein the cleaner further comprises:

a prefilter disposed in a flow path configured to connect the dust separating part and the suction motor, the prefilter being configured to filter out foreign substances contained in the air; and
a differential pressure sensor configured to detect a differential pressure between air before passing through the prefilter and air after passing through the prefilter, and
wherein the dust collecting motor operates when the cleaner is coupled to the cleaner station when the differential pressure detected by the differential pressure sensor is equal to or higher than a preset reference differential pressure.

2. The cleaner system of claim 1, wherein the cleaner station further comprises a suction port blocking part disposed in the housing and configured to open or close a suction port of the cleaner in a state in which the cleaner is coupled.

3. The cleaner system of claim 2, wherein the suction port blocking part blocks the suction port when the dust collecting motor operates.

4. The cleaner system of claim 1, wherein the differential pressure sensor comprises:

a first differential pressure sensor disposed in a flow path configured to connect the dust separating part and the prefilter; and
a second differential pressure sensor disposed in a flow path configured to connect the prefilter and the suction motor.

5. The cleaner system of claim 2, wherein the suction port blocking part comprises:

a blocking part main body coupled to the housing and disposed at a position that faces a cleaner nozzle of the cleaner; and
a shutter provided on the blocking part main body and configured to rectilinearly reciprocate, and
wherein the shutter moves in a state in which the dust collecting motor operates.

6. The cleaner system of claim 5, wherein the suction port blocking part comprises a suction port opening/closing door configured to provide driving power for moving the shutter, and
wherein the suction port opening/closing door operates in a state in which the dust collecting motor operates.

7. The cleaner system of claim 5, wherein the shutter is made of a material having elasticity.

8. A method of controlling a cleaner system, which is coupled to a cleaner comprising a cleaner nozzle having a suction port configured to suck dust, and a dust bin configured to store the dust sucked through the suction port, and collects dust in the dust bin to a dust collecting part, the method comprising:

    a differential pressure detection step of detecting a differential pressure between air before passing through a prefilter provided in the cleaner, and air after passing through the prefilter; and
    a cleaner foreign substance removal step of cleaning the prefilter when the cleaner is coupled to the cleaner station when the differential pressure detected in the differential pressure detection step is equal to or higher than a preset reference differential pressure.

9. The method of claim 8, further comprising:
a dust collecting step of collecting dust in the dust bin by operating a dust collecting motor of the cleaner station after the differential pressure detection step.

10. The method of claim 8, wherein in the cleaner foreign substance removal step, a shutter is moved to block the suction port in a state in which a dust collecting motor of the cleaner station operates.

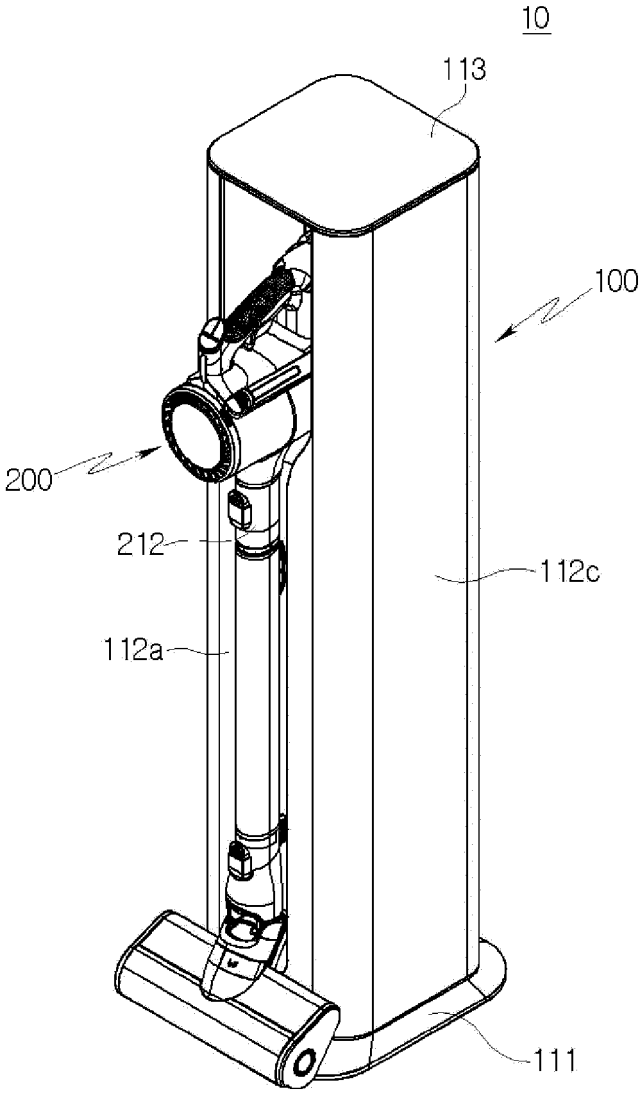
11. The method of claim 8, wherein the cleaner comprises an air discharge port formed to discharge the air sucked into the dust bin, and
wherein outside air is introduced into the prefilter through the air discharge port in the cleaner foreign substance removal step.

12. The method of claim 11, wherein in the cleaner foreign substance removal step, a flow rate of air passing through the air discharge port is higher than a flow rate of air passing through the cleaner nozzle.

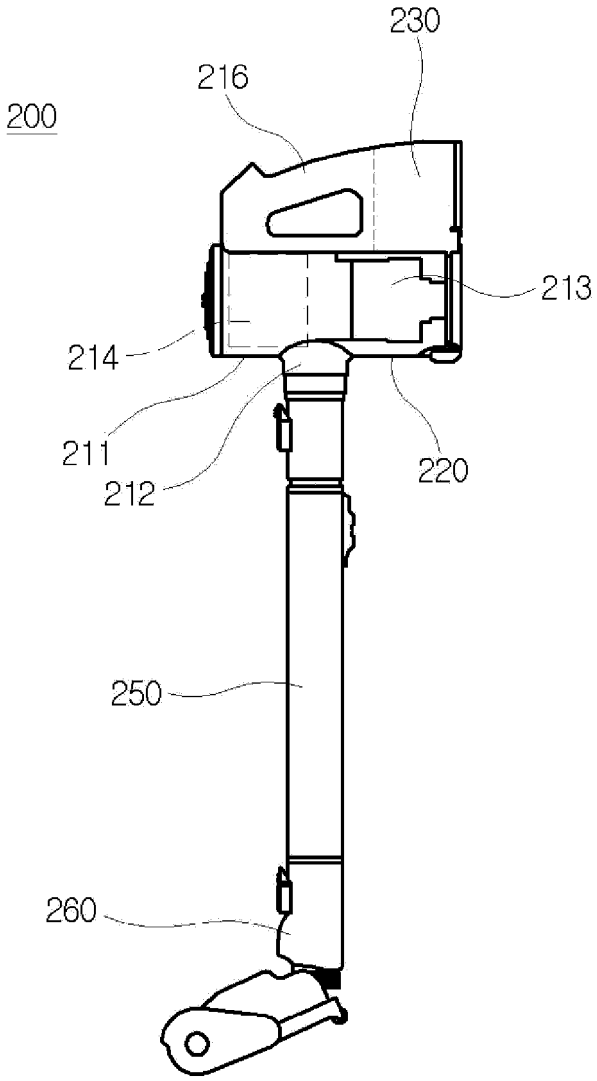
13. The method of claim 9, wherein the cleaner comprises an air discharge port formed to discharge the air sucked into the dust bin, and
wherein a flow rate of air passing through the air discharge port in the cleaner foreign substance removal step is higher than a flow rate of air passing through the air discharge port in the dust collecting step.

14. The method of claim 9, wherein the cleaner station comprises a shutter configured to open or close the suction port in a state in which the cleaner is coupled, and
wherein the shutter moves at least once in the cleaner foreign substance removal step.

