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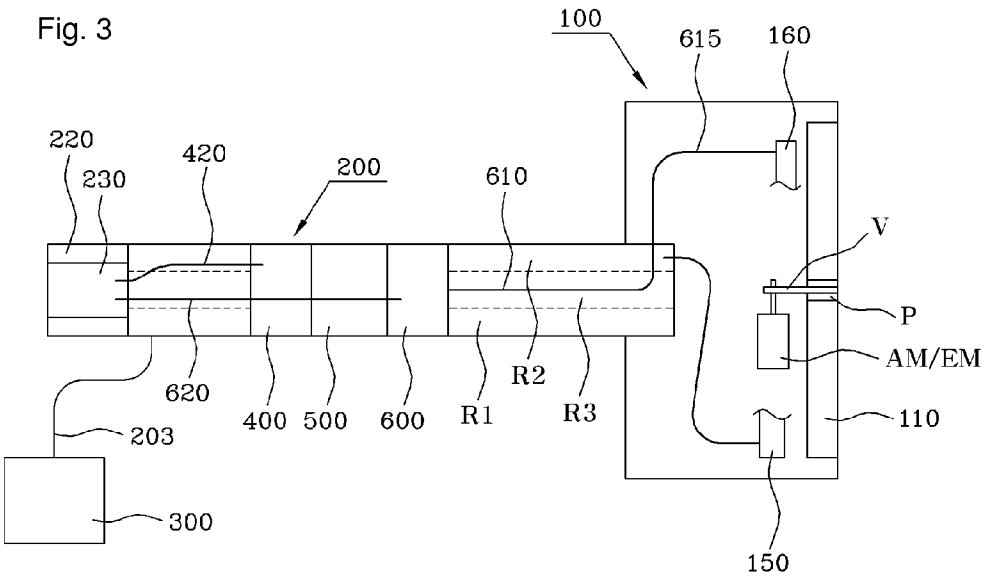
(54) **Title:** CLEANER WITH A WET FLOORCLOTH

Fig. 3



(57) **Abstract:** A cleaner capable of implementing cleaning while forcibly sucking air, the cleaner including a body having a rotating floorcloth, an operation rod with an end connected with the body and another end formed with a grip, and a suction unit sucking air, wherein air and dirt (a mixture of water, particulate material such as dust particles or the like, and hair and the like) are sucked, via the operation rod, from the floorcloth towards a suction barrel, which is coupled onto the operation rod, the air and dirt being separated while passing through a separation plate serving as a filter, the separated dirt flowing downwards and being collected into a water supply container having a water storage, and the water contained in the water storage being dropped into an auxiliary water storage, so that, when external air is introduced into the auxiliary water storage by operation of a lever, the water flows to the floorcloth along a discharge pipe, regulating water supply and removing even fine dust particles from the air.

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Description

CLEANER WITH A WET FLOORCLOTH

Technical Field

[1] The present invention relates to a cleaner, and more particularly, to a cleaner which can suck various foreign materials such as hair, dust, etc., which fall on the floor, together with water, by using a wet floorcloth while vacuuming them, and then separately disposing of dirt and air.

Background Art

[2] Vacuum cleaners, being on of the necessities of life, are extensively used in most houses. The use of vacuum cleaners enables the collection and removal of dust, hair, fine particles, or the like, which fall on the floor, in a faster, more efficient manner. However, most vacuum cleaners separate the sucked foreign matter from air by using a filter. Thus, the performance of the filter is regarded as important in the performance of the vacuum cleaner. However, although being of excellent performance, such a filter still has a limited ability to filter fine dust particles. Because of this, fine dust particles which are sucked in the cleaner are not filtered by the filter but are discharged again into the atmosphere so as to exert a bad influence upon the user's health. Meanwhile, if a user intends to employ a good quality filter, the manufacturing costs rise so as to problematically degrade the merchantability.

[3] In cleaning the floor, a room or an office, generally dust particles are first removed by a vacuum cleaner and then the floor is wiped with a wet floorcloth. That is, the cleaning is conducted in two steps. To solve this inconvenience, a combination type cleaner capable of both sucking dust particles or the like and wiping the floor with a wet floorcloth has been developed. In addition, a steaming cleaner also has been distributed, and it is true that a cleaner in which a steaming function is combined with a washing function or a vacuuming function has also been developed.

[4] Vacuum cleaners having a washing function according to the prior art will be described as follows.

[5] Korean Utility Model Application No. 1992-0014002 entitled "Water supplying device for a vacuum cleaner having a floorcloth" (hereinafter referred to as the first prior technology) is schematically illustrated in FIG. 1.

[6] As illustrated in the figure, the first prior technology includes a main body 1 generating suction power, a suction member 6 sucking dust or dirt particles, a floorcloth member 7 mounted under the suction member so as to carry out wet-wiping, a pump for supplying cleaning water by force to the floorcloth member 7, a check valve 10 capable of cutting off the water supply to the floorcloth member, a water

reservoir 11 storing water therein, a water supply pipe 12 connected with the pump, and a reservoir support 13, whereby cleaning is carried out while supplying the cleaning water to the floorcloth member 7 using the pumping operation of the pump 8.

[7] In the first prior technology, the operation is carried out such that, as the suction member 6 moves around, the floorcloth member 7 wipes the floor with water, contaminated water created by the wiping is sucked inside of the main body 1, and the floorcloth member is washed using supplied cleaning water.

[8] However, since the floorcloth member 7 continuously comes in contact with the floor, and thus it is always stained with dirt, it has a problem because, although the contaminated water is sucked inside of the main body 1, the floorcloth member wipes the floor in a state of being not sufficiently washed itself. Further, since the contaminated water is sucked via an extension pipe 5, a connection pipe 4, and a suction hose extending inside of the main body 1, a flowing path of the contaminated water is so long that the inside thereof is not easily cleaned, possibly gathering mold, which is not sanitary. Particularly, if the contaminated water is supplied to the corrugated suction hose 3, it may remain thereon, making it impossible to clean the corrugated suction hose. Further, in order to discharge the collected contaminated water, the main body has to be opened, resulting in causing inconvenience in use.

[9] As a further prior technology, Korean Patent Application No. 2005-0022924 entitled "Dust-collecting Unit of Vacuum Cleaner capable of doing washing with water" (hereinafter referred to as the second prior technology) disclosed a vacuum cleaner which is illustrated in the exploded perspective view of FIG. 2.

[10] As shown in the figure, the second prior technology includes a suction nozzle 100 sucking foreign matter from the floor, an extension pipe 200, a suction hose 300, and a main body 400, wherein the foreign matter is sucked via the suction nozzle 100 while washing water mixed with a detergent is sprayed out via a water-flowing pipe 110 connected with a water tank 410 containing washing water.

[11] In the second prior technology, after cleaning, the sprayed washing water is sucked again to an inside of the main body 400 together with the air, and is then separated from the air. Particularly, the separation in the main body occurring between air and washing water is implemented in a cyclone manner.

[12] Also in the second prior technology, since the contaminated water and various kinds of dirt are sucked inside of the main body 400 together with air after cleaning, and then are separated in a complex cyclone manner, the suction hose or the like may be easily contaminated, and the efficiency of cleaning with water is low.

[13] Further, if the contaminated water, dirt and air flow into the main body (where an electric motor or the like is operated via a power supply), electrical hazards may happen owing to the leakage of water and also it is not easy to clean there. Further,

since it needs a diversity of filters or a cyclone device for separating the contaminated water and dirt from air, the cleaner may become costly, complicated, and faulty.

Disclosure of Invention

Technical Problem

[14] The present invention has been made to solve the foregoing problems with the prior art, and therefore an object of the present invention is to provide a new conceptual cleaner with a wet floorcloth which can be purchased at a cheap price and which can conveniently and efficiently carry out cleaning, as well as being able to utilize a main body of an existing vacuum cleaner.

[15] Another object of the present invention is to provide a cleaner using a rotating floorcloth so as to immediately remove contaminants (contaminated water and various kinds of dirt) absorbed by the floorcloth through absorption, thereby implementing cleaning with the wet floorcloth which is always maintained in a clean state.

[16] A further object of the present invention is to provide a cleaner in which a floorcloth is forcibly rotated by an air motor or an electric motor, so that, even if a user does not press the cleaner downwards, the floor can be well cleaned by the weight of the cleaner alone in combination with the rotating force of the floorcloth.

[17] A further object of the present invention is to provide a cleaner with a wet floorcloth capable of, unlike the prior art, effectively separating air and dirt without using a separate, special filter.

[18] A further object of the present invention is to provide a cleaner with a wet floorcloth which is safe to electrical hazards despite using water.

Technical Solution

[19] In order to accomplish the above objects of the present invention, according to an aspect of the present invention, there is provided a cleaner capable of implementing cleaning while forcibly sucking air, the cleaner including a body having a rotating floorcloth, an operation rod with an end connected with the body and another end formed with a grip, and a suction unit sucking air, wherein air and dirt (a mixture of water, particulate materials such as dust particles or the like, and hair or the like) are sucked, via the operation rod, from the floorcloth towards a suction barrel, which is coupled onto the operation rod, the air and dirt are separated while passing through a separation plate serving as a filter, the separated dirt flows downwards and is collected into a water supply container having a water storage, and the water contained in the water storage is dropped into an auxiliary water storage, so that, when external air is introduced into the auxiliary water storage by operation of a lever, the water flows to the floorcloth along a discharge pipe, regulating water supply and removing even fine dust particles from the air.

[20] In an embodiment, the lever is disposed adjacent to the grip and is connected with a switching valve installed in a switching chamber provided at an end of the operation rod, so as to, upon manipulation, allow first and second pressure pipes to communicate with each other, or otherwise allow external air to be supplied towards only the second pressure pipe, the first and second pressure pipes extending from the switching chamber towards the suction barrel and the auxiliary water storage, respectively.

[21] In an embodiment, the first pressure pipe is connected, at its end, with a pathway, through which air is sucked from the suction barrel by means of the suction unit, so that the first pressure pipe is applied with a suction force, and that, when the first pressure pipe communicates with the second pressure pipe by the operation of the switching valve, the suction force is applied to the second pressure pipe together with to the first pressure pipe, so that the suction barrel and the auxiliary water storage have the same internal pressure.

[22] In an embodiment, the water supply container is detachably connected onto the operation rod between the suction barrel and the auxiliary water storage so as to collect the dirt flowing down from the suction barrel and allow the water in the water storage to be supplied to the auxiliary water storage.

[23] In an embodiment, the water storage is composed of a flexible material such as vinyl so that, as water is discharged out towards the auxiliary water storage, its volume decreases so as to secure a space for storing dirt flowing down from the suction barrel towards the water supply container.

[24] In an embodiment, the auxiliary water storage is provided with a connection pin connected with a lower portion of the water supply container, wherein a first valve is connected to a lower end of the connection pin so as to open and close depending upon variance in pressure of the auxiliary water storage.

[25] In an embodiment, the discharge pipe extending from the auxiliary water storage towards the floorcloth is connected with a plurality of branch pipes, which is coupled with dispersion nozzles coming into contact with the floorcloth, so as to supply and disperse water uniformly over the floorcloth.

[26] In an embodiment, the dispersion nozzle is provided with an adsorption fabric such as a nonwoven fabric on a surface facing the floorcloth so as to transfer the supplied water to the floorcloth.

[27] In an embodiment, the dispersion nozzle is connected with a bottom of the body via a spring so as to come into contact with the floorcloth.

[28] In an embodiment, the floorcloth is of a cylindrical shape and is rotated by an electric motor or an air motor.

[29] In an embodiment, the floorcloth includes a shaft having a pulley on its end in order to receive a rotating force from the electric motor or the air motor, a hollow core into

which the shaft is fixedly inserted and which has a plurality of through-holes on the circumference, and a cloth member provided so as to cover the circumference of the core.

[30] In an embodiment, a flared skirt shaped pipe is installed in the body, the flared skirt shaped pipe being configured such that an end is connected with the operation rod so as to apply a suction force therethrough, and another end is formed with a flared skirt to cover the overall width of the floorcloth while coming into contact with the same, so as to suck the dirt from the floorcloth, allowing the same to move towards the suction barrel.

[31] In an embodiment, the suction unit is either integrally combined with the operation rod, or separately connected with the operation rod via a flexible corrugated pipe, so as to apply a suction force.

[32] In an embodiment, when the air motor is used for rotating the floorcloth, the operation rod is configured to include a driving pathway for the air motor, which is formed by a plurality of dividers provided in the operation rod, and an auxiliary pathway through a side of a bracket connecting the operation rod and the body in a manner that the pathways are connected with a fan of the air motor so as to allow the air motor to be driven by a portion of the suction force created by the suction unit.

[33] In an embodiment, when the air motor is used to rotate the floorcloth, the cleaner is further provided with a silencer for reducing noise from the air motor.

[34] In an embodiment, the discharge pipe is connected with a second valve such that it opens only when the external air is supplied to the auxiliary water storage.

