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(19) **United States**(12) **Patent Application Publication****Oh et al.**(10) **Pub. No.: US 2006/0288517 A1**(43) **Pub. Date: Dec. 28, 2006**(54) **VACUUM CLEANER HAVING WET
CLEANING FUNCTION**(30) **Foreign Application Priority Data**

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ABSTRACT

A vacuum cleaner with a wet cleaning function comprises a main body, a brush assembly having a contaminant suction port facing a cleaning surface, a brush of the contaminant suction port to rotate in contact with the cleaning surface, and a water exhaust nozzle, the contaminants suction port is fluidly communicated with the main body, and a front and a rear block parts formed at a front and a rear of the brush on a bottom surface of the brush assembly to selectively open or block a contaminant suction path by a friction force against the cleaning surface.

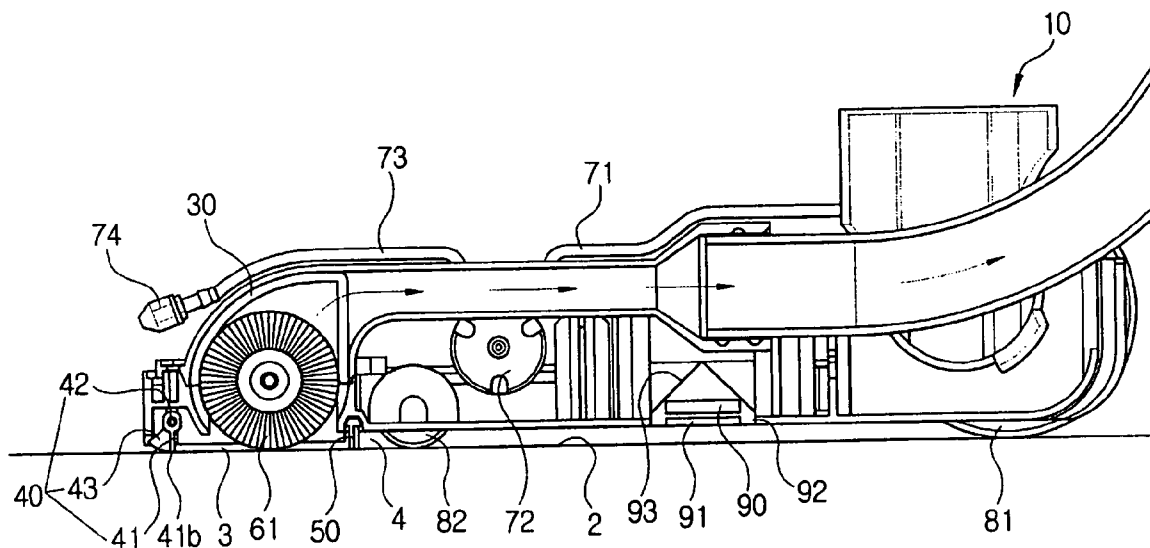
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ICS CO., LTD.**(21) Appl. No.: **11/317,279**(22) Filed: **Dec. 23, 2005**