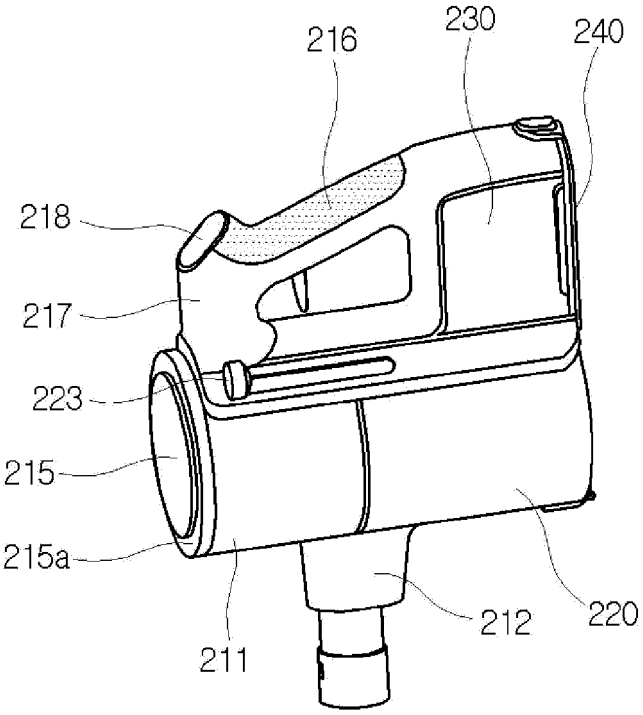
[FIG. 1]



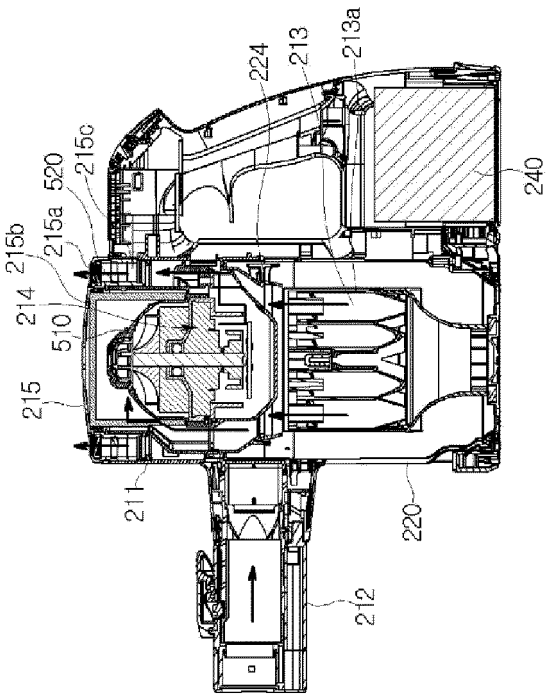
[FIG. 2]



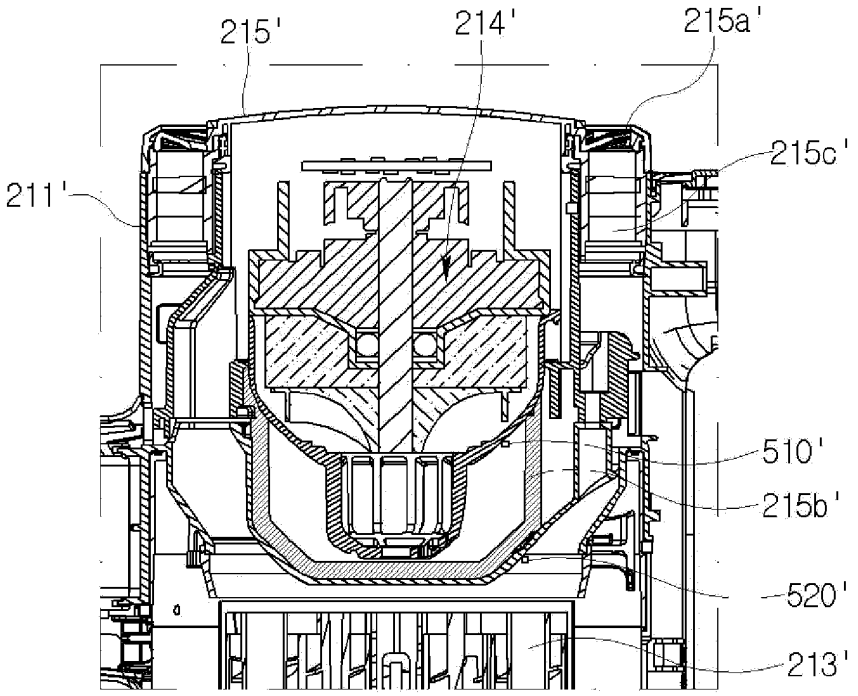
[FIG. 3]


216
230
240
218
217
223
215
215a
211
212
220

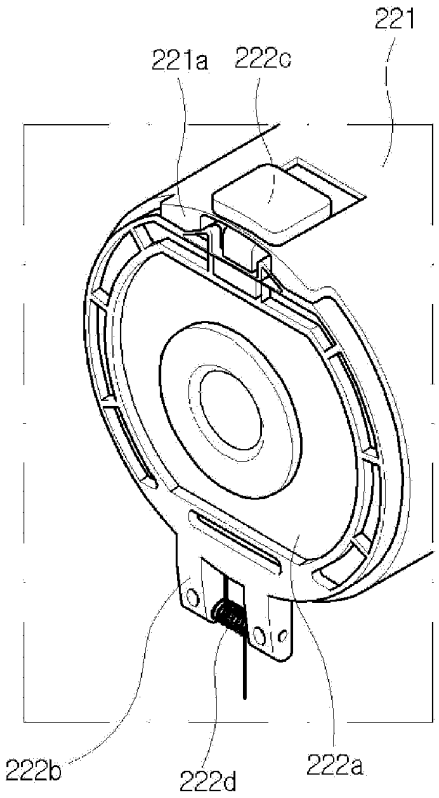
[FIG. 4]


224
213
213a
215c
520
240
215a
215b
214
510
215
211
220
212

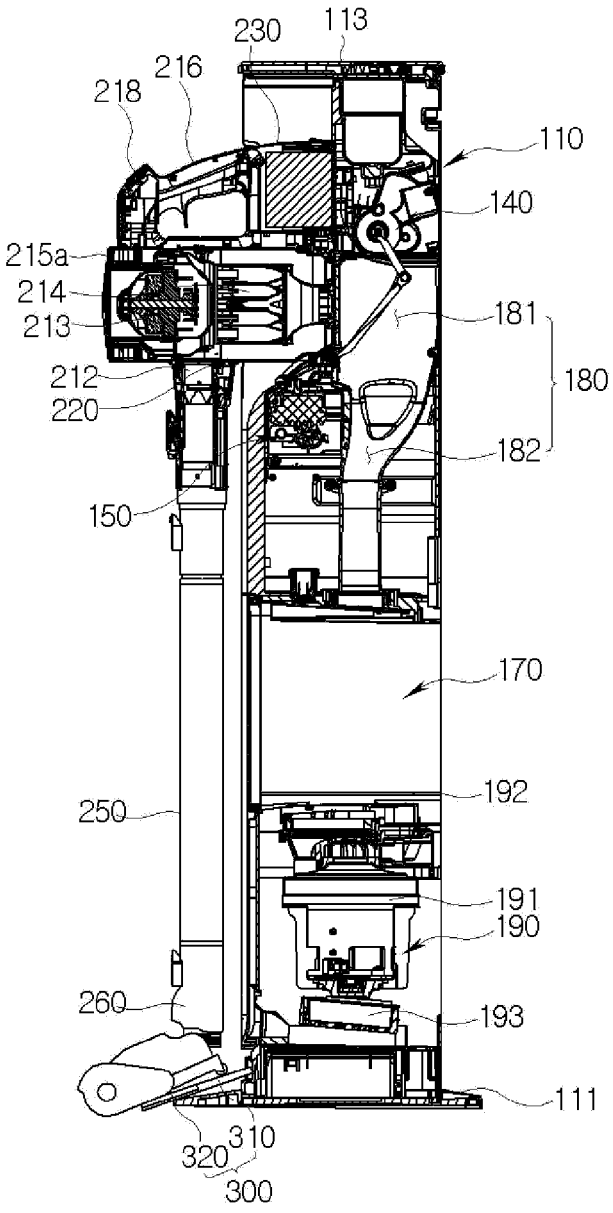
[FIG. 5]