[35] In an embodiment, the discharge pipe is connected with a manual shutoff valve next to the second valve such that an upper end thereof protrudes towards an upper portion of the body.

[36] In an embodiment, the suction barrel includes a dispersion plate which is spaced apart from an upper surface of the suction barrel and a side having a suction hole, and has an upper face on which a plurality of holes is uniformly provided so as to uniformly disperse the suction force exerted on the separation plate, allowing the air and dirt to be efficiently separated by the separation plate.

[37] In an embodiment, the bottom of the body includes an individual auxiliary plate, to which the operation rod is connected, in such a way that the bottom and the auxiliary plate are interconnected by means of a pivot pin such that the auxiliary plate is pivoted about the bottom, the auxiliary plate being provided, on its underside, with a plurality of rolling wheels.

[38] In an embodiment, the suction barrel is configured so as to vertically move along the operation rod so that upon attaching and detaching of the water supply container, a sufficient distance is formed between the suction barrel and the auxiliary water storage.

[39] In an embodiment, the water supply container is further provided with a handgrip, and has a hook for engagement with the suction barrel.

[40] In an embodiment, the separation plate is composed of a pair of upper and lower separable sections, which are coupled together, and is provided with a plurality of dividers which upon assembly, forms a complex internal space via a crossed arrangement so that the volume of the space increases as it goes outwards so as to both allow air flow to become slower and increase the number of particles of dirt mixed with air, separating the air and dirt from each other.

Advantageous Effects

[41] As set forth above, the cleaner with the wet floorcloth according to the present invention provides the effects in that it can be used economically and efficiently since it is used in combination with an existing conventional vacuum cleaner. Further, it can also prevent a safety accident such as electrical hazards caused by the use of water.

[42] Further, it can effectively separate air and dirt without using a high-cost filter, minimizing fine dusts contained in air to the maximum.

[43] Further, since the cylindrical rotating floorcloth rotates in a state of coming into contact with the floor, the floor cleaning is possible without exerting great power. It also has excellent performance in a sanitary aspect since dirt is immediately absorbed in the rotating floorcloth and then separated therefrom, maintaining the floorcloth in an always-clean state.

[44] Further, since if needed, water, a mixture of water and a detergent, or a mixture of water and a disinfectant is selectively stored in the water storage, which in turn is simply assembled into the cleaner, the cleaner is used conveniently, and a skin disease such as atopy may be prevented. That is, the cleaner can efficiently remove a microbe parasitic on the floor, such as a tick, or dead body thereof, which is one of the primary factors causing the skin disease, e.g. atopy.

[45] Further, since the cleaner can use hot water while pouring it in the water storage, the cleaner can also provide a steaming function without separately adding such a function.

Brief Description of Drawings

[46] FIG. 1 is a schematic perspective view of a cleaner according to the first prior art;

[47] FIG. 2 is a perspective view of a cleaner according to the second prior art;

[48] FIG. 3 is a schematic perspective view of a cleaner with a wet floorcloth according to the present invention;

[49] FIG. 4 is a perspective view illustrating a cleaner according to a first embodiment of the present invention;

[50] FIG. 5 is a partial perspective view illustrating the internal construction of a body of

the cleaner of the first embodiment;

[51] FIG. 6 is a side cross-sectional view of the body;

[52] FIG. 7 is a perspective view of a flared skirt of the cleaner;

[53] FIG. 8 is a partial perspective view illustrating a connection structure between a switching valve and first and second pressure pipes of the cleaner;

[54] FIG. 9 is an exploded perspective view of the switching valve;

[55] FIG. 10 is a partial perspective view illustrating the connection state between the second pressure pipe and an external air inlet when a valve disc of the switching valve is retracted;

[56] FIG. 11 is a partial cross-sectional view illustrating a general structure of a suction barrel attached onto an operation rod;

[57] FIG. 12 is an exploded perspective view of a separation plate of the cleaner;

[58] FIG. 13 is a partial perspective view illustrating an installation structure of a water supply container;

[59] FIG. 14 is a schematic perspective view of the water supply container;

[60] FIG. 15 is a cross-sectional view illustrating the assembled state between the suction barrel and the water supply container;

[61] FIG. 16 is a partial cross-sectional view of auxiliary water storage;

[62] FIG. 17 is a perspective view illustrating a cleaner with a wet floorcloth according to a second embodiment of the invention; and

[63] FIG. 18 is a view illustrating the internal construction of a body of the cleaner of the second embodiment.

[64] <Description of Reference Numerals in the Drawings>

[65] 100: Body 110: Floorcloth

[66] 110a: Shaft 110b: Core

[67] 110c: Cloth Member 111: Hole

[68] 120: Fixing Arm 150: Flared Skirt

[69] 151: Support Block 152: Auxiliary Connection Pipe

[70] 152a: Circular Holder 160: Dispersion Nozzle

[71] 170: Rolling Wheel 200: Operation Rod

[72] 201: Grip 202: Lever

[73] 203: Flexible Corrugated Tube 204: Guide Protrusion

[74] 205: Engaging Groove 210: Outlet For Air and Dirt

[75] 300: Suction Unit 400: Suction Barrel

[76] 410: Separation Plate 420: First Pressure Pipe

[77] 430: Dispersion Plate 412: Inlet For Air and Dirt

[78] 500: Water Supply Container 510: Outer Case

[79] 520: Water Storage 530: Handgrip

[80] 540: Engaging Bar 600: Auxiliary Water Storage

[81] 610: Discharge Pipe 620: Second Pressure Pipe

[82] AM: Air Motor EM: Electric Motor

[83] V: Belt P: Pulley

[84] C: Cover BP: Bottom Plate

[85] BP-1: Auxiliary Bottom Plate B: Bracket

[86] R1: Pathway For Driving Air Motor

[87] R2: Dirt-Collecting Pathway

[88] R3: Pathway For Discharge pipe

[89] SR1: Auxiliary Pathway

[90] CV1: First Valve CV2: Second Valve

[91] MV: Manual Shutoff Valve

Best Mode for Carrying out the Invention

[92] Reference will now be made in greater detail to a preferred embodiment of the invention, an example of which is illustrated in the accompanying drawings. Herein, since the accompanying drawings are provided in order to assist to allow the technical spirit of the present invention to be easily understood, the scope of the present invention is not limited thereto. Thus, it should be understood that the embodiments such as simple structural modification, addition, removal, or equivalent substitution within the scope of the technical spirit of the invention that is defined by the accompanying claims are also included in the scope of the present invention.

[93] Prior to description of the exemplary embodiments of the invention, the general concept of the invention will be described. FIG. 3 is a schematic perspective view of a cleaner with a wet floorcloth according to the present invention.

[94] The cleaner generally includes a body 100, an operation rod 200, and a suction unit 300. The suction unit may be provided in the operation rod in an integral or individual fashion. That is, it can be understood that the suction unit creates a suction force through the rotation of a suction fan via power supply. Thus, the suction unit may also be constructed by utilizing a main body (where a suction fan is arranged) of a conventional vacuum cleaner, which is connected with the operation rod.

[95] The portion called the body 100 means a portion on which a floorcloth 110 is mounted and which comes into contact with the ground. The operation rod 200 is rotatably connected to a rear portion of the body 100. An upper portion of the operation rod 200 is formed with a grip 201, so that while a user holds the grip 201 and pushes or pulls the cleaner, the body 100 moves around the floor to clean the same.

[96] The floorcloth 110 installed on the body 100 can be rotated using an air motor AM or an electric motor EM which is provided in the body. Alternatively, it is possible that

without using the air motor AM or the electric motor EM, the floorcloth 110 rolls on the floor by itself when coming into contact with the same. Of course, although cleaning through forcible rotation of the floorcloth by the air motor or the electric motor is advantageous in terms of the efficiency of cleaning, cleaning through simple rotation of the floorcloth without using the air motor or the electric motor, but by using friction with the floor, which is implemented by pushing or pulling the cleaner on the floor, is also advantageous in terms of reduction in manufacturing costs.

[97] The operation rod 200 is rotatably connected at its one end with a rear portion of the body 100, and on which a suction barrel 400, a water supply container 500, and an auxiliary water storage 600 are installed in order from upside. A discharge pipe 610 extends from the auxiliary water storage 600 towards the floorcloth 110 so that water can be supplied to the floorcloth 110. Air and dirt are forcibly sucked from the floorcloth 110 into the suction barrel 400 via the inside of the operation rod 200. Meanwhile, in case of forcibly rotating the floorcloth 110 using the air motor AM, an individual pathway R1 for driving the air motor is provided in the operation rod, and a portion of a suction force generated by the suction unit 300 is used to drive the air motor AM through the pathway.

[98] The suction force by the suction unit 300 allows air and dirt to be sucked at the same time from the floorcloth 110 into the suction barrel 400 via the operation rod 200. A pair of new conceptual separation plates 410 is provided in the suction barrel 400 as a filter, so that a mixture of dirt and air moves slowly along the operation rod 200 and is discharged into the suction barrel 400 through the separation plates 410. Herein, the dirt naturally flows down, and the air is discharged out of the suction barrel 400 along the suction force. The separation plate 410 installed in the suction barrel 400 consists of a pair of upper and lower separable sections 410a and 410b, which are coupled together. The respective upper and lower separable sections are provided with a plurality of dividers 411 which form a complex internal flowing space. When the suction force from the suction unit 300 is exerted upon the upside of the suction barrel 400, it is also exerted into the inside of the operation rod 200 via the separation plate 410, and finally upon the surface of the floorcloth 110 provided on the body 100, so that the dirt and air are forcibly moved towards the suction barrel 400. The operation rod 200 is provided with a discharge opening 210 for air and dirt at a corresponding position where the separation plate 410 is installed, so as to interconnect the inside of the operation rod 200 and the separation plate 410. The lower separable section 410b of the separation plate 410 is also provided with an opening 412 for air and dirt corresponding to the discharge opening 210.

[99] Since in the process of the mixture of the air and dirt moving along the operation rod 200 under the force of suction, even finer dust particles contained in the air are

naturally absorbed in the dirt, and after being sucked into the separation plate 410, the dirt moves out along the surface of the separation plate 410 via the internal flowing space, the volume of which increases as it goes outwards so that the suction force is dispersed, the dirt gathers and the particles thereof increase in size. By the sequential operation of this process, the air and dirt are cleanly separated from each other, and fine dust or harmful particles contained in the air are adsorbed in the gathering dirt, and then are separated. The dividers 411 provided on the respective upper and lower separable sections 401a and 410b further ensure the increase in the size of particles and the separation of dust particles or the like contained in air during the moving of the air and the dirt.

[100] The water supply container 500 of the cleaner of the present invention is configured into a dual structure in which an inner water storage 520 and an outer space provided outside of the water storage 520 are provided so that clean water or water mixed with a disinfectant or a detergent is put in the water storage 520, and the dirt separated from the air by the separation plate 410 of the suction barrel 400 flows down the walls of the suction barrel 400 and the water supply container 500 and is put in the outer space, thereby filling the water supply container 500.

[101] FIG. 14 is a perspective view illustrating the structure of the water supply container, and FIG. 15 is a schematic cross-sectional view illustrating the state in which the dirt separated by the separation plate 410 flows downwards into the water supply container 500. As illustrated, the dirt flows downwards while passing through the separation plate 410, and gathers in the water supply container 500 connected with the suction barrel 400. Particularly, since the water storage 520 is composed of a flexible material, when water is discharged into the auxiliary water storage 600, the volume thereof is reduced correspondingly so as to secure the storage space of the dirt flowing downwards from the suction barrel 400, thereby preventing the dirt from flowing downwards.

[102] After water has been discharged from the water storage 520 in the water supply container 500 into the auxiliary water storage 600, the water is selectively supplied to the floorcloth 110 along the discharge pipe 610 provided in the auxiliary water storage 600 by the operation of a lever 202 operated by a user.

[103] Reference will now be made to the exemplary embodiments illustrated in FIGS. 8 to 10. The auxiliary water storage 600 is provided with a first valve CV1, on which an opening pin 601 is provided. The water supply container 500 is provided, on its lower end, with a closing plate 521 connected with the inside of the water storage, wherein when the water supply container and the auxiliary water storage are coupled to each other, the opening pin 601 forces the closing plate 521 to be lifted. The closing plate 521 is connected with the water storage in the water supply container, so that when the

closing plate 521 is lifted, water in the water storage 520 flows towards the auxiliary water storage 600 via the first valve CV1. Before the water supply container 500 has been coupled to the auxiliary water storage 600, the first valve CV1 is maintained in a closed state. However, once they are coupled to each other, the first valve CV1 opens due to the inherent weight of the water.

[104] As illustrated in FIG. 4, since first and second pressure pipes 420 and 620 are connected with each other via a switching valve 230 in a switching chamber 220, the auxiliary water storage 600, the suction barrel 400, and the water supply container 500 all have the same internal pressure. Further, after the suction unit 300 is operated, but before the lever 202 of the switching valve has been pulled, a suction force is applied to the first pressure pipe 420, an end of which is provided at an inlet of the suction barrel 400, and the first pressure pipe 420 is connected with the second pressure pipe 620 via the switching valve 230, so that the same internal pressure as that of the suction unit is applied to the suction barrel and the auxiliary water storage 600. Thus, when the water supply container 500 is coupled to the auxiliary water storage 600, the first valve CV1 opens due to the inherent weight of the water, allowing the water to be supplied to the auxiliary water storage 600.