FIG. 1

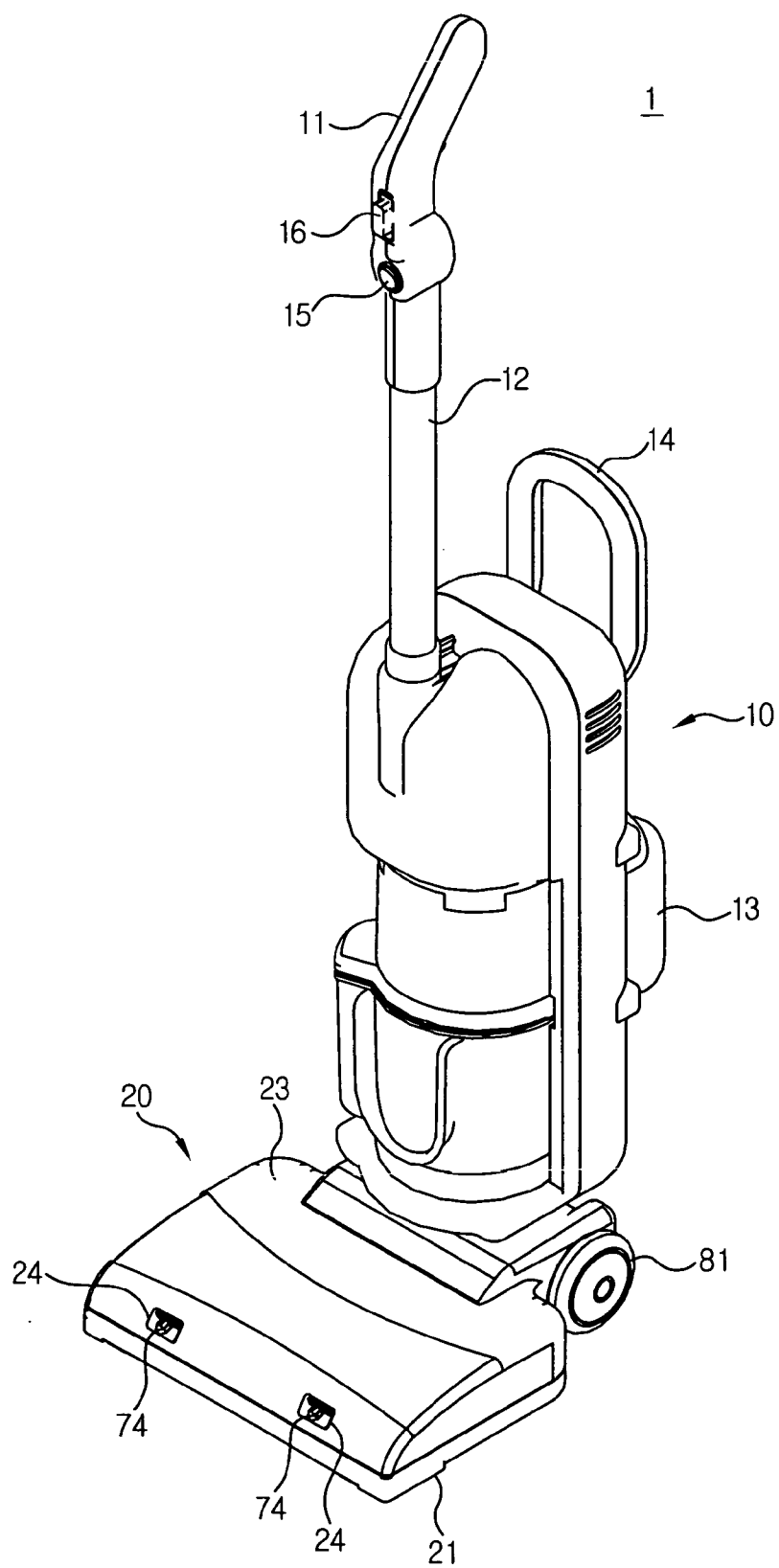


FIG. 2

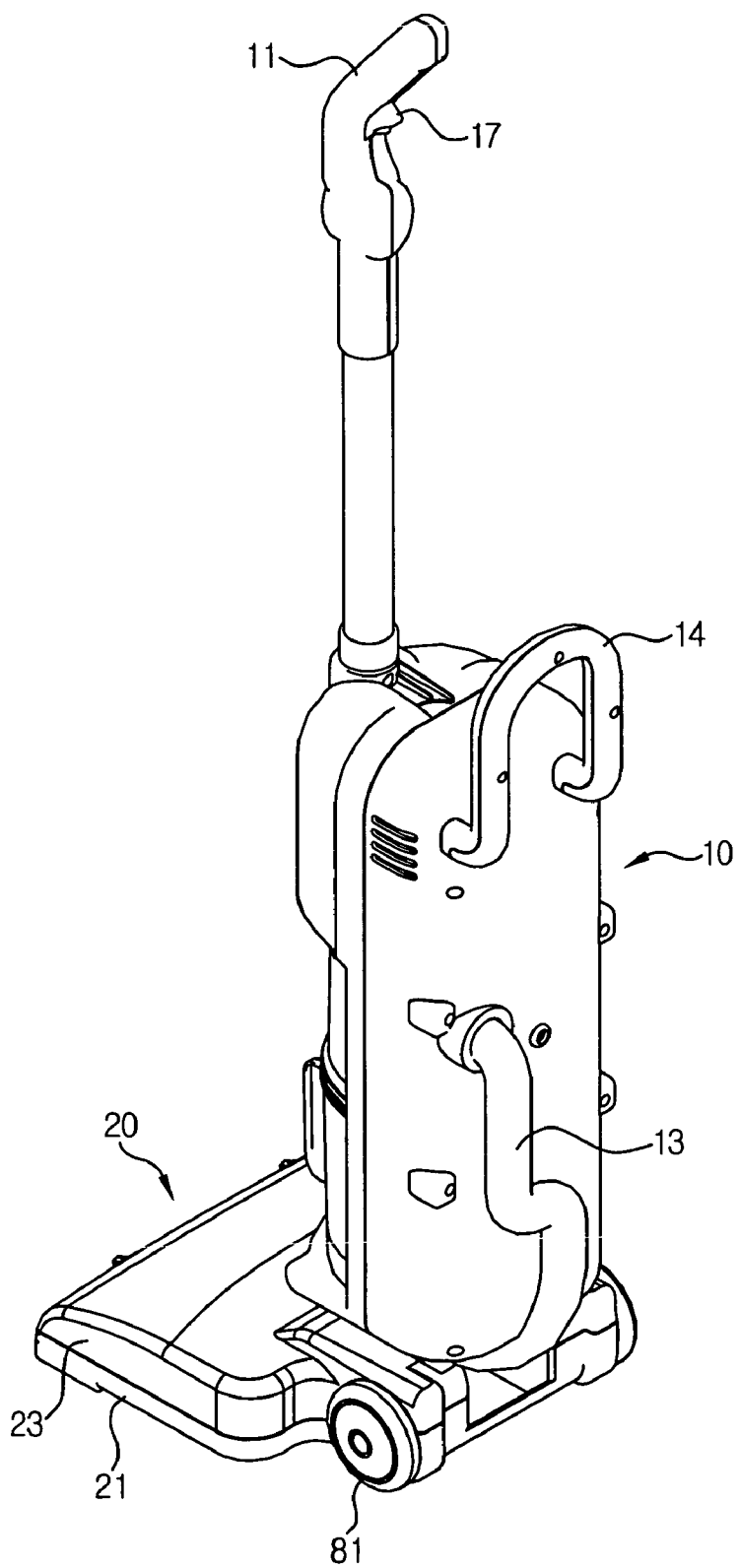


FIG. 5

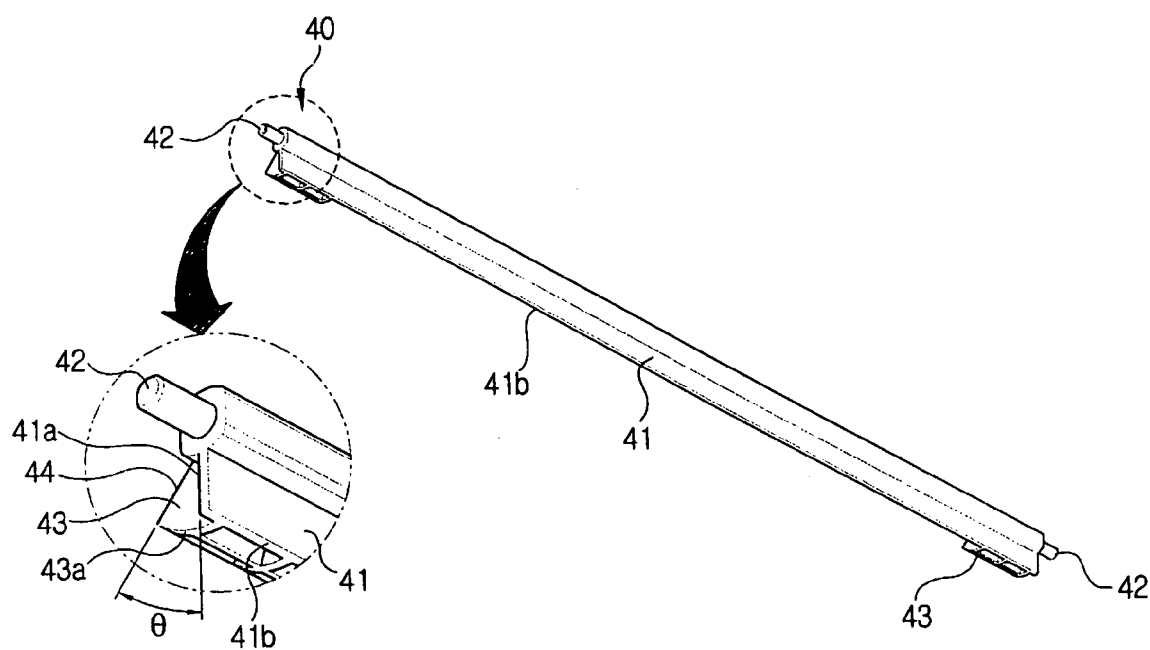


FIG. 6

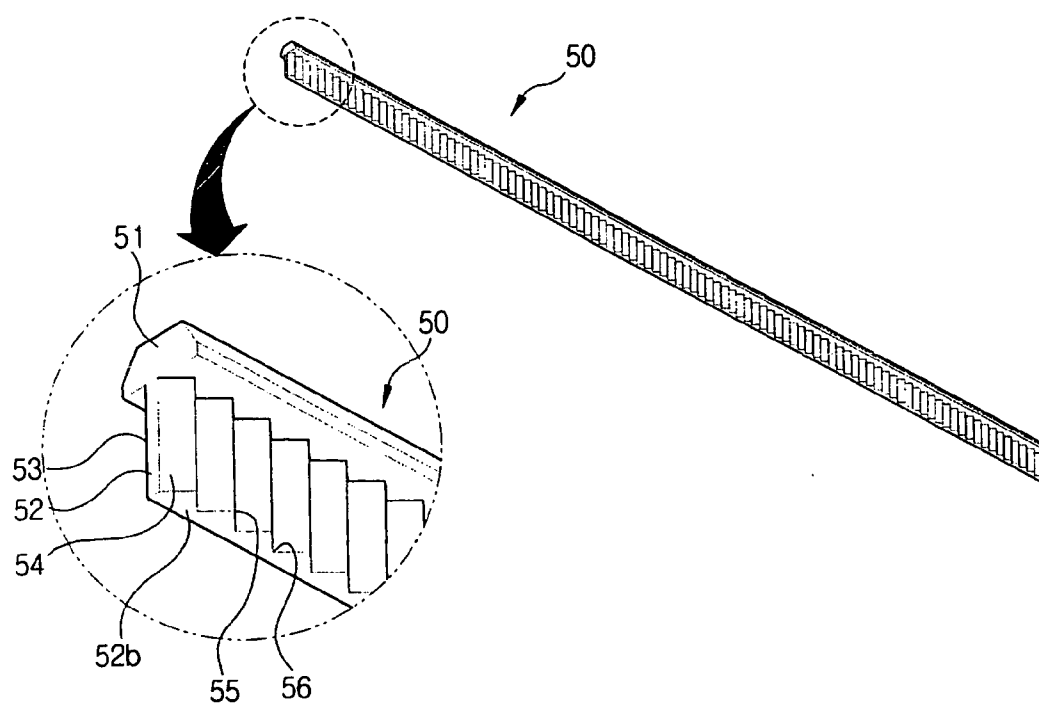


FIG. 8

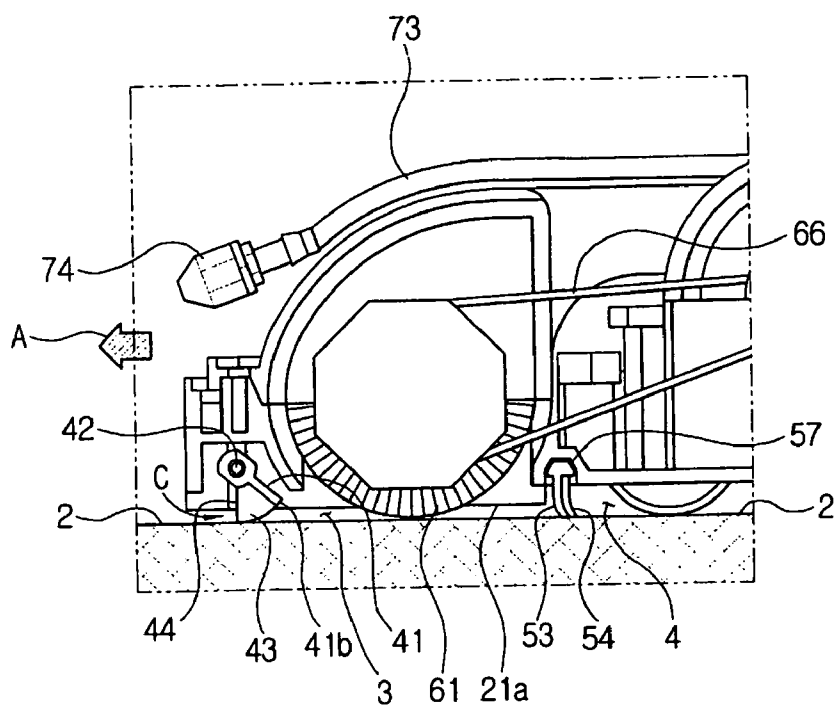
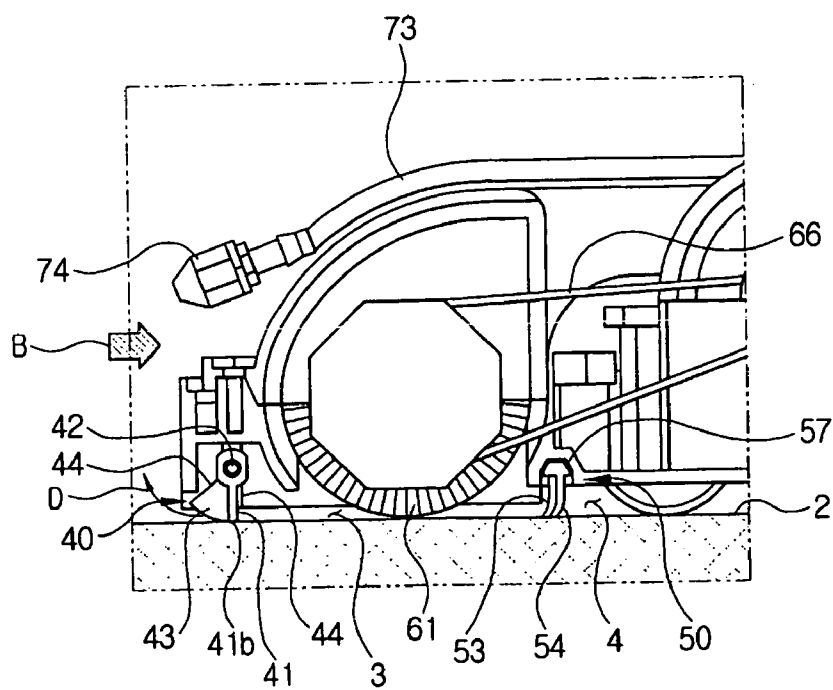


FIG. 9



VACUUM CLEANER HAVING WET CLEANING FUNCTION

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of Korean Patent Application No. 2005-54071 filed on Jun. 22, 2005, in the Korean Intellectual Property Office, the disclosure of which is incorporated herein by reference in its entirety.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] The present invention relates to a vacuum cleaner. More particularly, the present invention relates to a vacuum cleaner with a wet cleaning function.