215'
214'
215a'
215c'
211'
510'
215b'
520'
213'

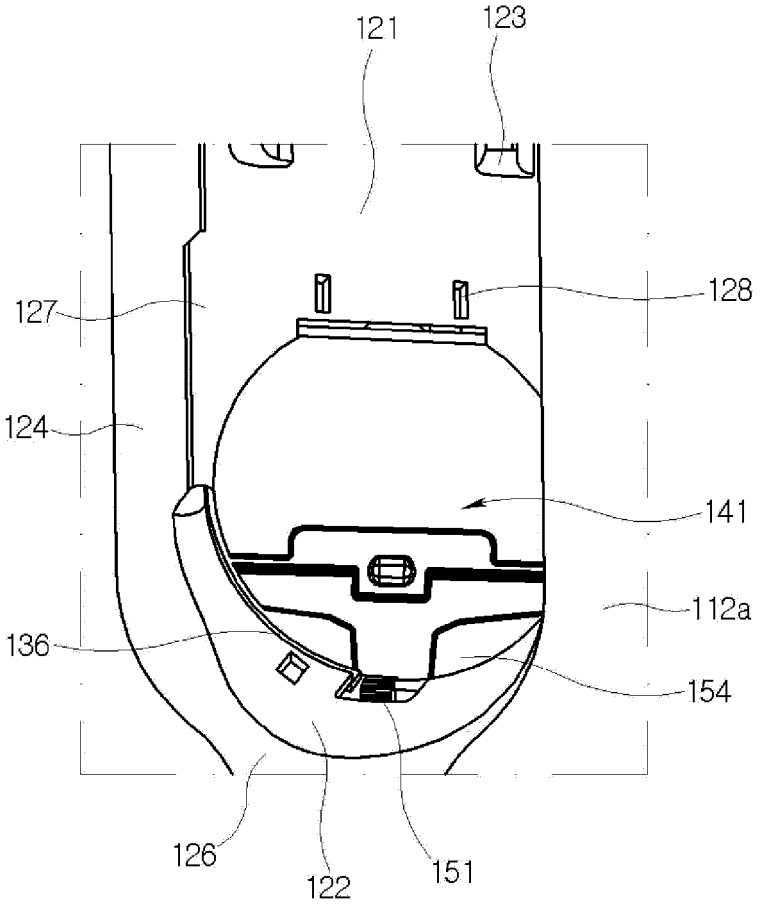
[FIG. 6]


221
221a
222c
222b
222d
222a

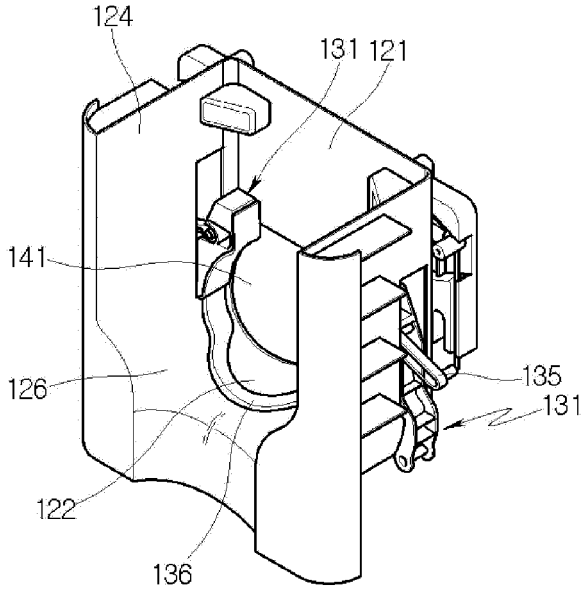
[FIG. 7]


230
113
216
218
110
140
215a
214
213
181
180
212
220
182
150
170
192
250
191
190
260
193
111
320
310
300

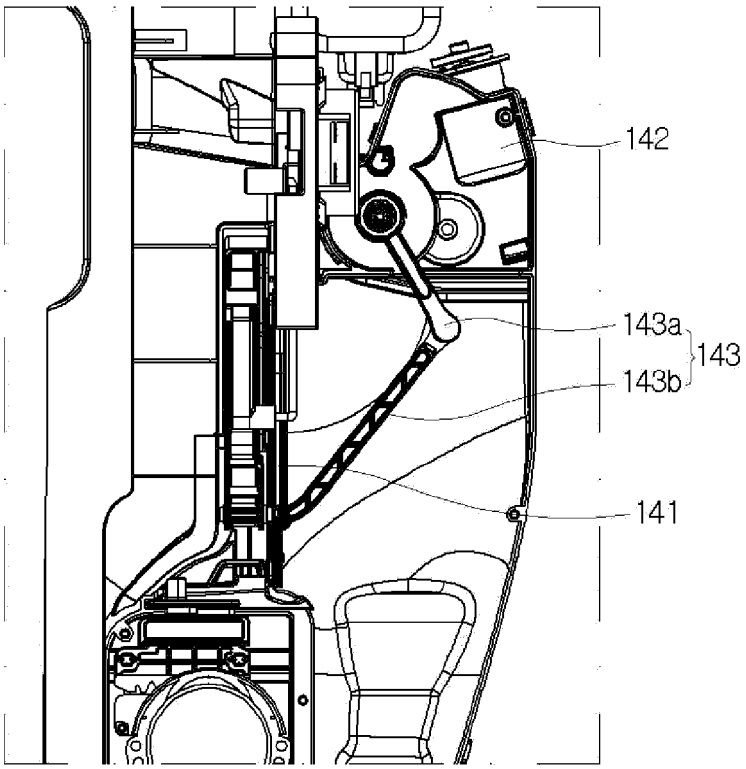
[FIG. 8]


121
123
127
128
124
141
112a
136
154
126
122
151

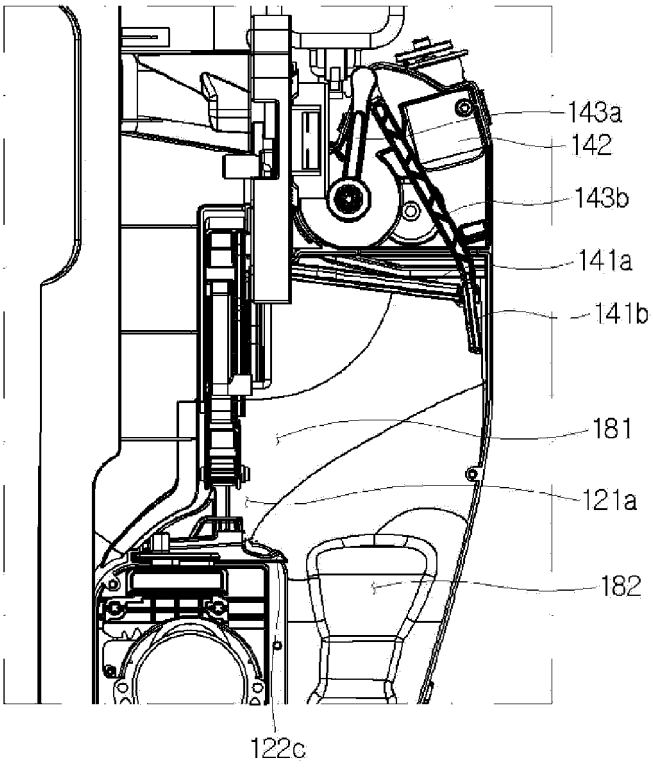
[FIG. 9]