[105] While if the water flows from the water storage 520 to the auxiliary water storage 600, it may in turn naturally flow along the discharge pipe 610, the suction force generated in the auxiliary water storage 600 shuts off a second valve CV2 so that the water cannot flow forwards, but is collected in the auxiliary water storage 600. That is, in order to finally supply the water collected in the auxiliary water storage 600 to the floorcloth via the discharge pipe 610, an additional force is required for opening the second valve CV2. To this end, the present invention proposes a solution in that an additional separate pressure is created only in the inside of the auxiliary water storage 600 so as to open the second valve CV2. The additional pressure is created by the introduction of external air into the auxiliary water storage 600, so that the second valve CV2 is opened because of the air pressure and the inherent weight of the water.

[106] The introduction of air into the auxiliary water storage 600 is carried out via the second pressure pipe 620 in such a manner that the lever 202 connected with the switching valve 230 is pulled to disconnect the first and second pressure pipes 420 and 620 from each other so that only the second pressure pipe 620 communicates with an inlet 221 for external air, thereby allowing the external air to be introduced into the auxiliary water storage via the second pressure pipe. When the suction force by the suction unit 300 is equally exerted upon the insides of the suction barrel 400, the water supply container 500, and the auxiliary water storage 600, and then external air is supplied to only the second pressure pipe 620 through the manipulation of the switching valve 230, the suction barrel 400 and the water supply container 500 are still

applied with the same suction force, but the auxiliary water storage 600 is applied with relatively higher internal pressure through the introduction of external air, thereby allowing the first and second valves CV1 and CV2 to be closed and opened, respectively, enabling the water to be supplied to the floorcloth.

[107] As set forth before, in order to induce variance in internal pressure of the suction barrel 400 and the auxiliary water storage 600, the switching valve 230 is provided adjacent the upper portion of the operation rod 200 so that a user can easily manipulate the switching valve 230. Referring to FIGS. 8 to 10, the connection between the first and second pressure pipes 420 and 620 by means of the switching valve 230 and the connection structure between the second pressure pipe 620 and the inlet 221 for external air can be easily understood.

[108] The switching valve 230 is installed in the empty switching chamber 220, which is provided adjacent an end of the operation rod 200 where the grip 201 is formed, as shown in the figures. The switching valve 230 consists of a valve housing 230a and a valve disk 230b. The valve disk 230b is installed in the valve housing 230a such that an end thereof (the right end in the figure) extends out of the valve housing 230a, and to this end the lever 202 is connected.

[109] In structural detail, the valve housing 230a is generally shaped like a hexahedron comprising three blocks. For convenience of explanation, the three blocks are hereinafter referred to as first, second, and third blocks 231, 232, and 233, respectively. In the intermediate second block 232, the planer valve disk 230b is installed in such a manner as to be supported by a spring 's' such that upon pulling the lever 202, it is retracted, and upon removing the external force, it returns to its original position. The valve disk 230b is provided with a connection hole 234 in a width direction. The first and third blocks 231 and 233 are provided with communication holes 235 extending from the left ends thereof to the connection hole 234.

[110] The communication holes 235 of the first and third blocks 231 and 233 are respectively connected with the second and first pressure pipes 620 and 420. When the valve disk 230b advances forward to the left end in the figure in the second block 232 (i.e., in the state before the lever is not pulled), the communication holes 235 become connected together so as to communicate with each other through the connection hole 234. That is, the respective communication holes 235 are formed so as to respectively extend from the left ends of the first and third blocks 231 and 233 towards the inside of the second block 232 and respectively terminate at different positions. The two communication holes 235 are connected together at different positions through the connection hole 234.

[111] Meanwhile, the third block 233 is provided with the inlet 221 for external air, which, as viewed from the figure, extends from the front face of the third block 233 which is

near the second block 232. When the lever 202 is pulled so as to allow the valve disk 230b to be retracted rearwards, the connection hole 234 provided in the valve disk 230b is also moved so as to communicate with the second pressure pipe 640 and the inlet 221 for external air, so that the external air is supplied to the second pressure pipe 640. When the lever 202 is pulled, the first and second pressure pipes 420 and 640 are disconnected from each other, resulting in variance in pressure.

[112] Until now, the concept of the general operational principle of the cleaner according to the present invention has been described, and hereinafter on the basis of the principle, exemplary embodiments will be described in detail.

[113] <First Embodiment>

[114] The perspective view of FIG. 4 illustrates a cleaner with a wet floorcloth according to a first embodiment of the present invention.

[115] In the present embodiment, a suction unit (not shown) may be of any fashion so long as it has a conventional suction fan. Generally, a main body of a conventional household vacuum cleaner can be used as a suction unit.

[116] As illustrated in the figure, the cleaner generally includes a body 100, an operation rod 200, and a suction unit (not shown). The operation rod 200 is rotatably connected at its lower end to a rear end of the body 100. The operation rod 200 is provided with a grip 201 and a flexible corrugated pipe 203, respectively, on and adjacent to an upper portion thereof, and via this flexible corrugated pipe is the operation rod connected with the suction unit. Since the flexible corrugated tube 203 is generally of a standard dimension, that of a conventional vacuum cleaner available is preferably utilized instead of a newly fabricated corrugated tube.

[117] Respective elements of the cleaner according to the invention will now be described with reference to FIGS. 5 and 6. FIG. 5 is a partial perspective view illustrating the internal construction of the body of the cleaner of the first embodiment, and FIG. 6 is a side cross-sectional view of the body.

[118] The body 100 includes a cover C and a bottom plate BP in which a plurality of other constitutional elements is installed. In order to rotatably install the operation rod 100 onto the rear end of the body 100, the body is provided with a bracket B protruding from the bottom plate BP. On the front side of the bottom plate BP, a rotating floorcloth 110 is disposed, which in the present embodiment, is forced to rotate by means of an air motor AM. In the embodiment, in order for the floorcloth 110 to receive a rotating force from the air motor AM, a belt V and a pulley transmission unit are used.

[119] The floorcloth 110 is divided into right and left floorcloth sections each including a shaft 110a, a core 110b, and a cloth member 110c. The shaft 110a is connected with a pulley P at an end thereof which faces the adjacent shaft, and the pulley P is connected

with a rotation shaft of the air motor AM, thereby obtaining power transmission.

[120] The core 110b is a hollow body having a plurality of through-holes 111 on the circumference thereof, and is inserted into the shaft 110a and fixed thereto through a fixing nut N. The through-holes 111 are also preferably formed at a side of an end of the core 110b (near the side where the fixing nut is inserted) while passing through the circumference of the core 110b.

[121] Then, the cloth member 110c which covers the core 110b is assembled, thereby forming a single floorcloth 110. The cloth member 110c is made of material such as a non-woven fabric or another kind of known material which can hold a certain quantity of water therein. Two floorcloth sections on the left and right sides rotate at the same time while sharing the single pulley P, which is installed by means of two fixing arms 120 which are provided at the front middle portion of the bottom plate BP. The two fixing arms 120 protrude forwards from the bottom plate BP so that the pulley P is disposed between the two arms.

[122] In the present embodiment, the pulley P and the belt V are provided with gear teeth on the respective surfaces thereof so that smooth power transmission can be obtained between them. The connection between the pulley P and the shaft 110a is implemented so as to prevent the occurrence of idling in rotation. For this purpose, a key-type connection structure is preferable.

[123] The air motor AM is installed on the bottom plate BP, and the operation rod 200 includes therein a driving pathway R1 for driving the air motor. Also, an auxiliary pathway SR1 is disposed on the bottom plate BP in order to connect the driving pathway R1 to the air motor AM.

[124] In the present embodiment, the connection between the auxiliary pathway SR1 and the driving pathway R1 of the operation rod 200 is carried out through the sides of the bracket B, which protrude from the bottom plate BP to function as means for connecting the operation rod 200 to the body 100. The auxiliary pathway SR1 consists of a first connector SR1-1 connected with a fan of the air motor AM and a second connector SR1-2 connected between the first connector SR1-1 and the driving pathway R1 for the air motor of the operation rod 200. The auxiliary pathway SR1 may be of any shape if it is connected between the driving pathway R1 of the operation rod 200 and the air motor AM so as to suck air therethrough.

[125] More preferably, the second connector SR1-2 may have a dual structure such that it can force a support block 151 against the side of the bracket B, the support block being required when a flared skirt 150 (through which dirt and air are sucked from the floorcloth) is connected to the end coming into contact with the bracket B. That is, the second connector is configured to include therein a tube body 10 serving as an air passage, an elastic body 20 such as a coil spring which is provided around the tube

body, and pressing plates 30 on both ends of the elastic body 20, so as to allow the support block 151 to come into close proximity with the bracket B and also prevent air leakage through a connecting portion with the first connector SR1-1.

[126] Meanwhile, when the air motor is used to forcibly rotate the floorcloth, it may generate noise. Thus, a silencer SI is preferably installed connected with the air motor. The silencer is generally known in the related art so its detailed description will be omitted. That is, since the silencer is a device for reducing noise generated upon driving the air motor, it may be configured as a stacked synthetic resinous pad or the like, which is installed in a separate space in one side of the air motor.

[127] In the body 100, the flared skirt 150 is installed so as to simultaneously suck dirt and air from the surface of the floorcloth 110. As illustrated in FIG. 7, the flared skirt 150 is of a shape in which a width thereof is gradually wider as it goes from one end to the other end.

[128] Both ends of the flared skirt 150 are open, and it is operated such that dirt or the like is sucked through the wider end, and discharged into the operation rod 200 through the narrow end. Preferably, the flared skirt is rotatably connected with the bracket B. To this end, according to the present embodiment, the flared skirt has a specified connection structure which provides easy connection and a function allowing the air and dirt to be guided into the operation rod 200.

[129] The flared skirt 150 has an opening on one side of the narrow end thereof so that an auxiliary connection pipe 152 is connected with the opening. The auxiliary pipe 152 has a circular holder 152a which protrudes from the opening such that it can rotate around the side of the bracket B. The bracket B is preferably provided with a support fitting (not shown) which protrudes from that side such that it is fitted, as a rotation axis, into the circular holder 152a and comes into contact with an inner circumferential face of the circular holder. The circular holder 152a of the auxiliary pipe 152 is connected with a dirt-collecting pathway R2, which is defined in the operation rod 200, via an open portion on the side of the bracket B.

[130] In the present embodiment, the operation rod 200 includes therein three independent pathways, i.e. the driving pathway R1 for the air motor, the dirt-collecting pathway R2, and a pathway R3 for a discharge pipe 610 which is installed between the two pathways so as to supply water to the floorcloth. Particularly, a suction force may be applied by the suction unit to the driving pathway R1 for the air motor and the dirt-collecting pathway R2, and the other pathway R3 for the discharge pipe may not have the suction force applied to them.

[131] Meanwhile, on the other side (the side which is opposite to the side connected with the auxiliary pipe) of the narrow end of the flared skirt 150, the support block 151 is connected so as to press against the side of the bracket B. As set forth before, the

support block 151 can come close to the side of the bracket B by means of the pressing plate 30 provided on the second connector SR1-2. With the above-mentioned structure, the flared skirt 150 can be rotated about the bracket B within a certain range.

[132] When in operation, when a suction force is applied to the dirt-collecting pathway R2, the suction force is in turn applied to the auxiliary pipe 152 and the flared skirt 150, so that the air and dirt adsorbed in the floorcloth are forcibly sucked through the wide end of the flared skirt, which comes into contact with the surface of the floorcloth 110, and are raised along the inside of the operation rod 200 through the dirt-collecting pathway R2. Then, the air and dirt are guided into the suction barrel 400, which will be described later, and are separated from each other.

[133] Meanwhile, the discharge pipe 610 extending through the pathway R3 provided in the operation rod 200 further extends out through the circular holder 152a of the auxiliary pipe 152 so as to supply water. This will be described later in detail.

[134] In the body 100, a dispersion nozzle 160 is also provided so as to supply water to the floorcloth 110. The dispersion nozzle 160 is connected with a plurality of branch pipes 615, which extend from the discharge pipe 610, so as to evenly distribute and supply water. As illustrated in the figures, the dispersion nozzle 160 has a length corresponding to the overall length of the floorcloth 110, and is connected with the bottom plate BP in such a manner as to come into contact with the surface of the floorcloth 110. That is, the dispersion nozzle 160 is preferably installed on the bottom plate BP through the medium of a spring 161 or the like, so that it is elastically movable within a certain range. Since the dispersion nozzle 160 directly contacts the surface of the floorcloth 110, as set forth above, the dispersion nozzle has an elastically movable structure so as to automatically cope with e.g. variance in size of an outer diameter of the floorcloth. It is also preferred that the dispersion nozzle is provided on its end (which contacts the floorcloth) with an adsorption fabric such as a non-woven fabric, which can contain therein a certain quantity of water, so as to allow water to be smoothly supplied to the floorcloth.