[0004] 2. Description of the Related Art

[0005] Generally, a vacuum cleaner with a wet cleaning function can selectively perform a general cleaning and a wet cleaning. In the general cleaning, the cleaner draws in contaminants such as dusts from cleaning surfaces without moisture, and in the wet cleaning, the cleaner sprays water onto hard cleaning surfaces such as paper-covered floors, floors, and marbles to wipe off stains from the cleaning surfaces and draws in the contaminants with water.

[0006] The vacuum cleaner with the wet cleaning function comprises a water exhaust unit having a water tank, a water exhaust valve, and a water exhaust nozzle, to exhaust water onto the cleaning surfaces and a brush wiping off stains from the cleaning surface. When performing the wet cleaning, the vacuum cleaner exhausts water onto the cleaning surface and wipes off stains from the cleaning surface with the brush so as to draw in the exhausted water with the stains removed by the brush.

[0007] However, when performing the general cleaning, the brush prevents the contaminants from drawing into a contaminant inlet. To solve this problem, intervals between the brush and the cleaning surface can be adjusted according to a conventional art. In other words, when performing the general cleaning, the brush distances from the cleaning surface to smoothly draw in contaminants, and when performing the wet cleaning, the brush contacts the cleaning surface to wipe. Accordingly, the conventional vacuum cleaner with the wet cleaning function needs a structure for raising or ascending and lowering or descending the brush, and therefore, the structure of the brush assembly is complicated.

[0008] Additionally, when performing the wet cleaning, the cleaner performs a general cleaning such as drawing in contaminants, with the distanced brush from the cleaning surface, and then a wet cleaning such as spraying water and wiping the cleaning surface with descended brush. Therefore, it takes almost twice the time taken to perform the mere general cleaning.

[0009] Finally, although the water exhaust valve is blocked after completing the wet cleaning, water remaining between the water exhaust valve and the water exhaust nozzle flows from the water exhaust nozzle. Therefore, the area around the vacuum cleaner be soiled by this remaining water.

SUMMARY OF THE INVENTION

[0010] The present invention has been conceived to solve the above-mentioned problems occurring in the prior art, and an aspect of the present invention is to provide a vacuum cleaner having a wet cleaning function of a simple structure without requiring the descent and ascent of a brush.

[0011] Another aspect of the present invention is to provide a vacuum cleaner with a wet cleaning function which draws in contaminants and simultaneously performs a wet cleaning so that the cleaning time can be shorten when wet cleaning.

[0012] In order to achieve the above aspects, there is provided a vacuum cleaner with a wet cleaning function, comprising a main body, a brush assembly having a contaminant suction port facing a cleaning surface, a brush of the contaminant suction port to rotate in contact with the cleaning surface, and a water exhaust nozzle, the contaminants suction port is fluidly communicated with the main body, and a front and a rear block parts formed at a front and a rear of the brush on a bottom surface of the brush assembly to selectively open or block a contaminant suction path by a friction force against the cleaning surface.

[0013] As one of the front block part and the rear block part opens the contaminant suction path, the other may block the contaminant suction path. In other words, the front block part may open the contaminant suction path as the brush assembly moves forward.

[0014] The front block part is formed at a front of the brush and on a bottom surface of the brush assembly to rotate a certain degree by a friction force against the cleaning surface, and selectively opens or blocks the contaminant suction path according to the rotated degree. The front block part comprises a block board taking on a configuration of a plate to block the contaminant suction path of a front of the brush assembly; a rotation axis formed at both ends of the block board and rotatably attached to the brush assembly, and a rotation protrusion provided in a form of a sector at a side of the block board and of which an arc portion is extended from a leading end of the block board, and as the arc portion of the rotation protrusion contacts the cleaning surface, the leading end of the block board distances from the cleaning surface.

[0015] The rear block part may comprise a head part fixed in a rear block part receiving groove of the brush assembly, and a rear block board having a plane side and a side with a consecutive plurality of protrusions of a regular interval, a part of each leading end of the plane side or the side with a plurality of protrusions are selectively pressed by the cleaning surface according to a movement direction of the brush assembly.

[0016] The brush assembly further comprises an air pump for exhausting water including air via the water exhaust nozzle.

[0017] The brush assembly may be provided with one or more water exhaust nozzles on a front of the brush assembly.

[0018] The vacuum cleaner may further comprise a mode switch formed in the main body to select one of a general cleaning and a wet cleaning, and a pump switch selectively operating the air pump to exhaust water via the water exhaust nozzle as the mode switch is selected to the wet cleaning.

[0019] The vacuum cleaner may further comprise an ultraviolet ray lamp provided at a rear of the rear block part on a bottom surface of the brush assembly to sterilize the cleaning surface. The ultraviolet ray lamp may have at a front a cover made of synthetic resinous fluorine-containing polymers, such as materials available under the trademark Teflon®.

[0020] As described above, the vacuum cleaner with the wet cleaning function according to embodiments of the present invention opens or blocks the contaminant suction path by the front and the rear block parts so that the brush does not need to be ascended and descended. Additionally, the front and the rear block parts operate by friction force against the cleaning surface so that they do not need dedicated driving members. According to embodiments of the present invention, a vacuum cleaner with a cleaning function can be provided with very simple structure compared with a conventional vacuum cleaner with a cleaning function.

[0021] The vacuum cleaner can draw in contaminants while performing the wet cleaning with bristles of brush since the contaminant suction path is opened during the wet cleaning. In other words, the vacuum cleaner with the wet cleaning according to embodiments of the present invention does not need to perform a general cleaning to remove contaminants from the cleaning surface. Therefore, the cleaning time for wet cleaning can be shortened, compared to a conventional vacuum cleaner with a wet cleaning.

[0022] Further, as the vacuum cleaner with the wet cleaning according to embodiments of the present invention completes the wet cleaning and stops the air pump, water remaining in the water exhaust hose between the air pump and the water exhaust nozzle is blocked by air so as not to flow out from the water exhaust nozzle. Accordingly, if the vacuum cleaner with the wet cleaning according to embodiments of the present invention is applied, the circumstance around the vacuum cleaner does not get dirty by the remaining water.

BRIEF DESCRIPTION OF THE DRAWINGS

[0023] The above and other aspects, features and advantages of the present invention will be more apparent from the following detailed description taken with reference to the accompanying drawings, in which:

[0024] **FIG. 1** is a perspective view of a front of a vacuum cleaner with a wet cleaning function according to an embodiment of the present invention;

[0025] **FIG. 2** is a perspective view of a rear of the vacuum cleaner of **FIG. 1**;

[0026] **FIG. 3** is a perspective view of an uncovered brush assembly of the vacuum cleaner of **FIG. 1**;

[0027] **FIG. 4** is perspective view of a bottom of the brush assembly of the vacuum cleaner of **FIG. 3**;

[0028] **FIG. 5** is a perspective view of a front block part of the vacuum cleaner of **FIG. 1**;

[0029] **FIG. 6** is a perspective view of a rear block part of the vacuum cleaner of **FIG. 1**;

[0030] **FIG. 7** is a cross-sectional view of the brush assembly of the vacuum cleaner of **FIG. 1** when stationary;

[0031] **FIG. 8** is a partial cross-sectional view of the brush assembly of **FIG. 7** when moving forward; and

[0032] **FIG. 9** is a partial cross-sectional view of the brush assembly of **FIG. 7** when moving backward.