124
131 121
141
126
135
131
122
136

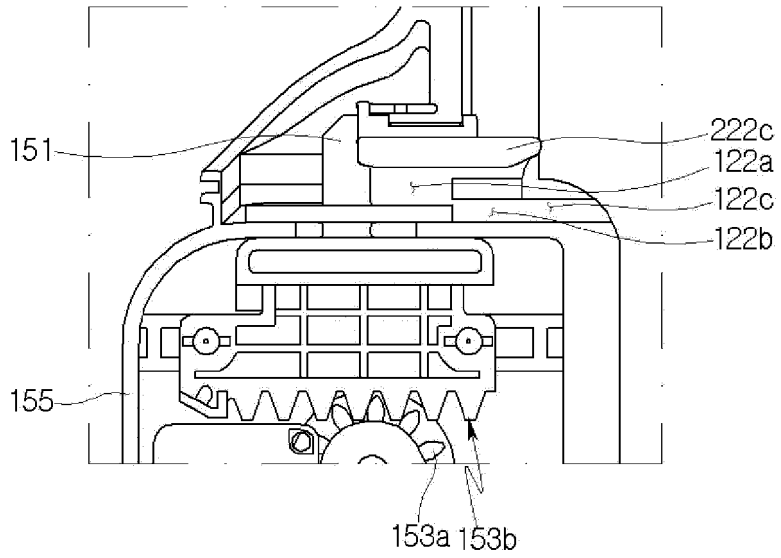
[FIG. 10]


142
143a
143
143b
141

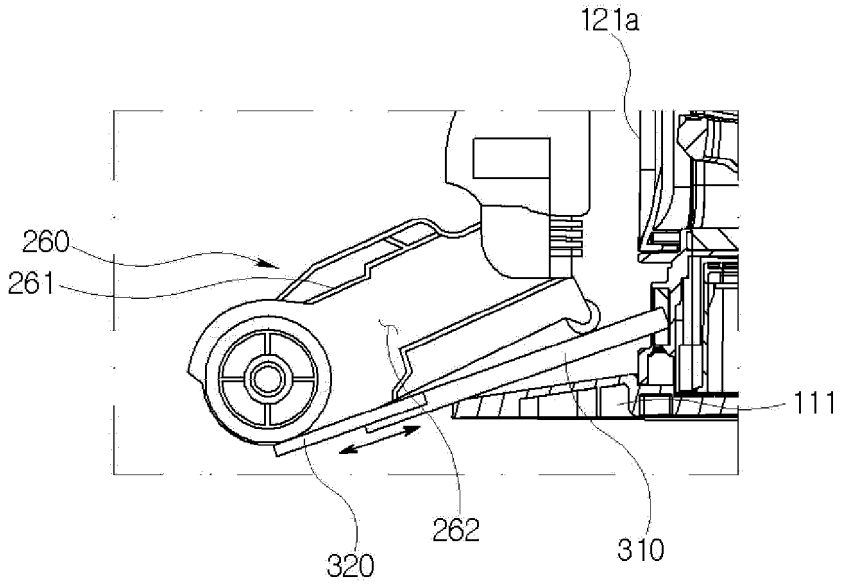
[FIG. 11]


143a
142
143b
141a
141b
181
121a
182
122c

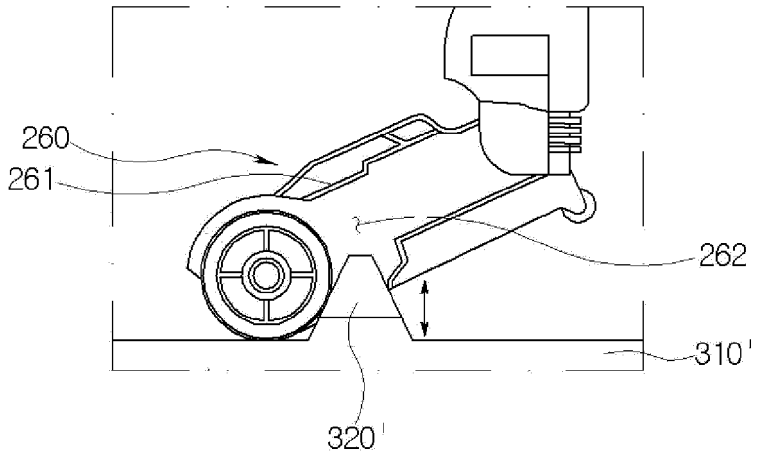
[FIG. 12]


151
222c
122a
122c
122b
155
153a
153b

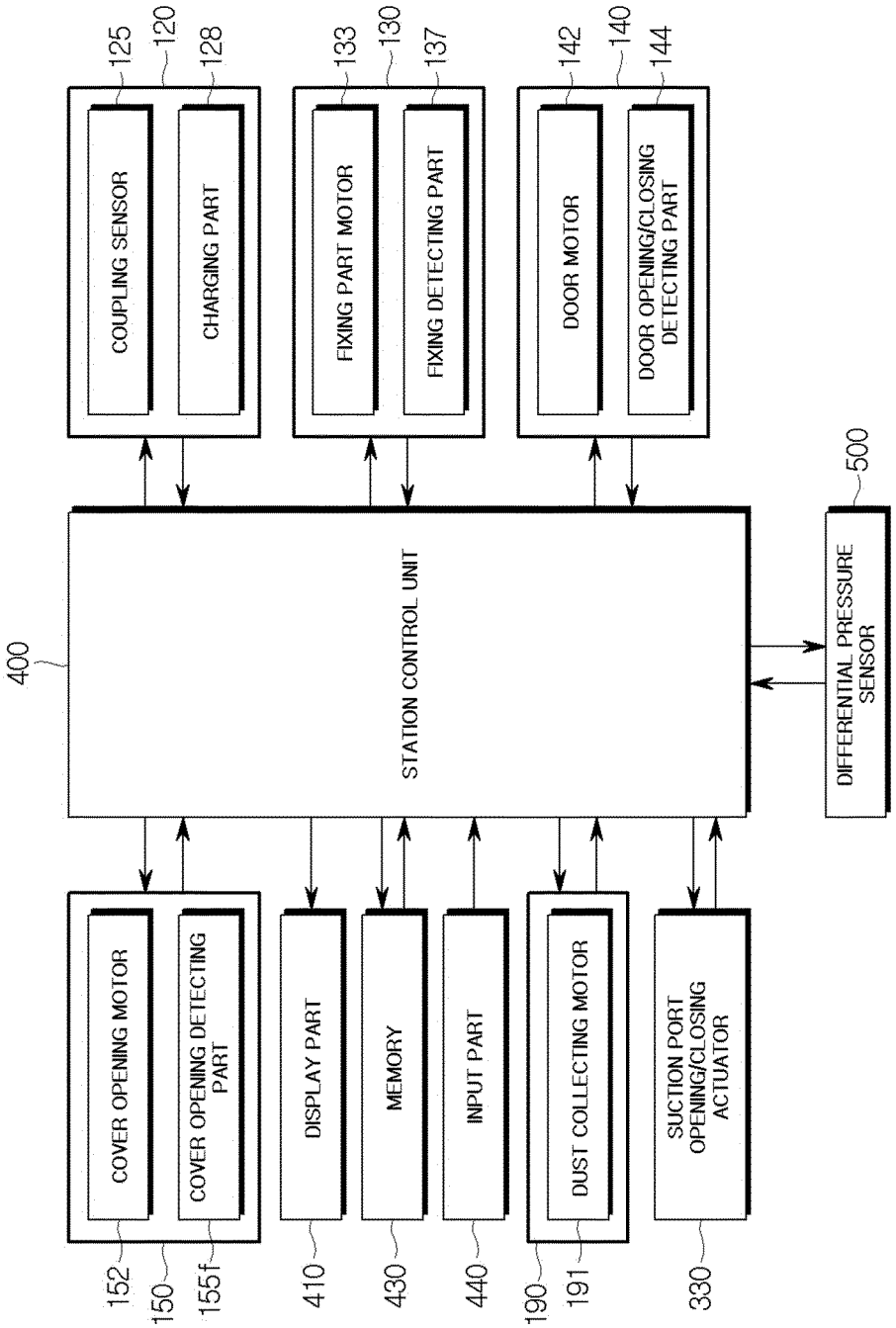
[FIG. 13]