[135] The dispersion nozzle 160 preferably drills a plurality of holes 162 in an upper side thereof so as to supply water therethrough. The dispersion nozzle 160 is connected with the plurality of branch pipes 615. The branch pipes 615 are two or more, and are connected with the discharge pipe. In the middle of the discharge pipe 610, which extends into the body 100 through the pathway R3 for the discharge pipe and the auxiliary pipe 152 in the operation rod 200, a second valve CV2 is coupled, which opens and closes so as to control a flow of water in accordance with a user's manipulation. Further, preferably, a manual shutoff valve MV is provided next to the second valve in the body 100. This is for stopping the supply of water by closing the manual shutoff valve MV even when the second valve CV2 opens in a state of having

suspended cleaning. The plurality of branch pipes 615 may diverge from the manual shutoff valve MV. Meanwhile, for easy manipulation, the manual shutoff valve MV preferably protrudes upwards from a cover C constituting the body. The supply of water through the discharge pipe and the second valve will be described later.

[136] Next, the construction of the operation rod 200, which is rotatably connected to the body 100, the suction barrel 400, the water supply container 500, and the auxiliary water storage, which are installed on the operation rod 200, will now be described. The operation rod 200 is a long hollow member which is connected to the body 100 at its lower end, and is provided with the grip 201 at its upper end. The suction barrel 400, the water supply container 500, and the auxiliary water storage 600 are disposed in series on the operation rod 200.

[137] As set forth before, the operation rod 200 has three independent flow paths each having a function. FIGS. 8 to 10 are partial perspective views illustrating a connection structure between a switching valve and first and second pressure pipes, and a structure of the switching valve.

[138] The switching valve 230 is provided in the switching chamber 220 which is provided near the grip 201 of the operation rod 200. The switching valve 230 consists of the valve housing 230a and the valve disk 230b to which the lever 202 is connected.

[139] The operation of connection/disconnection between the first and second pressure pipes 420 and 620 and a connection structure between the second pressure pipe 620 and the inlet 221 for external air have been already described before. In the present embodiment, a suction chamber 240 is provided adjacent to the switching chamber 220, and the flexible corrugated tube 203 for connecting the suction chamber with the suction unit is provided. Thus, the suction force from the suction unit is transferred to the flow pathway in the operation rod 200 through the suction chamber. The operation rod 200 includes therein three flow pathways. Among the pathways, only the driving pathway R1 for the air motor and the dirt-collecting pathway R2 need the application of the suction force, so the cleaner is preferably constructed such that the suction force is exerted upon only these two pathways.

[140] In the switching chamber 220 are the ends of the first and second pressure pipes 420 and 620 connected, and the first and second pressure pipes are respectively connected or disconnected using the switching valve 230 provided in the switching chamber 220. That is, as set forth before, the first and second pressure pipes 420 and 620 are connected via the connection hole 234 provided in the valve disk 230b. When the lever 202 is pulled, the valve disk 230b is retracted so that the second pressure pipe 620 and the inlet 221 for external air are connected with each other through the connection hole 234, thereby allowing the external air to be supplied to the second pressure pipe 620.

[141] The first pressure pipe 420 extends up to the suction barrel 400, and the second

pressure pipe 620 extends up to the auxiliary water storage 600. Particularly, the first pressure pipe 420 is arranged along the dirt-collecting pathway R2 in the operation rod 200 and extends to the suction barrel 400, and the second pressure pipe 620 is arranged along the pathway R3 for the discharge pipe and extends to the auxiliary water storage 600.

[142] The valve disk 230b of the switching valve 230 provided in the switching chamber 220 is connected with the lever 202 provided near the grip 201, so that under the manipulation of the lever 202, it retracts or advances so as to connect or disconnect the first and second pressure pipes 420 and 620.

[143] More specifically, in a normal state as shown in FIG. 8 or 10 (the state in which an external force has not been applied to the lever so that the switching valve advances forward the maximal distance), the first and second pressure pipes 420 and 620 are connected by means of the connection hole 234 provided in the valve disk 230b. In this state, when the lever 202 is pulled, the valve disk 230b is retracted to a limited position so that the second pressure pipe 620 is connected with the inlet 221 for external air, which is provided on one side of the valve housing 230a, and is disconnected from the first pressure pipe 420.

[144] Of course, the switching chamber 220 is also provided with an opening connected with the inlet 221 for external air so as to allow the external air to be introduced into the inlet 221. When the suction unit is operated, the first pressure pipe 420 is continuously applied with the suction force from the suction unit, whereas if the valve disk 230b is in a state of being retracted, external air is introduced into the second pressure pipe 620, thereby resulting in the occurrence of a pressure difference. Such a pressure difference is relative to the supply and cutting off of the supply of water, which will be described later.

[145] The operation rod 200 includes, on the upper surface thereof, the suction barrel 400, the water supply container 500, and the auxiliary water storage 600 in the order listed from top to bottom. The suction barrel 400 is connected with the dirt-collecting pathway R2 in the operation rod 200 so as to suck the dirt and air. The dirt-collecting pathway R2 is divided into upper and lower pathways substantially on the basis of the installed location of the suction barrel 400, wherein the upper pathway R2a becomes the installation place of the first pressure pipe 420 and through which the suction force from the suction unit acts on the suction barrel 400, and the lower pathway R2b is used as a path through which the dirt and air are sucked from the floorcloth 110. The dirt and air, which have been sucked from the floorcloth 110 through the flared skirt 150, are then sucked by the force of suction into the suction barrel 400 via the dirt-collecting pathway R2 through the upper pathway R2a.

[146] The separation of air and dirt at the section barrel 400 is carried out using the

principle whereby the speed of a flowing fluid becomes rapid in a narrow place and slow in a wide place. The suction barrel 400 includes the separation plate 410 on its inner bottom face so as to efficiently separate the sucked air and dirt by acting as a filter. The present invention has a characteristic in that the separation plate is used, also serving as a filter, without using a conventional filter. FIG. 11 is a partial cross-sectional view illustrating a general structure of the suction barrel attached onto the operation rod, and FIG. 12 is an exploded perspective view of the separation plate.

[147] As shown in the figures, the separation plate 410 consists of a pair of upper and lower separation plates 410a and 410b. The lower separation plate 410b is provided near the center with an inlet 412 for air and dirt communicating with the inside of the operation rod 200. The operation rod 200 is correspondingly provided with an outlet 210 for air and dirt communicating with the dirt-collecting pathway R2.

[148] That is, the outlet 210 and inlet 412 for air and dirt communicate with each other, and the air and dirt are first introduced into the suction barrel 400 via the inlet 412 for air and dirt. The detailed structure of the separation plate will now be described.

[149] In the present embodiment, the upper and lower separation plates 410a and 410b are constructed in a rectangular shape, wherein they are respectively provided with a plurality of dividers 411 such that, when the upper and lower separation plates are combined with each other, the dividers are alternatively arranged, thereby forming a complex internal space.

[150] When the suction force is applied from upside of the suction barrel 400, it acts along the internal space of the separation plate, so that the air and dirt are introduced via the inlet 412 for the air and dirt. The dirt introduced via the inlet 412 for the air and dirt is guided outwards along an inner surface of the upper or lower separation plates 410a or 410b, during which fine dust particles contained in air come into contact with the dirt and are adsorbed in the dirt, and thus the size of the particle of water containing the dirt increases as it goes outwards.

[151] Since the surface area of the separation plate 410 gradually increases as it goes outwards from the inlet 412 for the air and dirt, the suction force becomes gradually dispersed so that the speed of the air and dirt becomes slower and the particle size of water containing the dirt further increases. Then, the flow of sucked air in the suction barrel 400 gets evenly dispersed in the suction barrel 400 through holes h, which are formed in a dispersion plate 431 at regular intervals, and becomes very slow, so that the dirt or the like naturally flows down along an outer wall of the separation plate.

[152] While passing through the dirt-collecting pathway R2 in the operation rod 200 and the separation plate 410, fine dust particles contained in air are naturally separated from the air and are adsorbed in the dirt, and the purified air is guided outside of the suction barrel 400 by the action of the suction force. That is, the purified air guided

from inside to outside of the suction barrel 400 is transferred to the suction unit through the upper pathway R2a in the operation rod 200 and the flexible corrugated tube 203.

[153] Meanwhile, on the inlet side of the suction barrel 400, an end of the first pressure pipe 420 is arranged, so that a portion of the suction force created by the suction unit creates an effect on the first pressure pipe 420. Here, the first pressure pipe is connected with the second pressure pipe 620, which is in turn connected with the auxiliary water storage 600, so that the first and second pressure pipes 420 and 620 and the auxiliary water storage 600 have the same pressure applied to them.

[154] As shown in the figures, in the suction barrel 400, in addition to the separation plate 410, the dispersion plate 430 is preferably provided in such a way that it is spatially separated from the upper portion of the suction barrel 400 and a suction hole 450 through which the suction force is exerted.

[155] The first pressure pipe 420 disposed along the inside of the upper dirt-collecting pathway R2a is preferably installed in the operation rod 200 such that it extends through a connection hole 460 connected with the suction barrel 400 and reaches the suction hole 450. Thus, the suction force of the suction unit acts upon the connection hole 460, the suction hole 450, the dispersion plate 430, and the separation plate 410 via the upper dirt-collecting pathway R2a, and then upon the inside of the lower dirt-collecting pathway R2b.

[156] The upper section 431 of the dispersion plate 430 is provided with the plurality of holes h at regular intervals through which air flows. If the dispersion plate 430 is provided, the suction force acting upon the inside of the suction barrel 400 through the upper dirt-collecting pathway R2a gets evenly dispersed all over the suction barrel through the holes h of the upper section 431 of the dispersion plate, rendering the air flow slower, so that the dirt, which increases in size during passing through the separation plate 430, is not mixed with the air, but, by its own weight, flows down into the water supply container 500 along a lower face of the suction barrel 400.

[157] Downstream the suction barrel 400, the water supply container 500 and the auxiliary water storage 600 are combined in series. Here, since the water supply container 500 can be connected to and disconnected from the suction barrel, the suction barrel 400 is preferably shifted within a certain range relative to the operation rod 200. To this end, the operation rod 200 is provided on the side with a guide protrusion 204, and the suction barrel 400 is correspondingly provided on the side with a guide hole 440, which is longer than the guide protrusion 204, thereby allowing the suction barrel 400 to be shifted within a certain range. It should be noted that the above-mentioned construction is only an exemplary embodiment, and the shift of the suction barrel 400 may be possible by means of other structures and manners.

[158] Now, the water supply container 500 installed downstream the suction barrel will now be described. FIG. 13 is a partial perspective view illustrating an installation structure of the water supply container. As shown in the figure, the water supply container 500 is detachably attached to the operation rod 200, and has a characteristic double structure. That is, the water supply container 500 includes a solid outer case 510 forming an outer contour, and a flexible water storage 520 installed in the outer case.

[159] The water storage 520 is installed in the outer case 510 of the water supply container 500 such that it is connected together at its lower end. The water storage 520 contains therein water (or water mixed with a detergent or a disinfectant) to be supplied to the floorcloth for cleaning. When the water contained in the water storage 520 is discharged, the volume of water contained in the flexible water storage 520 can decrease, and the dirt separated from air in the suction barrel flows down into the inside (i.e. the space between the outer case and the water storage) of the water supply container 500 connected with the suction barrel 400.

[160] When water is discharged from the water storage 520, extra space is secured in the water supply container 500 equivalent to the amount of discharged water, providing sufficient space to store the dirt flowing in the suction barrel 400, thereby preventing the possibility of the dirt running over. As shown in the figure, the water storage 520 is connected to the lower end of the water supply container 500. The water storage 520 is provided with the closing plate 521 which is forced by a spring so as to cut off the water flow, and the closing plate 521 is opened by the engagement with the auxiliary water storage 600 to be described later.

[161] More preferably, the water supply container (outer case) is provided with a grip 530 on its outer surface and a plurality of engaging bars 540 on its bottom face, which is connected with the operation rod 200. In correspondence with the engaging bars 540, the operation rod 200 is provided on its upper surface with a plurality of engaging grooves 205. The water storage 520 is provided on its upper end with a narrow inlet 522 through which water can be supplied and which is arrested by a support band 523 connected from the inner upper end of the water supply container (the outer case). Since the inlet is arrested by the support band 523, the installation height of the water storage can always be maintained at a constant height. Meanwhile, it is preferred that the water supply container 500 is provided on its upper end side with an engaging hook (not shown) for the suction barrel 400, and the suction barrel 400 is correspondingly provided on its lower end with an engaging member (not shown). The engaging hook and the engaging member may be a conventional clamp device which can be easily used.