DETAILED DESCRIPTION OF THE EXEMPLARY EMBODIMENTS

[0033] Exemplary embodiments of the present invention will be described in detail with reference to the annexed drawings. In the drawings, the same elements are denoted by the same reference numerals throughout the drawings in the following description, detailed descriptions of known functions and configurations incorporated herein have been omitted for conciseness and clarity.

[0034] Referring to **FIG. 1** and **FIG. 2**, a vacuum cleaner **1** with a wet cleaning function comprises a main body **10** and a brush assembly **20**.

[0035] The main body **10** comprises a motor assembly (not shown) for generating a suction force, a contaminant-collecting receptacle (not shown) for collecting contaminants and water drawn in via the brush assembly **20**, and a water tank (not shown) for storing water for wet cleaning. The body **10** has at an upper end a handle **11** for a user to grasp. The handle **11** is connected via an extension pipe **12** to the main body **10**. The body **10** has at a rear side a hose **13** for connecting the brush assembly **20** and the contaminant-collecting receptacle of the main body **10** and a knob **14** for moving the vacuum cleaner **1**.

[0036] The handle **11** comprises a power switch **15** for operating the motor assembly, a mode switch **16** for selecting one of a general cleaning mode and a wet cleaning mode, and a pump switch **17** for operating an air pump **72** (refer to **FIG. 3**). If the general cleaning mode is set, power is supplied to the motor of motor assembly and a brush motor **62** (refer to **FIG. 3**), but not supplied to the air pump **72**. Accordingly, as the power switch **15** is on, the motor of motor assembly and the brush motor **62** rotate. However, since power is not supplied to the air pump **72**, water is not exhausted from the water exhaust nozzle **74** although the pump switch is on. If the wet cleaning is set, power is supplied to the motor of motor assembly, brush motor **62**, and the air pump **72**. Accordingly, as the power switch **15** is on, the motor of motor assembly and the brush motor **62** rotate, and as the pump switch **17** is on, the air pump **72** operates so that water is exhausted from the water exhaust nozzle **74**.

[0037] Referring to **FIGS. 3** and **4**, the brush assembly **20** comprises a brush body **21**, a suction duct **30**, a front and a rear block parts **40**, **50**, a brush unit **60**, a water exhaust unit **70**, a plurality of wheels **81**, **82**, and an ultraviolet ray lamp **90** (refer to **FIG. 7**).

[0038] The brush body **21** comprises at a bottom front a contaminant suction port **22** for drawing in contaminants and water from the cleaning surface, and supports another members which will be explained later.

[0039] The suction duct **30** is disposed at an upper portion of the brush body **21**, of which an end is connected with the contaminant suction port **22** and of which the other end is connected with a hose **13** (refer to **FIG. 1**) of the main body **10**. Accordingly, the suction duct **30** forms a path in which

contaminants and water drawn in through the contaminant suction port 22 are collected via the hose 13 into the contaminant-collecting receptacle of the main body 10.

[0040] The brush unit 60 comprises a brush 61 rotatably disposed in the contaminant suction port 22, a brush motor 62 rotating the brush 61, and a driving force transmission device 63 transmitting a driving force of the brush motor 62 to the brush 61.

[0041] The brush 61 comprises a cylindrical brush drum 61a and a brush bristle 61b. The brush drum 61a is rotatably supported by a rotation support member 67 such as a bearing disposed at opposite ends of the contaminants suction port 22. The brush drum 61a has at the surface a plurality of brush bristles 61b. The plurality of bristles 61b may be provided in various ways, however, in the present embodiment, the bristles 61b are provided with three rows separated by a certain interval. The row of each brush bristle 61b takes on the configuration of a circular arc. The length of brush bristle 61b may be set for a leading end of the brush bristle 61b to wipe and move forward the cleaning surface when the brush drum 61a rotates. Thanks to the brush 61, the cleaner may wipe the cleaning surface to remove stains when performing the wet cleaning, and contaminants may be easily drawn from the cleaning surface into the contaminant suction port 22 when performing the general cleaning.

[0042] The driving force transmission device 63 can include two pulleys 65, 64 provided in each of the brush motor 62 and the brush 61, and a belt 66 connecting the two pulleys 65, 64. As the brush motor 62 rotates, the driving force of the brush motor 62 is transmitted to the brush 61 via the two pulleys 65, 64 and the belt 66 so that the brush 61 can rotate.

[0043] The front block part 40 is provided at a front of the brush 61 and on a bottom surface of the brush body 21 to selectively block or open a contaminant suction path 3 (refer to FIG. 7) through which contaminants of the front of the brush assembly 20 are drawn into the contaminant suction port 22. FIG. 5 is a view of an example of the front block part 40. Referring to FIG. 5, the front block part 40 comprises a block board 41, two rotation axes 42, and two rotation protrusions 43, and is made of a rubber.

[0044] The block board 41 blocks the front contaminant suction path 3 through which contaminants are drawn into the contaminant suction port 22 from the front of brush assembly 20, and is plate-like. The height of block board 41 may be set to slightly press a bottom end 41b of the block board 41 against the cleaning surface when the block board 41 is perpendicular to the cleaning surface 2 (refer to FIG. 7). Accordingly, if the block board 41 is perpendicular to the cleaning surface, the contaminants at the front of the block board 41 are not drawn into the contaminant suction port 22. The rotation axes 42 are formed at opposite ends of the block board 41 and inserted in hinge grooves (not shown) of the brush body 21 of the brush assembly 20 so that the front block part 40 can rotate by a certain degree. The rotation axes 42 may be made of a stainless rod penetrating the block board 41 for endurance. The rotation protrusions 43 are also formed at opposite ends of the block board 41 and are provided in the form of a sectorial arc part 43a extending from a leading end 41a of the block board 41. The radius of the sectorial arc part 43a is the distance between the rotation axis 42 to the bottom end 41b of the block board 41. The