121a
260
261
111
262
320
310

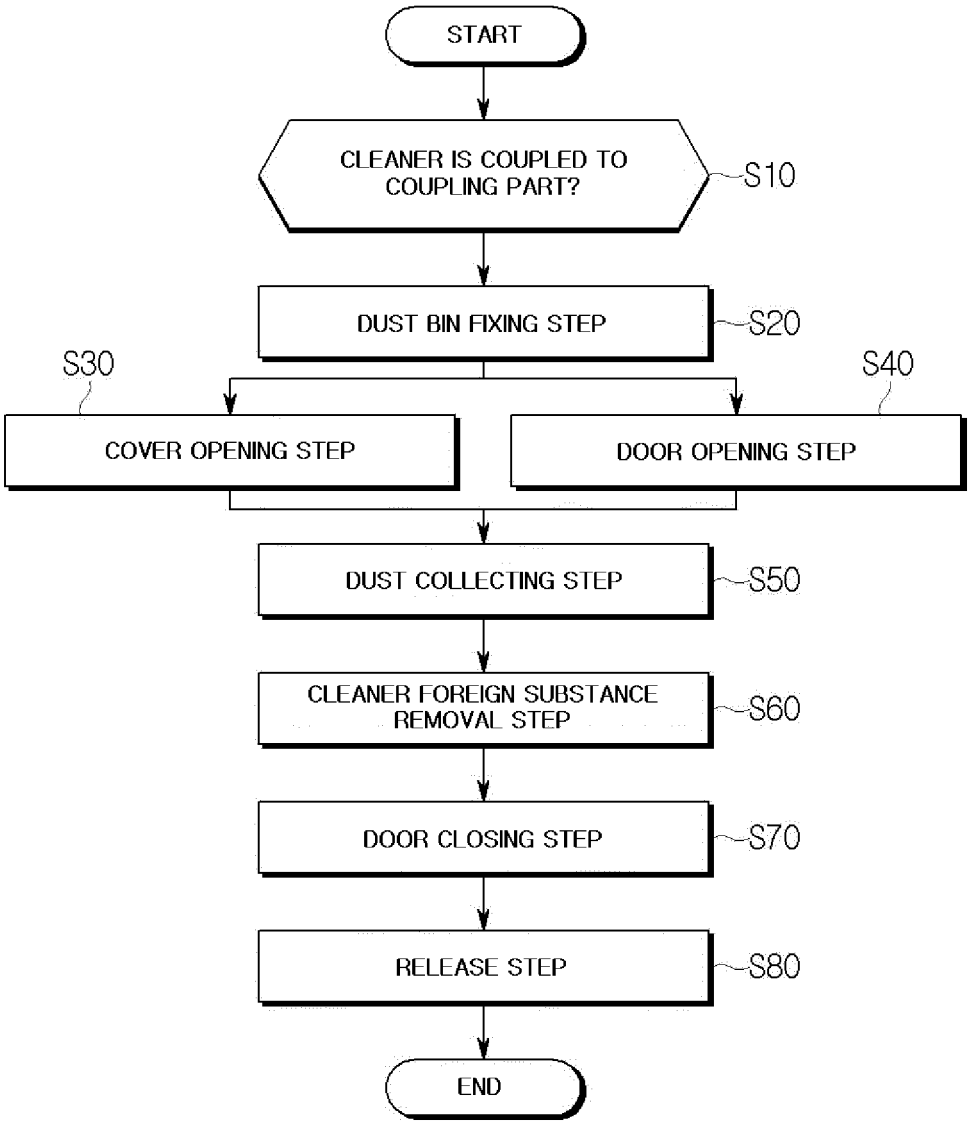
[FIG. 14]



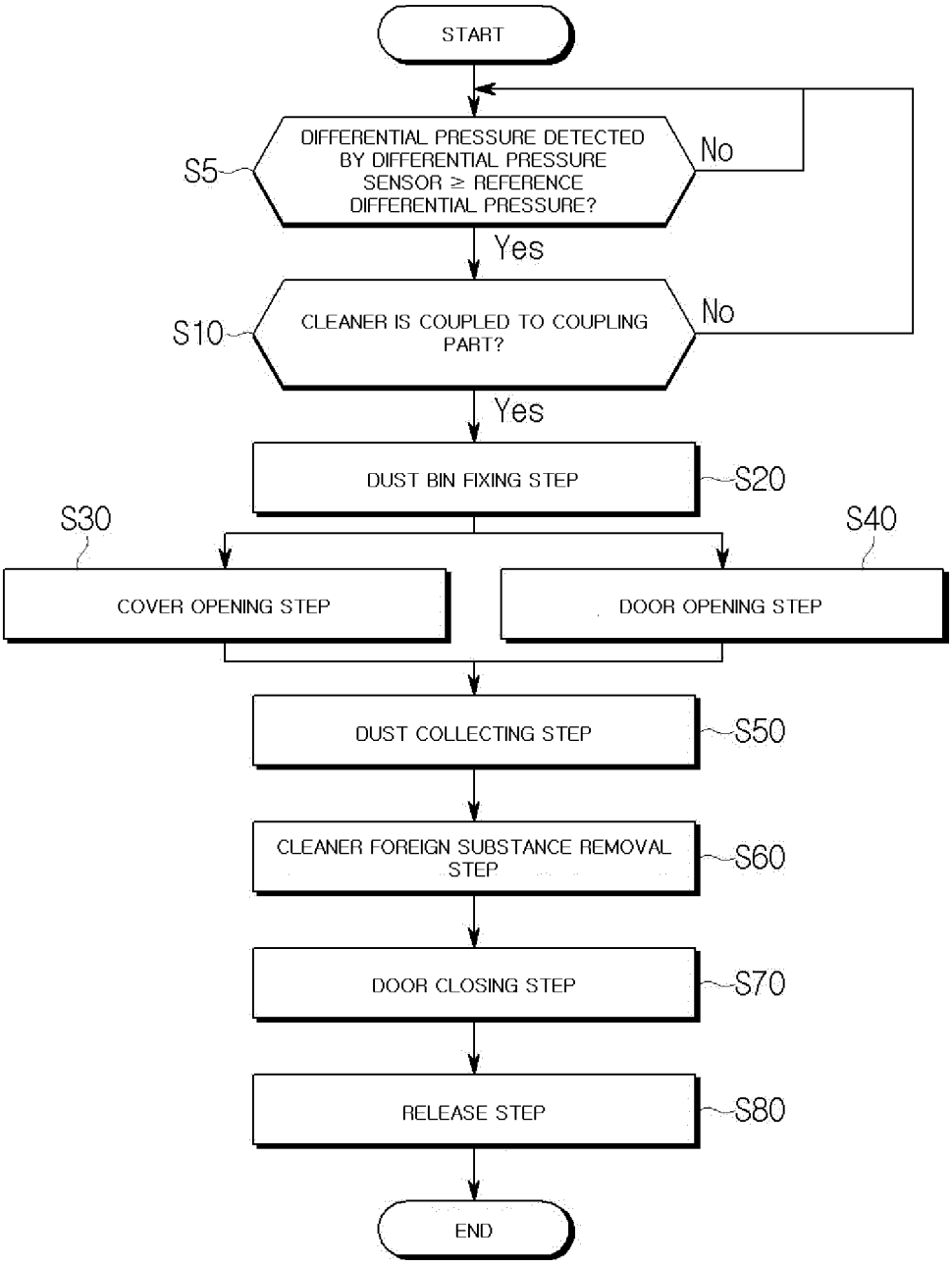
[FIG. 15]