[162] Now, the auxiliary water storage 600 positioned downstream the water supply

container 500 will be described. FIG. 16 is a partial cross-sectional view of the auxiliary water storage. The auxiliary water storage is fixedly installed onto the operation rod 200. The suction barrel 400 and the auxiliary water storage 600 are installed on the same upper face of the operation rod 200 at a certain interval, where the water supply container 500 can be detachably installed. When the water supply container 500 is coupled onto the operation rod 200, the closing plate 521 of the water storage 520 is opened, becoming the state in which the water in the water storage can be supplied to the auxiliary water storage 600. However, although the water supply container 500 has been coupled with the auxiliary water storage 600, water does not always flow towards the auxiliary water storage. This is because of the operation of the first valve CV1 provided in the auxiliary water storage 600. The auxiliary water storage 600 is provided on its upper portion with the opening pin 601 below which the first valve CV1 is installed. The opening and closing operations of the first valve is connected with a variance in pressure in the auxiliary water storage 600.

[163] A procedure of supplying water from the water storage 520 in the water supply container 500 to the auxiliary water storage 600 will now be described.

[164] When the water storage 520 of the water supply container 500 is filled with water, the water supply container 500 is installed between the suction barrel 400 and the auxiliary water storage 600, and then the suction unit is operated to clean the floor, and the suction force acts upon the inside of the operation rod 200 so that it is applied to the inside of the suction barrel 400 and the first pressure pipe 420 through the upper dirt-collecting pathway R2a.

[165] When the suction force acts upon the first pressure pipe 420, it also acts upon both the second pressure pipe 620, which is connected with the first pressure pipe 420 via the connection hole 234 of the valve disk 230b of the switching valve 230, and the inside of the auxiliary water storage 600, which is connected with the second pressure pipe 620. Then, the second valve CV2 is shut off so that the inside of the water supply container 500 communicating with the suction barrel 400 and the inside of the auxiliary water storage 600 have the same pressure. When the insides of the auxiliary water storage 600 and the suction barrel 400 are of the same pressure, the first valve CV1 is opened owing solely to the weight of the water contained in the water storage 520 so that the water is supplied to the auxiliary water storage 600.

[166] Meanwhile, the auxiliary water storage 600 is connected at the bottom with the discharge pipe 610, which extends to the body 100 along the pathway R3 for the discharge pipe in the operation rod 200 and further extends up to the dispersion nozzle 160 coming into contact with the surface of the floorcloth 110, through the circular holder 152a of the auxiliary connection pipe 152 constituting the flared skirt 150. Of course, as set forth before, the second valve CV2 is further connected with the

discharge pipe 610 in the body 100, and the manual shutoff valve MV is provided next to the second valve CV2.

[167] Further, the plurality of branch pipes 615 diverging from the manual shutoff valve MV is connected with the dispersion nozzle 160 so as to discharge water. When the first valve CV1 of the auxiliary water storage 600 is opened and the water is supplied into the auxiliary water storage 600, the second valve CV2 in the body 100 is in a closed state owing to the suction force applied to the auxiliary water storage 600. In this state, if a user wants to supply water to the floorcloth 110, the lever 202 of the switching valve 230 near the grip 201 of the operation rod 200 is pulled so that the first and second pressure pipes 420 and 620 are disconnected from each other, and the external air is supplied to the second pressure pipe 620. Then, the internal pressure of the auxiliary water storage 600 increases so that the second valve CV2 is opened.

[168] Here, the user can determine whether to finally discharge water through the manipulation of the manual shutoff valve MV, and if the manual shutoff valve MV is in an opened state, opening the second valve CV2 allows the water to be discharged to the floorcloth 110 through the dispersion nozzle 160 via the branch pipes 615. if the user determines that a proper quantity of water has been discharged, he returns the lever 202 to its original position so as to shut off the introduction of external air into the second pressure pipe 620 and connect the second pressure valve with the first pressure valve, so that the second valve CV2 becomes closed to stop discharging water and switch the first valve CV1 into the open state, because of the suction force applied to the auxiliary water storage 600.

[169] Like this, according to the cleaner of the present invention, a user can implement washing only through the processes of simply filling the water supply container 500 with water, coupling the same onto the operation rod, and washing the floor while freely regulating the supply of water with only manipulation of the lever 202 provided near the grip 201. Further, the sucked dirt and air are efficiently separated from each other so that the purified air is discharged, and the separated dirt or the like is stored again in the water supply container 500, which, after cleaning, can be simply separated so as to dispose the dirt or the like.

[170] Further, more preferably, the body 100 of the cleaner may be configured into two bottom plates BP which are rotatable within a certain range. Generally, a rolling wheel 170 is installed on the rear side of an under face of the bottom plate BP. In the present embodiment, the rolling wheel 170 is provided in such a manner that a rear center portion of the bottom plate BP is cut and separated so as to form an auxiliary bottom plate BP-1, a bracket B for connection with the operation rod 200 is formed on the auxiliary bottom plate BP-1, and the rolling wheel 170 is installed on an under face of the auxiliary bottom plate BP-1. The auxiliary bottom plate BP-1 is pivotably

connected with the bottom plate BP by means of a pivot pin 101, so that a user can implement cleaning while easily pushing and pulling the operation rod 200. Further, since the auxiliary bottom plate BP-1 can be pivoted about the bottom plate BP within a certain stroke range, even on uneven surfaces of the floor, the cleaning is advantageously carried out without difficulties.

[171] <Second Embodiment>

[172] The second embodiment of the present invention is characterized in that unlike the first embodiment, the suction unit is integrally included in the cleaner. That is, the second embodiment is constructed as a portable type for ease of use. To this end, it is constructed such that the grip 201 or the like is supplied with power so as to supply electric power to the operation rod 200. Further, due to having such a type of power supply, instead of the air motor, an electric motor EM is preferably provided as means of rotating the floorcloth 110. That is, while the first embodiment employs the air motor in order to use the suction force of the suction unit, the second embodiment employs the electric motor instead of the air motor because the air motor may generate severe noise.

[173] FIG. 17 is a perspective view illustrating the cleaner with a wet floorcloth according to the second embodiment of the invention, and FIG. 18 is a view illustrating the internal construction of a body of the cleaner of the second embodiment.

[174] The cleaner of the second embodiment includes a suction barrel 400, a water supply container 500, and an auxiliary water storage 600 on an operation rod 200. Further, a suction unit 300 is integrally provided above the suction barrel 400. That is, the suction unit 300 is electrically powered so as to generate the suction force, which is then appl ied to the suction barrel 400 and a first pressure pipe 420. While the first embodiment requires a separate pathway for driving the air motor in the operation rod 200, the second embodiment does not require such an independent pathway, and may include only a dirt-collecting pathway for guiding dirt or the like into the suction barrel in the operation rod.

[175] In the present embodiment, since the electric motor EM is used, an electric cable may be disposed only near the body 100 so as to drive the electric motor. The principle of water supply and the operation of the cleaner are identical to those of the first embodiment, so description of the overlapping portions thereof will be omitted.

[176] Further, a heater (not shown) may be further provided in the body of the cleaner so as to heat water using electric power or the like, such that if needed, a user can clean the floor using hot water. The installation of a heater in the body can be carried out using a conventional known technology, so the detailed description thereof will be omitted.

[177] According to the present invention, the new conceptual cleaner has a characteristic feature in that the dust and air and even harmful particles such as fine dust particles

contained in the air can be completely separated from the mixture of the dirt and air so as to finally discharge only the purified air, without using a high cost filter. That is, the cleaner of the invention serves both to clean the floor and purify the air in the room.

[178] Further, since the dirt is immediately sucked and removed from the rotating floorcloth through the flared skirt, which comes into contact with the floorcloth, the floorcloth is always maintained in a clean state, so that even after a long cleaning session, the floorcloth is in a clean state, providing an advantageous effect from the sanitary point of view.

Industrial Applicability

[179] As set forth before, the cleaner with a wet floorcloth according to the present invention is a new type cleaner which can replace the plurality of existing cleaners while not doing harm to a human body so that it is expected to be widely disseminated and used as a very excellent practicable technology.

[180] Further, the cleaner is expected to be adaptable to both home and a diversity of industrial fields, and since parts such as filters are not required, the competitiveness thereof in terms of price increases so as to satisfy the consumer's demands concerning the price of the cleaner.

[181] Further, according to the first embodiment of the cleaner, the consumers can utilize the existing vacuum cleaner they have had, so that the cleaner is a practicable device in terms of re-use of materials.

[182] Furthermore, the present invention is expected to contribute to an increase in the amount of exports and benefit the national economy owing to being of a new conceptual technology.

Claims

[1] A cleaner capable of implementing cleaning while forcibly sucking air, the cleaner including a body having a rotating floorcloth, an operation rod with an end connected with the body and another end formed with a grip, and a suction unit sucking air, wherein upon cleaning, air and dirt (a mixture of water, particulate materials such as dust particles or the like, and hair or the like) are sucked by a suction force created by the suction unit, via the operation rod, from the floorcloth towards a suction barrel, which is coupled onto the operation rod, the air and dirt are separated while passing through a pair of separation plates provided in the suction barrel and serving as a filter, and the separated dirt flows downwards and is collected into a water supply container coupled onto the suction barrel, and

wherein in order to supply water to the floorcloth, the water supply container is provided with a water storage having an independent space, and water contained in the water storage is dropped into an auxiliary water storage, which is coupled downstream the water supply container, so that, when external air is introduced into the auxiliary water storage by operation of a lever provided near the grip, an additional pressure is created in the auxiliary water storage, and the water in the auxiliary water storage is supplied to the floorcloth along a discharge pipe connected with the auxiliary water storage.

[2] The cleaner according to claim 1, wherein the lever is disposed adjacent to the grip and is connected with a switching valve installed in a switching chamber provided at an end of the operation rod, so as to, upon manipulation, allow a first pressure pipe and a second pressure pipe to communicate with each other, or otherwise allow external air to be supplied towards only the second pressure pipe, the first and second pressure pipes extending from the switching chamber towards the suction barrel and the auxiliary water storage, respectively.

[3] The cleaner according to claim 2, wherein the first pressure pipe is connected, at its end, with a pathway, through which air is sucked from the suction barrel by means of the suction unit, so that a suction force is applied to the first pressure pipe, and that, when the first pressure pipe communicates with the second pressure pipe by the operation of the switching valve, the suction force is applied to the second pressure pipe together with to the first pressure pipe, so that the suction barrel and the auxiliary water storage are of identical internal pressure.

[4] The cleaner according to claim 1, wherein the water supply container is detachably connected onto the operation rod between the suction barrel and the auxiliary water storage so as to collect the dirt flowing down from the suction

barrel and allow the water in the water storage to be supplied to the auxiliary water storage.

[5] The cleaner according to claim 4, wherein the water storage is composed of a flexible material such as vinyl so that, as water is discharged out towards the auxiliary water storage, its volume decreases so as to secure a space for storing dirt flowing down from the suction barrel towards the water supply container.

[6] The cleaner according to claim 1, wherein the auxiliary water storage is provided with a connection pin connected with a lower portion of the water supply container, wherein a first valve is connected to a lower end of the connection pin so as to open and close depending upon variance in pressure of the auxiliary water storage.

[7] The cleaner according to any one of claims 1 to 6, wherein the discharge pipe extending from the auxiliary water storage towards the floorcloth is connected with a plurality of branch pipes, which is coupled with dispersion nozzles coming into contact with the floorcloth, so as to supply and disperse water uniformly over the floorcloth.

[8] The cleaner according to claim 7, wherein the dispersion nozzle is provided with an adsorption fabric such as a nonwoven fabric on a surface facing the floorcloth so as to transfer the supplied water to the floorcloth.

[9] The cleaner according to claim 7, wherein the dispersion nozzle is connected with a bottom of the body via a spring so as to come into contact with the floorcloth.

[10] The cleaner according to any one of claims 1 to 6, wherein the floorcloth is of a cylindrical shape and is rotated by an electric motor or an air motor.

[11] The cleaner according to claim 10, wherein the floorcloth includes:
a shaft having a pulley on its end in order to receive a rotating force from the electric motor or the air motor;
a hollow core into which the shaft is fixedly inserted and which has a plurality of through-holes on the circumference; and
a cloth member provided so as to cover the circumference of the core.

[12] The cleaner according to any one of claims 1 to 6, wherein a flared skirt shaped pipe is installed in the body, the flared skirt shaped pipe being configured such that an end is connected with the operation rod so as to apply a suction force therethrough, and another end is formed with a flared skirt to cover the overall width of the floorcloth while coming into contact with the same, so as to suck the dirt from the floorcloth, allowing the same to move towards the suction barrel.

[13] The cleaner according to any one of claims 1 to 6, wherein the suction unit is either integrally combined with the operation rod, or separately connected with

the operation rod via a flexible corrugated pipe, so as to apply a suction force.

[14] The cleaner according to claim 10, wherein when the air motor is used for rotating the floorcloth, the operation rod is configured to include a driving pathway for the air motor formed by a plurality of dividers provided in the operation rod and an auxiliary pathway formed through a side of a bracket connecting the operation rod and the body in a manner such that the pathways are connected with a fan of the air motor so as to allow the air motor to be driven by a portion of the suction force created by the suction unit.