rotation protrusions 43 are provided at each of opposite ends of the block board 41 so as to maintain contaminants therebetween. The arc angle θ of the rotation protrusion 43 may be set so that point of intersection of the leading and bottom ends 41a, 41b of the block board 41 is about adjacent to a bottom surface 21a of the brush body 21 when one surface 44 of the rotation protrusion 43 is perpendicular to the cleaning surface 2 as shown in FIG. 8. Accordingly, as the brush assembly 20 moves in a first direction A (FIG. 8), the front block part 40 can rotate in an opposite direction of the movement of the brush assembly 20 due to a friction force against the cleaning surface 2. Then, the front contaminant suction path 3 is opened between the block board 41 and the two rotation protrusions 43. As the brush assembly 20 moves in a second direction B oppositely to the first direction A, the front block part 40 allows the block board 41 to be perpendicular to the cleaning surface 2 due to the friction force against the cleaning surface 2 to block the front contaminant suction path 3 (refer to FIG. 9). Accordingly, it is determined if the front block part 40 opens or blocks the front contaminant suction path 3 as the brush assembly 20 moves in a certain direction depending on the direction of attachment of the rotation protrusions 43 of the front block part 40 to the brush assembly 20. For example, if the front block part 40 is provided for the rotation protrusions 43 to face the front of the brush assembly 20 according to the present embodiment of the present invention (refer to FIG. 7), the front contaminant suction path 3 of the brush assembly 20 is opened as the brush assembly 20 moves forward, and the front contaminant suction path 3 is blocked as the brush assembly 20 moves backward.

[0045] The rear block part 50 is formed at a bottom surface of the brush body 21 and at a rear of the brush, i.e., the contaminant suction port 22, and selectively blocks and opens a rear contaminant suction path 4 which draws in the contaminants from the rear of the contaminant suction port 22. FIG. 6 is a view of an example of the rear block part 50. Referring to FIG. 6, the rear block part 50 comprises a head part 51 and a rear block board 52. The head part 51 is fixed in a rear block part receiving groove 57 of the brush body 21 of the brush assembly 20. A front surface (hereinafter, plane surface) 53 of the rear block board 52 is plane, and a rear surface thereof (hereinafter, protrusion surface) 54 has a plurality of protrusions 55 consecutively formed by a certain interval. The protrusion surface 54 may take up the configuration of a rack gear with a plurality of triangular teeth. The length of the rear block board 52 may be set so that a bottom end 52b of the rear block board 52 slightly presses against the cleaning surface 2 as the brush assembly 20 is located on the cleaning surface 2 as shown in FIG. 7. Then, as the brush assembly 20 moves backward and forward, the bottom end 52b of the rear block part 50 moves with a friction force against the cleaning surface 2, causing the rear block part 50 to be bent in a direction opposite to the brush assembly's moving direction. Accordingly, the leading end portion of the plane surface 53 (FIG. 8) or the leading end portion of the protrusion surface 54 (FIG. 9) is selectively pressed against the cleaning surface 2 depending on the moving direction of the brush assembly 20. When the protrusion surface 54 contacts the cleaning surface 2, the rear contaminant suction path 4 of the rear of the contaminant suction port 22 is opened since contaminants and water are drawn into spaces 56 among the plurality of protrusions 55. Accordingly, it is determined that the rear block part 50

opens or blocks the rear contaminant suction path 4 as the brush assembly 20 moves in a certain direction depending on the direction of attachment of the protrusion surface 54 of the rear block part 50 to the brush assembly 20. For example, if the rear block part 50 is provided for the protrusion surface 54 to face the rear of the brush assembly 20 (refer to FIG. 7), the rear contaminant suction path 4 is opened as the brush assembly moves back, and as the brush assembly 20 moves forward, the rear contaminant suction path 4 is blocked.

[0046] According to the present embodiment, as the brush assembly 20 moves forward (FIG. 8), the front block part 40 opens the front contaminant suction path 3 and the rear block part 50 blocks the rear contaminant suction path 4. As the brush assembly 20 moves backward (FIG. 9), the front block part 40 blocks the front contaminant suction path 3 and the rear block part 50 opens the rear contaminant suction path 4. However, this should not be considered as limiting. As the brush assembly 20 moves forward or backward, the operations of the front and the rear block parts 40, 50 may be reversed to that described above. Or, as the brush assembly 20 moves forward, the front and the rear block parts 40, 50 may open both contaminant suction paths 3 and 4 or as the brush assembly 20 moves backward, the front and the rear block parts 40, 50 may block both contaminant suction paths 3 and 4.

[0047] Additionally, according to the present embodiment of the present invention, each of the front and the rear block parts 40, 56 has a different configuration, however it is contemplated by the present invention for the front and the rear block parts 40, 50 to have the same configuration.

[0048] The water exhaust unit 70 exhausts water onto the cleaning surface 2 when performing the wet cleaning. Referring to FIG. 3, the water exhaust unit 70 comprises a water tank (not shown), a water supply hose 71, the air pump 72, the water exhaust hose 73, and the water exhaust nozzle 74. The water tank stores therein a certain amount of water and is provided in the main body 10 to supply the water exhaust nozzle 74 with water. The water tank may be mounted higher than the water exhaust nozzle 74 to assist in exhausting the water from the water tank through the water exhaust nozzle 74. The water supply hose 71 fluidly communicates the water tank and the air pump 72 to supply the air pump 72 with the water of the water tank.

[0049] The air pump 72 mixes the water exhausted via the water exhaust nozzle 71 with air. The water mixed with air is exhausted via the water exhaust hose 73 to the outside. The water remaining in the water exhaust hose 73 is prevented from flowing down the outside of the brush assembly 20 via the water exhaust nozzle 74 due to the surface tension as the water exhaust is blocked. The air pump 72 rotates by an electric motor, and mixes and compresses air and water supplied from the water supply hose 71 by the cam mechanism to discharge them via the water exhaust hose 73. The compression pressure of the air pump 72 is approximately 0.8 to approximately 1 kilogram of force per square meter (Kg/m^2). If the air pump 72 is diaphragm-operated, the air pump 72 is not damaged although water flows backward. The air pump 72 can electrically control the amount of exhausted water. In specific, the air pump 72 adjusts the voltage supplied thereto in order to control the amount of exhausted water. At this time, the amount of exhausted water

is approximately 0 to approximately 800 cubic centimeters per minute (CC/min). To control the amount of exhausted water of the air pump 72, an exhausted amount control part (not shown) may be provided which can manually adjust the voltage supplied to the air pump 72. Or, a program may be set in the exhausted amount control part to variously control the amount of exhausted water of the air pump 72 depending on the movement direction of the brush body 21. Or, a direction sensor (not shown) may be disposed on the bottom surface of the brush body 21 to sense the movement direction of the brush assembly 20 so that the air pump 72 may exhaust water according to signals of the direction sensor. The air pump 72 can be any air pump such as those commonly used for bidets, instruments for measuring blood pressure, and aquariums.