400
STATION CONTROL UNIT
500
DIFFERENTIAL PRESSURE SENSOR
125
120
128
COUPLING SENSOR
CHARGING PART
133
130
137
FIXING PART MOTOR
FIXING DETECTING PART
142
140
144
DOOR MOTOR
DOOR OPENING/CLOSING DETECTING PART
152
150
155f
COVER OPENING MOTOR
COVER OPENING DETECTING PART
410
DISPLAY PART
430
MEMORY
440
INPUT PART
190
191
DUST COLLECTING MOTOR
330
SUCTION PORT OPENING/CLOSING ACTUATOR

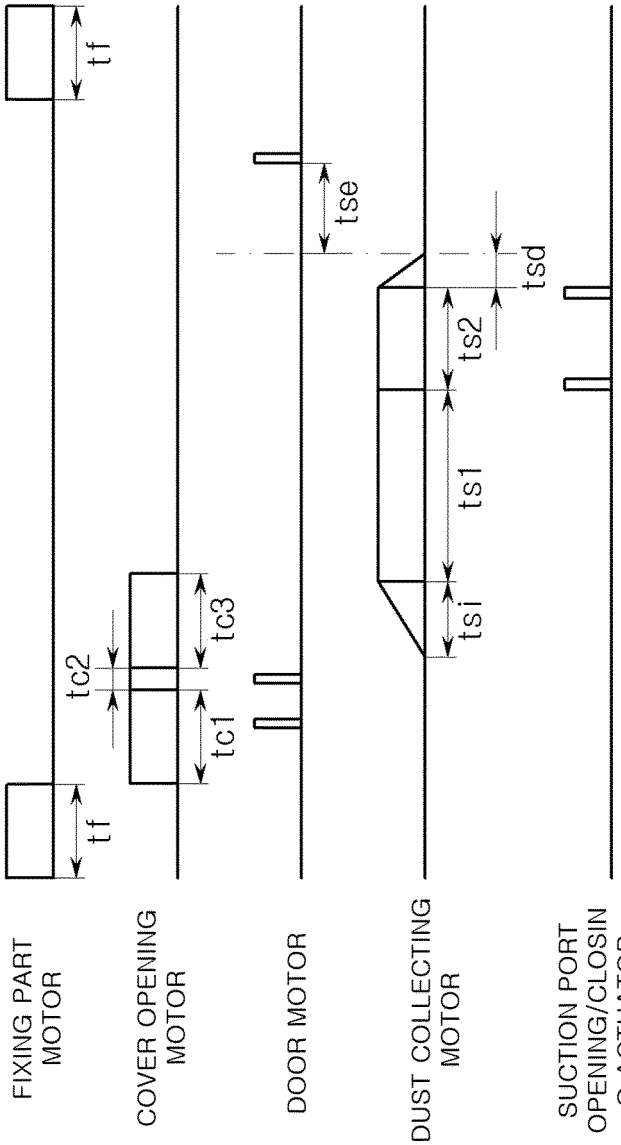
[FIG. 16]


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
CLEANER FOREIGN SUBSTANCE REMOVAL STEP
S60
DOOR CLOSING STEP
S70
RELEASE STEP
S80
END

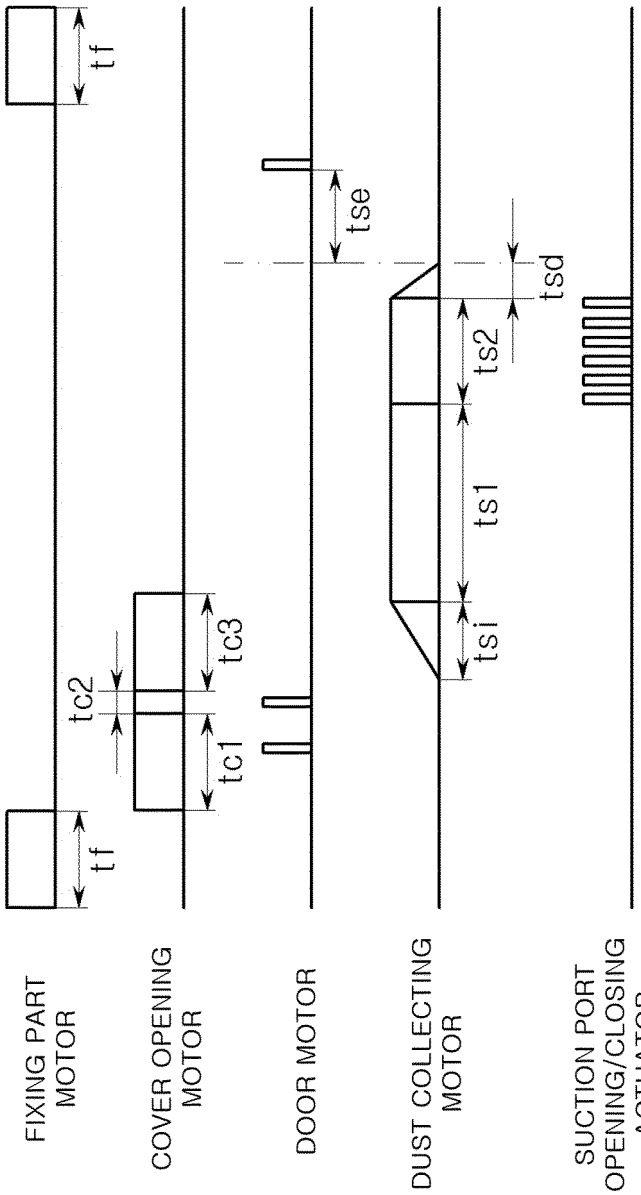
[FIG. 17]


START
S5
DIFFERENTIAL PRESSURE DETECTED BY DIFFERENTIAL PRESSURE SENSOR ≥ REFERENCE DIFFERENTIAL PRESSURE?
No
Yes
S10
CLEANER IS COUPLED TO COUPLING PART?
No
Yes
DUST BIN FIXING STEP
S20
S30
S40
COVER OPENING STEP
DOOR OPENING STEP
DUST COLLECTING STEP
S50
CLEANER FOREIGN SUBSTANCE REMOVAL STEP
S60
DOOR CLOSING STEP
S70
RELEASE STEP
S80
END