[15] The cleaner according to claim 10, wherein when the air motor is used to rotate the floorcloth, the cleaner is further provided with a silencer for reducing noise from the air motor.

[16] The cleaner according to any one of claims 1 to 6, wherein the discharge pipe is connected with a second valve such that it opens only when the external air is supplied to the auxiliary water storage.

[17] The cleaner according to claim 16, wherein the discharge pipe is connected with a manual shutoff valve next to the second valve such that an upper end thereof protrudes towards an upper portion of the body.

[18] The cleaner according to any one of claims 1 to 6, wherein the suction barrel includes a dispersion plate which is spaced apart from an upper surface of the suction barrel and a side having a suction hole, and has an upper face on which a plurality of holes is provided uniformly so as to uniformly disperse the suction force of the suction barrel throughout the suction barrel so that a flow of the sucked air becomes slower, allowing the dirt, which is separated from the air and increases in particle size while passing through the separation plate, to flow down and be stored in the water supply container without being mixed with the air.

[19] The cleaner according to any one of claims 1 to 6, wherein the bottom plate of the body includes an individual auxiliary plate, to which the operation rod is connected, in such a way that the bottom and the auxiliary plate are inter-connected by means of a pivot pin such that the auxiliary plate is pivoted about the bottom plate, the auxiliary plate being provided, on an underside, with a plurality of rolling wheels.

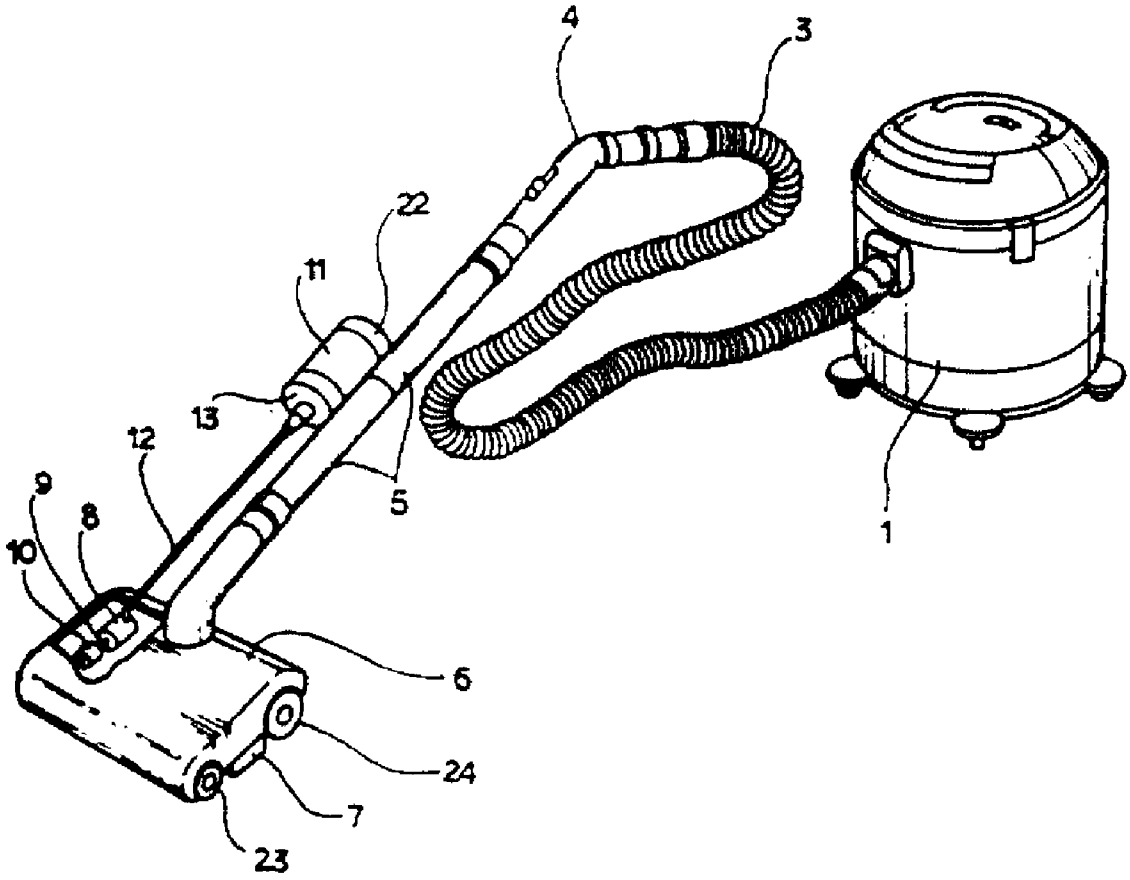
[20] The cleaner according to claim 4, wherein the suction barrel is configured so as to vertically move along the operation rod so that upon attaching and detaching of the water supply container, a sufficient distance is formed between the suction barrel and the auxiliary water storage.

[21] The cleaner according to claim 20, wherein the water supply container is further provided with a handgrip, and has an engagement hook for engagement with the

suction barrel.

[22] The cleaner according to any one of claims 1 to 6, wherein the separation plate is composed of a pair of upper and lower separation plates, which are coupled together, and are respectively provided with a plurality of dividers which upon assembly of the separation plates, forms a complex internal space via a crossed arrangement, allowing the particles of the dirt to increase in size as they go outwards from the space.

[Fig. 1]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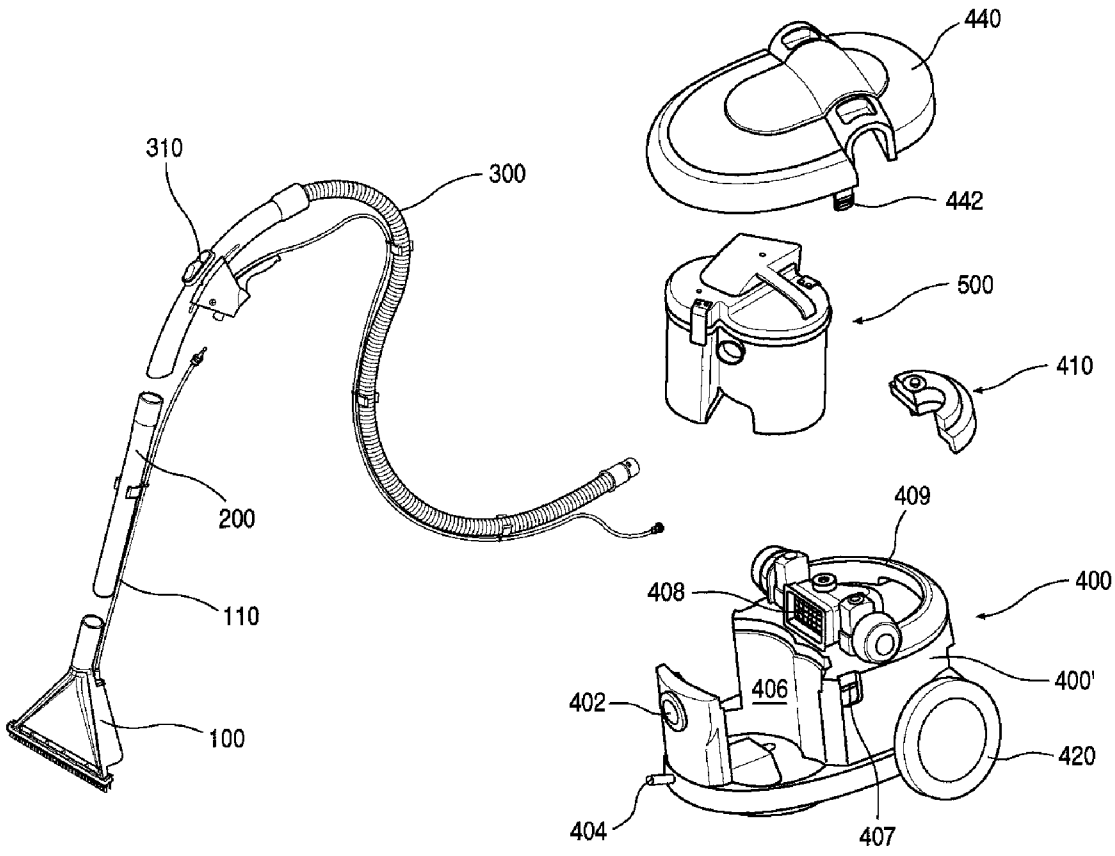
23

[Fig. 2]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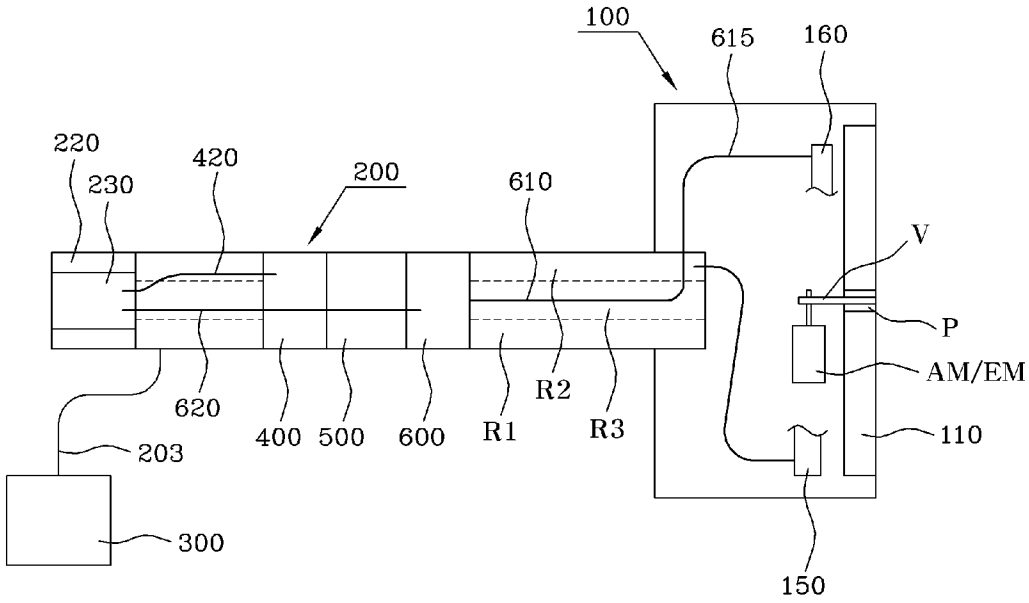
100
404
407

[Fig. 3]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615
160
220
230
420
200
610
V
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AM/EM
110
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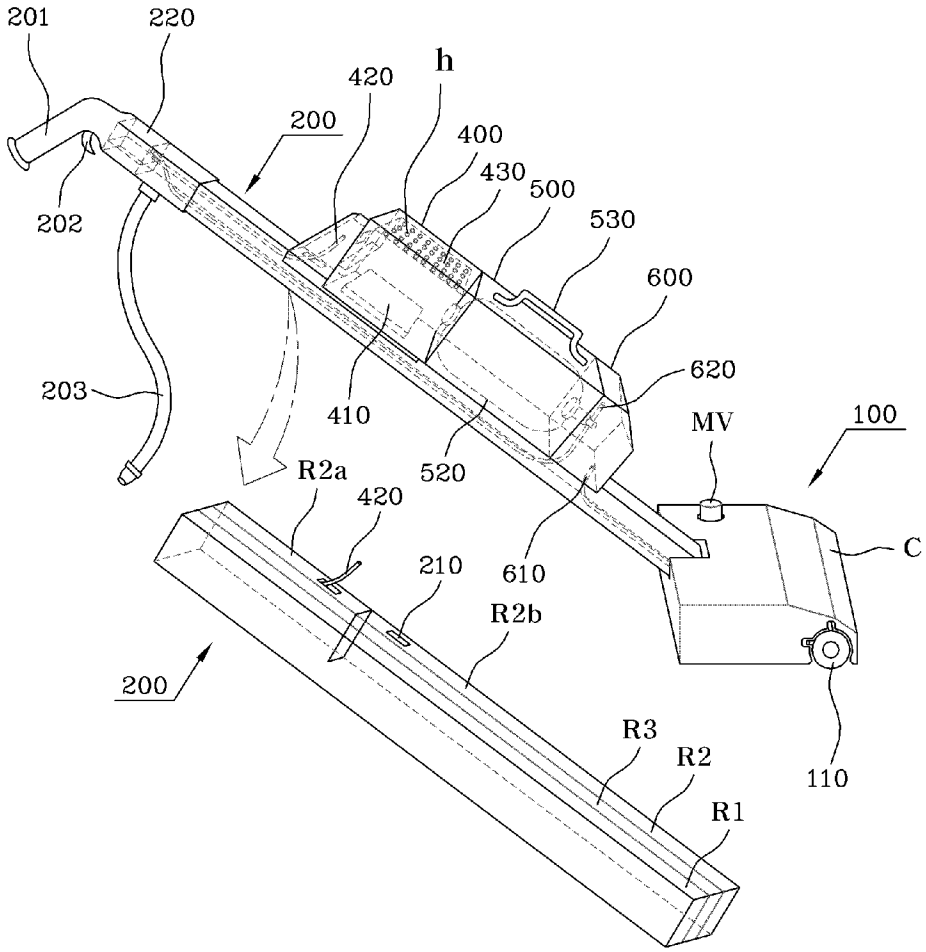
500
600
R1
R2
R3
203
300
150