[0050] The water exhaust nozzle 74 is disposed at a front of the brush body 21 to exhaust water toward the front of the brush assembly 20. The brush assembly 20 may be provided with one water exhaust nozzle 74, and preferably, with two water exhaust nozzles 74 as shown in FIG. 3. The water exhaust hose 73 fluidly communicates the two water exhaust nozzles 74 and the air pump 72 so that air-mixed water flowing via the air pump 72 can be discharged via the water exhaust nozzle 74.

[0051] The wheels 81, 82 comprise a pair of big wheels 81 of the rear of the brush body 21 and a pair of small wheels 82 of the rear of the rear block part 50 on a bottom surface of the brush body 21.

[0052] Referring to FIGS. 4 and 7, the ultraviolet ray lamp 90 is formed at the brush body 21 at rear sides of the small wheels 82 to sterilize the cleaning surface 2 completed with the wet cleaning. A reflection plate 93 made of a reflective material, such as stainless steel or aluminum, is formed over a top portion of the ultraviolet ray lamp 90 to maximally reflect the ultraviolet to a bottom portion of the ultraviolet ray lamp 90, which is radiated to the top portion from the ultraviolet ray lamp 90. A protection window 91 of transparent synthetic resinous fluorine-containing polymers, such as Teflon®, is formed at the bottom portion of the ultraviolet ray lamp 90. The protection window 91 may be formed by integrally projecting with a framework 92. Preferably, window 91 is made of a synthetic resinous fluorine-containing polymer that is capable of transmitting the ultraviolet rays emitted from lamp 90.

[0053] The cover 23 has two holes 24 to expose the two water exhaust nozzles 74 to the outside, and is attached onto the brush assembly 21 not to expose the above-described members to the outside.

[0054] The operations of the vacuum cleaner I with the wet cleaning function and the above structures according to embodiments of the present invention will be in detail explained with reference to FIGS. 1 through 9.

[0055] First, the case will be explained when the vacuum cleaner 1 according to an embodiment of the present invention performs the wet cleaning.

[0056] When performing the wet cleaning, the power switch 15 is on, and the mode switch 16 of the handle 11 is switched to a wet-cleaning mode. Then, the pump switch 17 is on to exhaust water from the two water exhaust nozzles 74 to the front of the brush assembly 20. As the pump switch 17 is on, the air pump 72 operates. The air pump 72 mixes

the water from the water supply hose 71 with air to discharge via the water exhaust hose 73. Then, the water mixed with air is exhausted via the two water exhaust nozzles 74. At this time, water or air alternatively flows in the water exhaust hose 73. Accordingly, while the air pump 72 operates, water is continuously exhausted, however, as the air pump 72 is stopped, air in the water exhaust hose 73 prevents water from flowing so that water remaining between the water exhaust nozzles 74 and the air pump 72 may be prevented from discharging via the water exhaust nozzle 74. If necessary, the exhaust amount of the air pump 72 may be adjusted to appropriately control the amount of water exhausted via the water exhaust nozzles 74.

[0057] As water is exhausted on the cleaning surface 2 of the front of the brush assembly 20, a user moves the brush assembly 20 forward and backward with the handle 11. Then, the front and the rear block parts 40, 50, the motor of motor assembly, and the motor 62 of the brush unit 60 operate so as to draw in water with contaminants and collect into the contaminant-collecting receptacle.

[0058] The operations of the front and the rear block parts 40, 50 will be in detail explained.

[0059] As the brush assembly 20 is on the cleaning surface 2, the bottom ends 41b, 52b of the front and the rear block parts 40, 50 are pressed by own weight of the brush assembly 20. As the brush assembly 20 moves forward in first direction A, the front block part 40 rotates counter-clockwise (in a direction of arrow C of FIG. 8) based on the rotation axes 42 with the rotation protrusion 43 contacted on the cleaning surface 2. Then, as the rotation degrees of the front block part 40 increases, the interval between the bottom end 41b of the block board 41 and the cleaning surface 2 gets greater. Since the bottom end 41b of the block board 41 is located at the highest position as the one side 44 of the rotation protrusion 43 is perpendicular to the cleaning surface 2 as shown in FIG. 8, the front contaminant suction path 3 of the front of the contaminant suction port 22 is entirely opened. As the brush assembly 20 moves forward in first direction A, the rear block part 50 has the rear block board 52 bent toward the rear side of the brush assembly 20. Since the plane surface 53 of the rear block board 52 is at front, the rear contaminant suction path 4 of the contaminant suction port 22 is blocked. Accordingly, contaminants are prevented from being drawn in from the rear side of the contaminant suction port 22. As described above, as the brush assembly 20 moves forward in first direction A, the front contaminant suction path 3 is opened by the front block part 40 and the rear contaminant suction path 4 is blocked by the rear block part 50. Therefore, the vacuum cleaner 1 according to an embodiment of the present invention may effectively draw in wet contaminants and water exhausted to the front of the brush assembly 20 with air.

[0060] As a user moves the brush assembly 20 backward in second direction B, the front block part 40 rotates clockwise (in a direction of arrow D of FIG. 9) based on the rotation axes 42 with the rotation protrusion 43 contacted on the cleaning surface 2 (refer to FIG. 9). As the rotation degrees increase, the bottom end 41b of the block part 41 gets lower so as to block the front contaminant suction path 3. As shown in FIG. 9, as the block board 41 is perpendicular to the cleaning surface 2, the front contaminant suction path 3 is entirely blocked. As the brush assembly 20

moves forward in second direction B, the rear block part 50 has the rear block board 52 bent toward the front of the brush assembly 20. At this time, since the rear block board 52 has at the rear side the protrusion surface 54, the rear of the contaminant suction port 22 is fluidly communicated with the contaminant suction port 22 via the spaces 56 between the plurality of protrusions 55 of the protrusion surface 54. Accordingly, the rear contaminant suction path 4 is opened. As described above, as the brush assembly 20 moves back in second direction B, the cleaner 1 mainly draws in and removes water remaining on the cleaning surface 2 although the brush assembly 20 moves forward.

[0061] As the power switch 15 is on, the brush motor 62 rotates. As the brush motor 62 rotates, the brush 61 receives a rotation force of the brush motor 62 via the pulleys 64, 65 and the belt 66 (refer to FIG. 3) and rotates. As the brush 61 rotates, the brush bristle 61b rotates, wiping the cleaning surface 2 so as to effectively remove wet stains from the cleaning surface 2. Since the brush bristles 61b take on the configuration of a circular arc for example, in concave form in the rotation direction E of the brush 61 (refer to FIG. 4), the contaminants and water removed from the cleaning surface 2 can be effectively pushed into the contaminant suction port 22.

[0062] As described above, as the brush assembly 20 moves forward or backward, the front block part 40 and the rear block part 50 selectively open or block the front and the rear contaminant suction paths 3, 4, and the brush 61 rotates, wiping the cleaning surface 2 so that contaminants and water may be effectively removed from the cleaning surface 2.