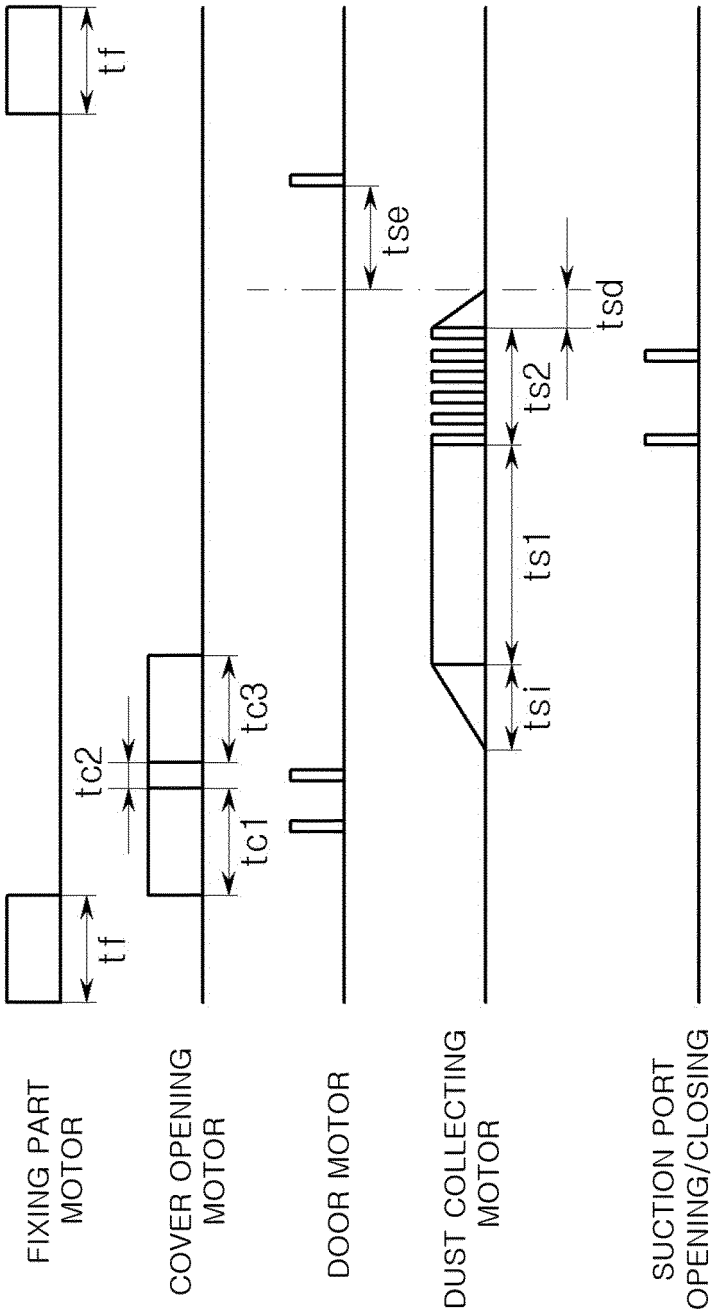
[FIG. 18]


tf
tf
tc2
tc3
tc1
tse
tsd
ts2
ts1
tsi
FIXING PART MOTOR
COVER OPENING MOTOR
DOOR MOTOR
DUST COLLECTING MOTOR
SUCTION PORT OPENING/CLOSIN G ACTUATOR

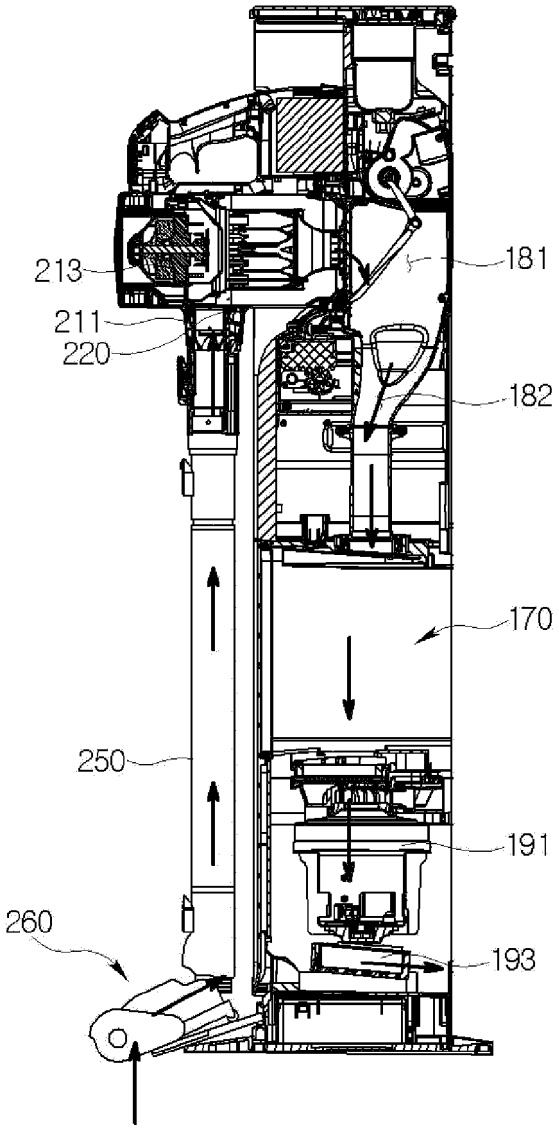
[FIG. 19]


tf
tc2
tc3
tc1
tf
tse
tsd
ts2
ts1
tsi
FIXING PART MOTOR
COVER OPENING MOTOR
DOOR MOTOR
DUST COLLECTING MOTOR
SUCTION PORT OPENING/CLOSING ACTUATOR

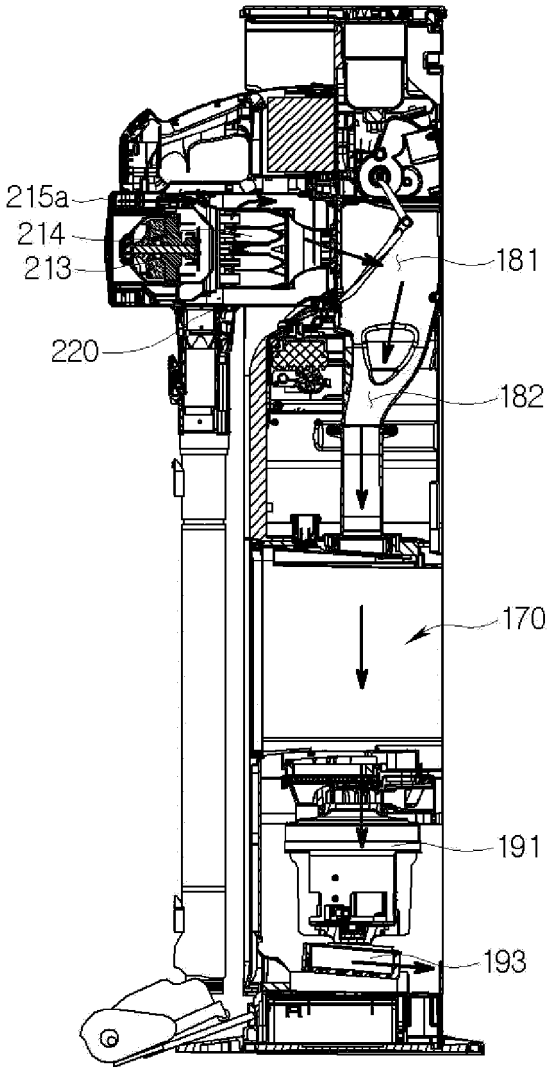
[FIG. 20]


tf
tf
tc2
tc3
tc1
tse
tsd
ts2
ts1
tsi
FIXING PART MOTOR
COVER OPENING MOTOR
DOOR MOTOR
DUST COLLECTING MOTOR
SUCTION PORT OPENING/CLOSING ACTUATOR