[Fig. 4]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220
h
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200
400
430
500
530
600
620
202
203
410
520
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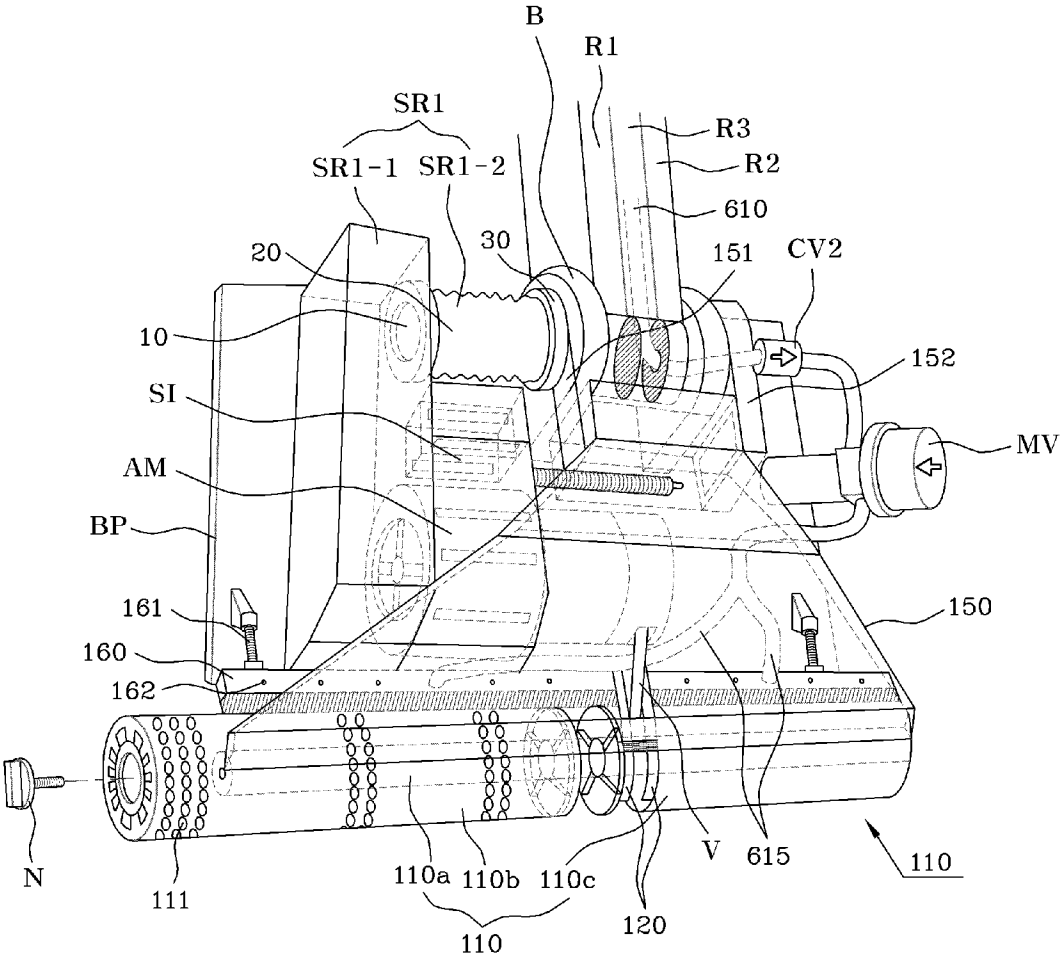
100
C
R2a
420
210
610
R2b
200
R3
R2
R1
110

[Fig. 5]


B
R1
SR1
SR1-1
SR1-2
R3
R2
610
30
20
151
CV2
10
152
SI
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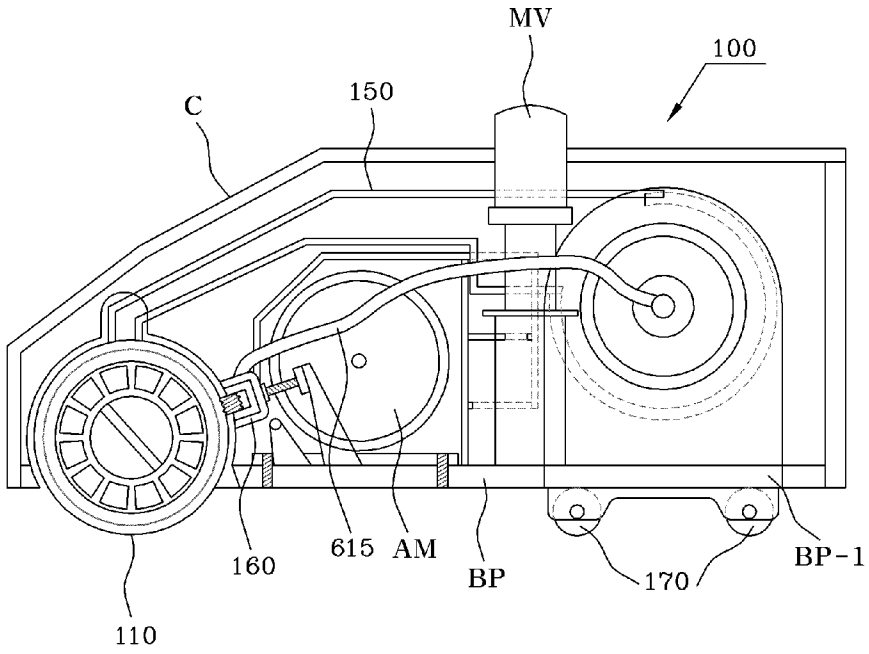
110b
110c
110
120
V
615
110

[Fig. 6]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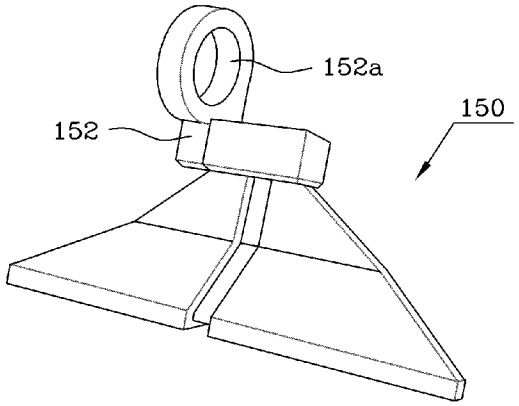
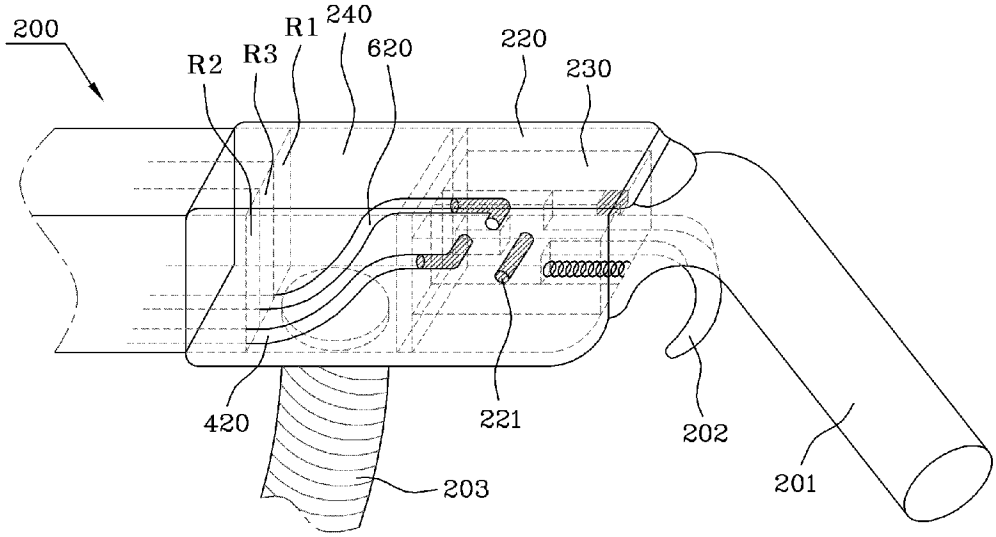
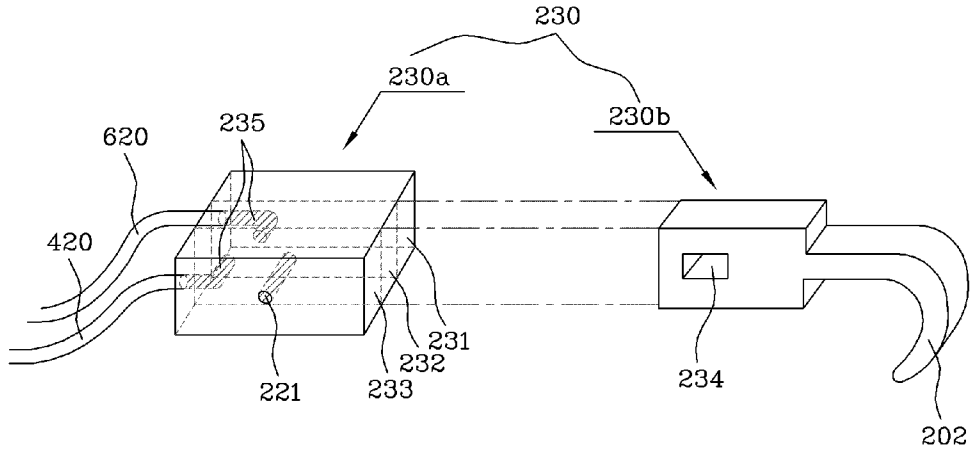
[Fig. 7]



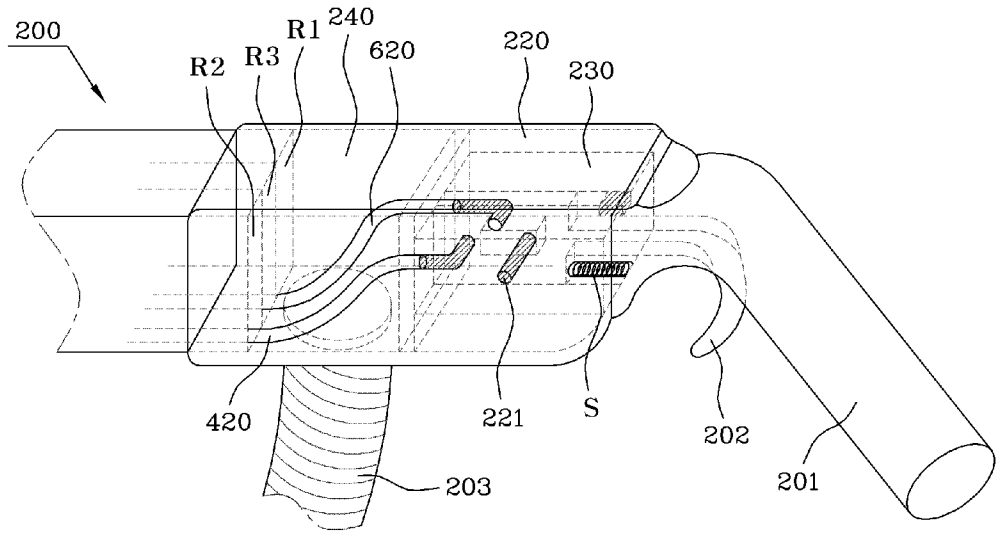
[Fig. 8]



[Fig. 9]



[Fig. 10]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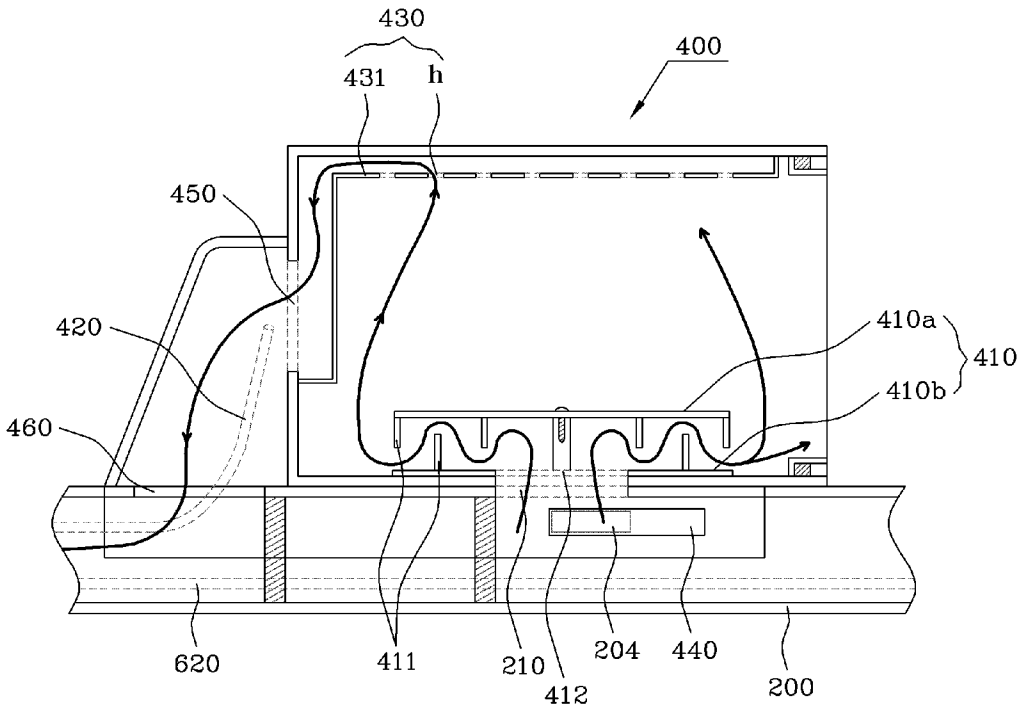
[Fig. 11]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410a
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410b
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411
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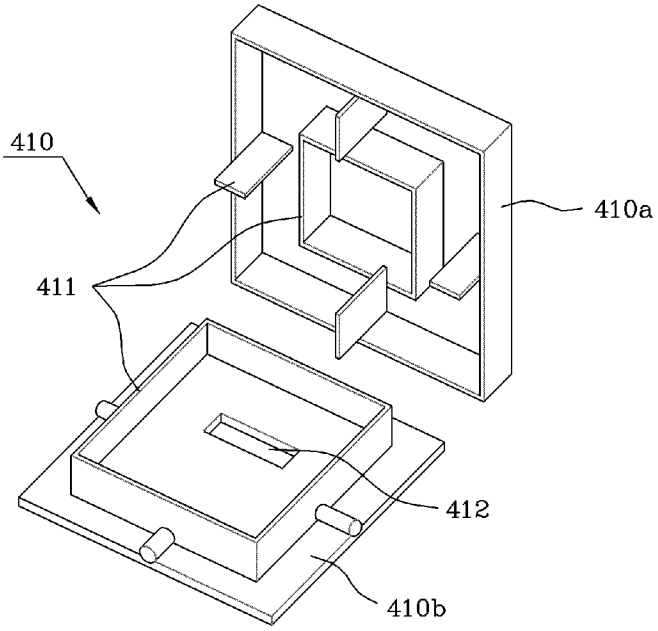
412
204
440
200

[Fig. 12]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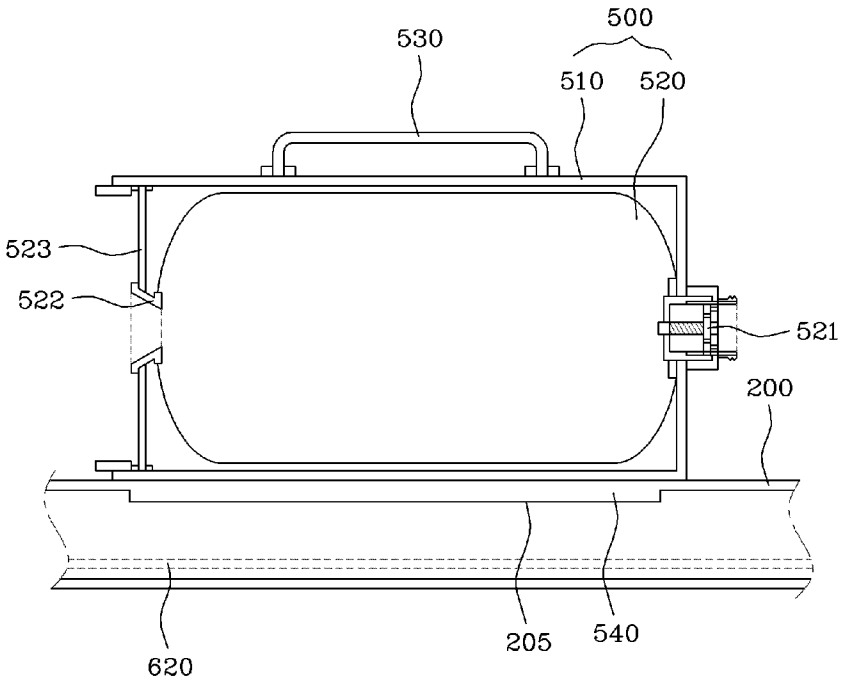
410b

[Fig. 13]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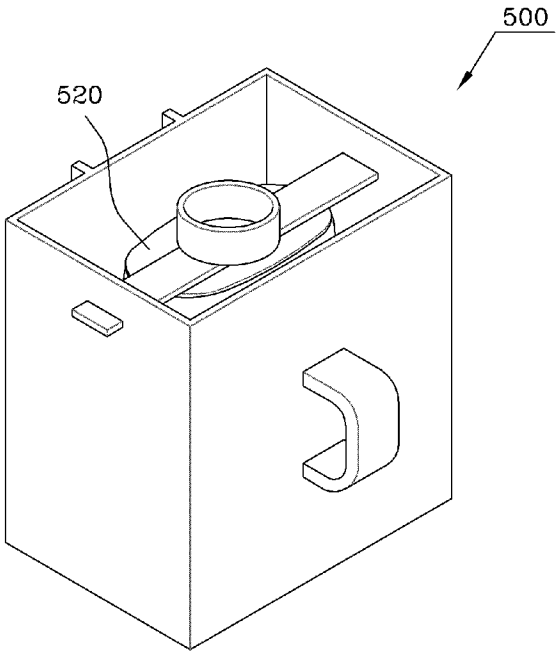
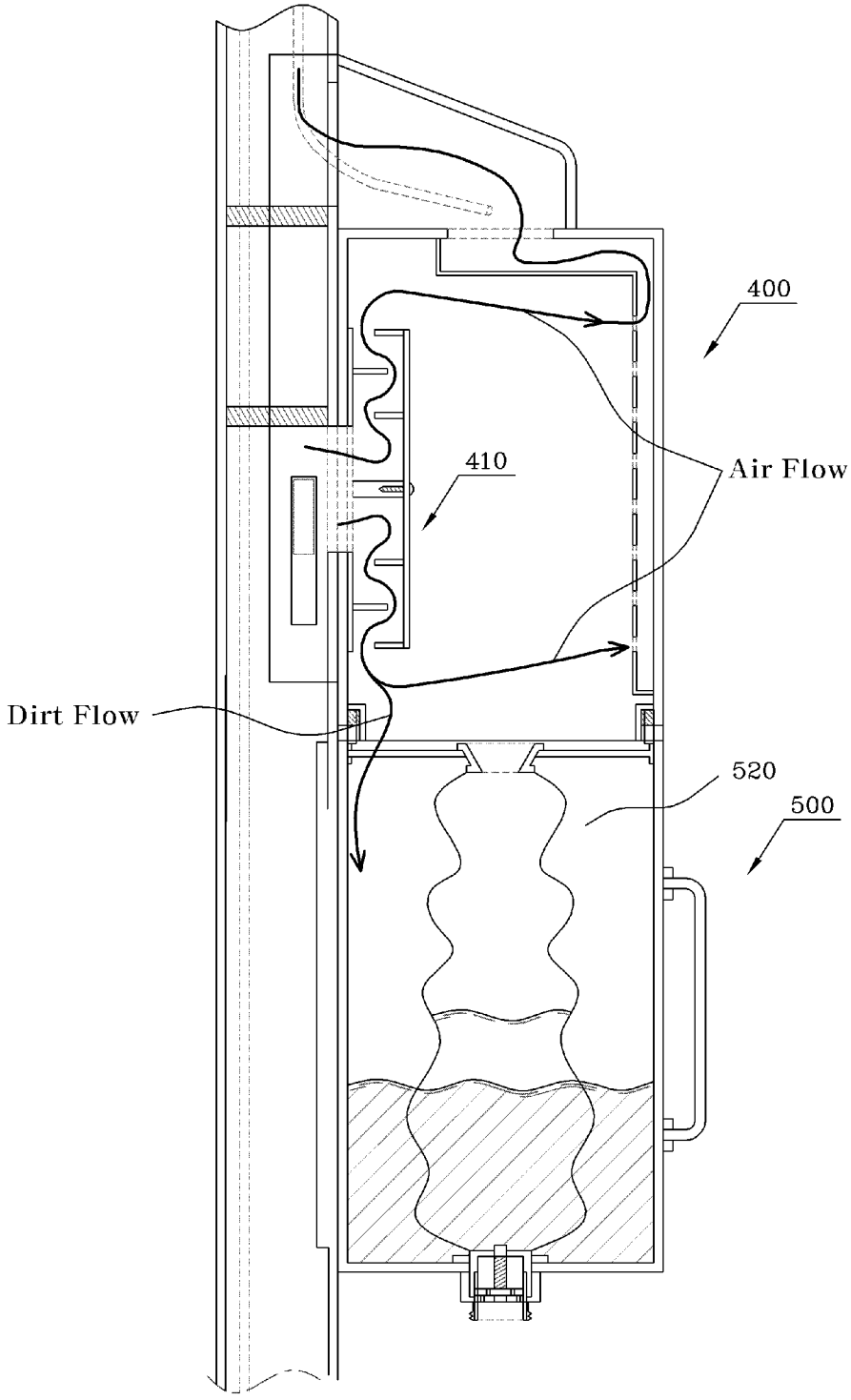
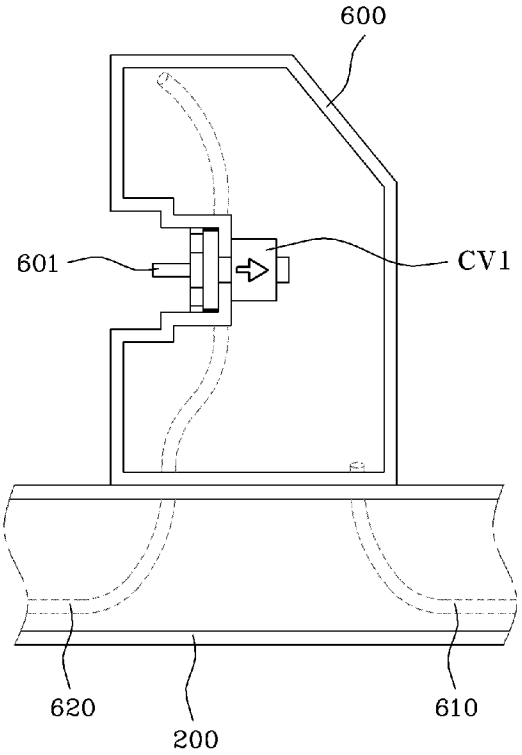
[Fig. 14]



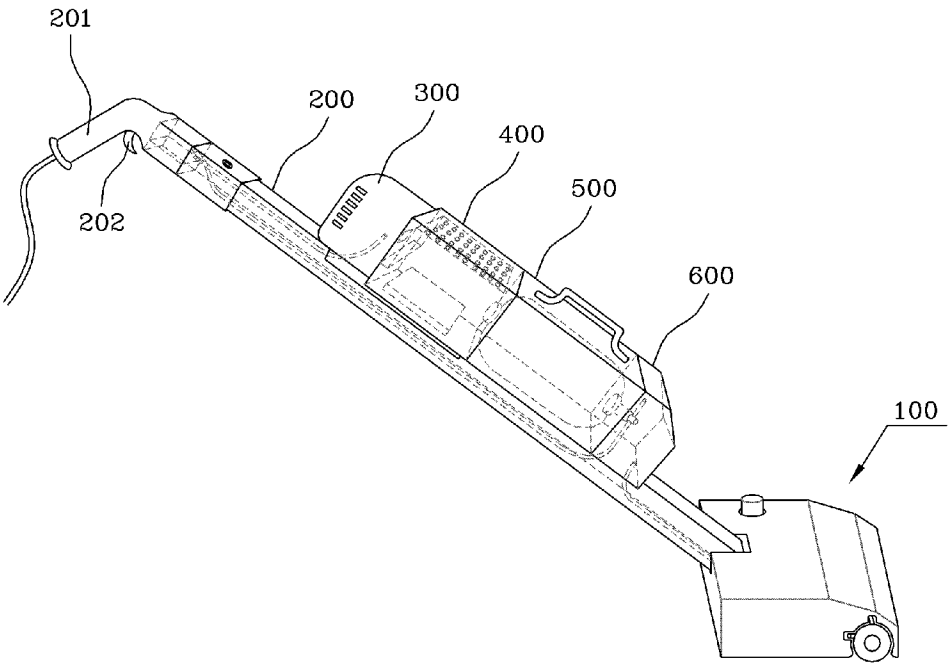
[Fig. 15]



[Fig. 16]



[Fig. 17]



[Fig. 18]