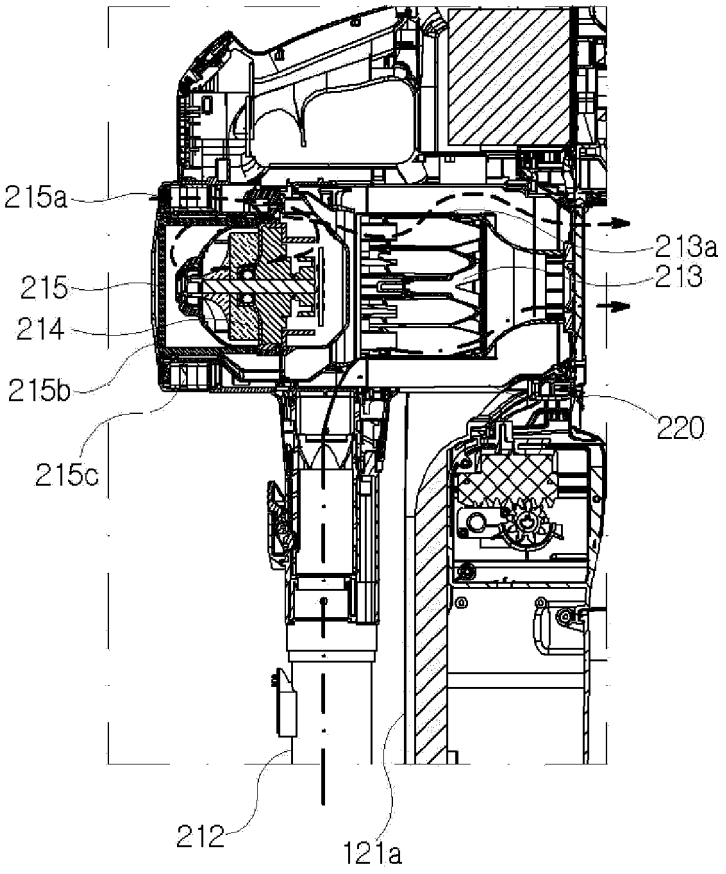
[FIG. 21]



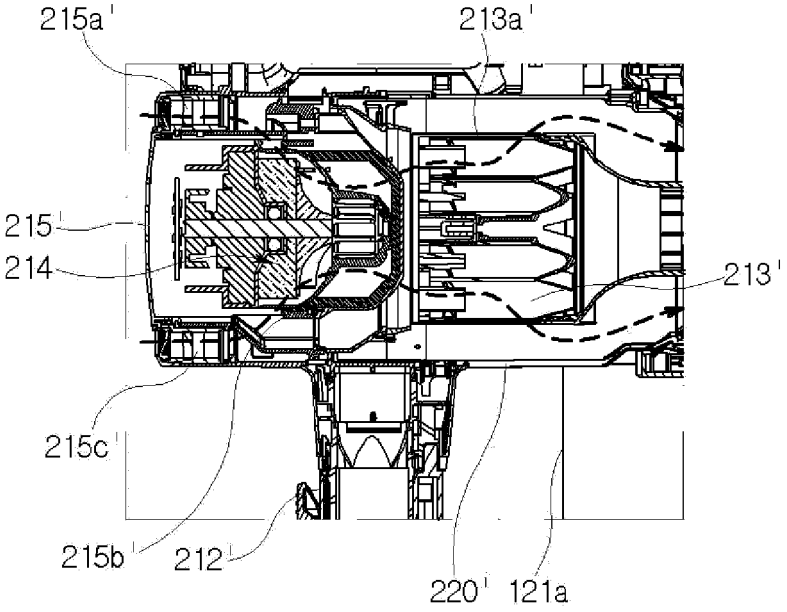
[FIG. 22]



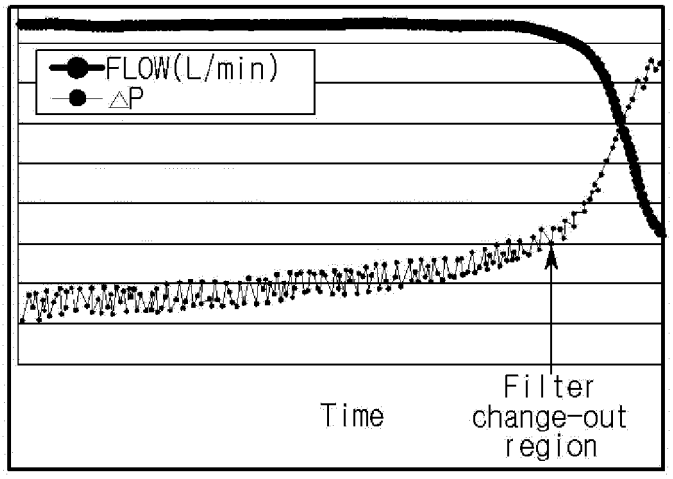
[FIG. 23]



[FIG. 24]


215a'
213a'
215'
214
213'
215c'
215b'
212'
220'
121a

[FIG. 25]


FLOW(L/min)
△P
Time
Filter
change-out
region

INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2022/019424

A. CLASSIFICATION OF SUBJECT MATTER

A47L 9/20(2006.01)i; **A47L 9/10**(2006.01)i; **A47L 9/28**(2006.01)i; **A47L 7/00**(2006.01)i

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A47L 9/20(2006.01); A47L 5/28(2006.01); A47L 9/00(2006.01); A47L 9/10(2006.01); A47L 9/19(2006.01); A47L 9/28(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: 진공청소기(vacuum cleaner), 스테이션(station), 차압(differential pressure), 프리필터(prefilter), 차단(block), 셔터(shutter)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 2020-142073 A (VORWERK & CO. INTERHOLDING GMBH) 10 September 2020 (2020-09-10) See paragraphs [0029]-[0034] and figures 1-2.	1,4,8-9
Y		2-3,5-7,10-14
Y	JP 2016-116850 A (VORWERK & CO. INTERHOLDING GMBH) 30 June 2016 (2016-06-30) See paragraphs [0029]-[0037] and [0041] and figures 5-11.	2-3,5-7,10-14
A	JP 2021-506540 A (HILTI AKTIENGESELLSCHAFT) 22 February 2021 (2021-02-22) See paragraph [0023], claim 1 and figures 1-2.	1-14
A	JP 2008-206981 A (PANASONIC CORP. OF NORTH AMERICA) 11 September 2008 (2008-09-11) See paragraphs [0017]-[0023] and figures 1-4.	1-14
A	KR 10-1151132 B1 (ETWO CO., LTD.) 01 June 2012 (2012-06-01) See claim 10 and figure 3.	1-14

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

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"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
15 March 2023	**15 March 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
Information on patent family members

International application No.
PCT/KR2022/019424

Patent document cited in search report			Publication date (day/month/year)	Patent family member(s)			Publication date (day/month/year)
JP	2020-142073	A	10 September 2020	CN	111657785	A	15 September 2020
				CN	111657785	B	08 November 2022
				DE	102019105936	A1	10 September 2020
				EP	3705010	A1	09 September 2020
				EP	3705010	B1	24 November 2021
				ES	2904495	T3	05 April 2022
				TW	202038842	A	01 November 2020
				US	11357373	B2	14 June 2022
				US	2020-0281428	A1	10 September 2020
JP	2016-116850	A	30 June 2016	CN	105708389	A	29 June 2016
				CN	105708389	B	30 July 2019
				DE	102014119191	A1	23 June 2016
				EP	3033982	A1	22 June 2016
				EP	3033982	B1	03 April 2019
				EP	3517012	A1	31 July 2019
				EP	3517012	B1	18 May 2022
				ES	2728661	T3	28 October 2019
				ES	2919565	T3	27 July 2022
				JP	6726453	B2	22 July 2020
				TW	201633985	A	01 October 2016
				TW	I685324	B	21 February 2020
JP	2021-506540	A	22 February 2021	CN	111315274	A	19 June 2020
				CN	111315274	B	09 July 2021
				DK	3727120	T3	21 June 2021
				EP	3498142	A1	19 June 2019
				EP	3727120	A1	28 October 2020
				EP	3727120	B1	07 April 2021
				JP	6969016	B2	24 November 2021
				US	11564543	B2	31 January 2023
				US	2021-0212540	A1	15 July 2021
				WO	2019-120809	A1	27 June 2019
JP	2008-206981	A	11 September 2008	CA	2619128	A1	23 August 2008
				JP	4792476	B2	12 October 2011
				MX	2008002094	A	25 February 2009
				US	2008-0201898	A1	28 August 2008
KR	10-1151132	B1	01 June 2012	KR	10-2011-0088244	A	03 August 2011

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- KR 101151132 **[0012]**
- KR 1020200074001 **[0015] [0016] [0018]**