[0063] Next, the case will be explained when the vacuum cleaner 1 according to an embodiment of the present invention performs the general cleaning.

[0064] A user switches the mode switch 16 of the handle 11 to the general cleaning mode. Then, as the power switch 15 is pressed, the motor assembly of the main body 10 operates so that a suction force can be generated. The contaminants from the cleaning surface 2 are drawn in the contaminant suction port 22 of the brush assembly 20 by the suction force and collected in the contaminant-collecting receptacle. At this time, the brush motor 62 also operates to rotate the brush 61 of the contaminant suction port 22. In other words, the vacuum cleaner 1 according to embodiments of the present invention draws in contaminants from the cleaning surface 2 to clean up as the same as a general vacuum cleaner. However, the only difference is that the front and the rear block parts 40, 50 selectively operate as the brush assembly 20 moves forward or backward. In specific, as the brush assembly 20 moves forward in first direction A, the front block part 40 rotates by a certain degree to open the front contaminant suction path 3, and the rear block board 52 is bent in an opposite direction of the contaminant suction port 22 to block the rear contaminant suction path 4. On the contrary, as the brush assembly 20 moves back in second direction B, the front block part 40 rotates in an opposite direction of the above by a certain degree to block the front contaminant suction path 3, and the rear block board 52 is bent toward the contaminant suction port 22 to open the rear contaminant suction path 4.

[0065] Additionally, if the brush body 21 has the ultraviolet ray lamp 90 on the bottom surface, the cleaning surface 2 can be sterilized as the brush assembly 20 moves since the ultraviolet ray is emitted on the cleaning surface 2.

[0066] While the invention has been shown and described with reference to certain embodiments thereof, it will be understood by those skilled in the art that various changes in form and details may be made therein without departing from the spirit and scope of the invention as defined by the appended claims.

What is claimed is:

1. A vacuum cleaner with a wet cleaning function, comprising:

a main body;

a brush assembly having a contaminant suction port, a brush, and a water exhaust nozzle, the contaminant suction port facing a cleaning surface and defining a contaminate suction path, the brush rotating in contact with the cleaning surface, the contaminant suction port being in fluid communication with the main body; and

a front and a rear block parts formed at a front and a rear of the brush assembly on a bottom surface of the brush assembly to selectively open or block the contaminant suction path by a friction force against the cleaning surface.

2. The vacuum cleaner according to claim 1, wherein as one of the front block part and the rear block part opens the contaminant suction path, the other blocks the contaminant suction path.

3. The vacuum cleaner according to claim 2, wherein the front block part opens the contaminant suction path as the brush assembly moves forward.

4. The vacuum cleaner according to claim 1, wherein the front block part rotates a certain degree by a friction force against the cleaning surface to selectively open or block the contaminant suction path according to the rotated degree.

5. The vacuum cleaner according to claim 4, wherein the front block part comprises:

a block board taking on a configuration of plate to block the contaminant suction path of the front of the brush assembly;

a rotation axis formed at opposite ends of the block board and rotatably attached to the brush assembly; and

a rotation protrusion provided in a sector form at a side of the block board and of which an arc portion is extended from a leading end of the block board so that as the arc portion contacts the cleaning surface, the leading end of the block board distances from the cleaning surface.

6. The vacuum cleaner according to claim 4, wherein the rear block part comprises:

a head part fixed in a rear block part receiving groove of the brush assembly; and

a rear block board having a plane surface and a protrusion surface with a consecutive plurality of protrusions of a regular interval, a part of each leading end of the plane surface or the protrusion surface is selectively pressed against the cleaning surface according to a movement direction of the brush assembly.

7. The vacuum cleaner according to claim 1, wherein brush assembly further comprises:

an air pump for exhausting water including air via the water exhaust nozzle.

8. The vacuum cleaner according to claim 7, further comprising:

a mode switch formed in the main body to select one of a general cleaning and a wet cleaning, and

a pump switch selectively operating the air pump to exhaust water via the water exhaust nozzle as the mode switch is selected to the wet cleaning.

9. The vacuum cleaner according to claim 1, wherein the water exhaust nozzle comprises one or more water exhaust nozzles on the front of the brush assembly.

10. The vacuum cleaner according to claim 1, further comprising:

an ultraviolet ray lamp provided at a rear of the rear block part on the bottom surface of the brush assembly to sterilize the cleaning surface.

11. The vacuum cleaner according to claim 10, wherein the ultraviolet ray lamp has a cover made of synthetic resinous fluorine-containing polymers.

12. A vacuum cleaner with a wet cleaning function, comprising:

a main body;

a brush assembly having a contaminant suction port facing a cleaning surface, a brush rotating in contact with the cleaning surface, and a water exhaust nozzle, the contaminant suction port being in fluid communication with the main body; and

a front and a rear block parts formed at a front and a rear of the brush assembly on a bottom surface of the brush assembly to selectively open or block a contaminant suction path by a friction force against the cleaning surface;

wherein, as the brush assembly moves forward, the front block part opens the contaminant suction path and the rear block part blocks the contaminant suction path.

13. The vacuum cleaner according to claim 12, wherein the front block part comprises:

a block board taking on a configuration of a plate to block the contaminant suction path at the front of the brush assembly;

a rotation axis formed at both ends of the block board and rotatably attached to the brush assembly; and

a rotation protrusion provided in a form of a sector at a side of the block board and of which an arc portion is extended from a leading end of the block board so that as the arc portion contacts the cleaning surface the leading end of the block board distances from the cleaning surface.

14. The vacuum cleaner according to claim 12, wherein the rear block part comprises:

a head part fixed in a rear block part receiving groove of the brush assembly;

a rear block board having a plane front surface and a rear protrusion surface with a consecutive plurality of protrusions of a regular interval, a part of each leading end of the plane front surface or the rear protrusion surface is selectively pressed against the cleaning surface according to a movement direction of the brush assembly.

15. The vacuum cleaner according to claim 12, wherein brush assembly further comprises:

an air pump for exhausting water including air via the water exhaust nozzle.

16. The vacuum cleaner according to claim 15, further comprising:

a mode switch formed in the main body to select one of a general cleaning and a wet cleaning, and

a pump switch selectively operating the air pump to exhaust water via the water exhaust nozzle as the mode switch is selected to the wet cleaning.

17. A vacuum cleaner with a wet cleaning function, comprising:

a contaminant suction port facing a cleaning surface to define a contaminant suction path;

a rotating brush in contact with the cleaning surface;

a front block part formed at a front of the rotating brush; and

a rear block part formed at a rear of the rotating brush, the front block part opening the contaminant suction path and the rear block part blocking the contaminant suction path as the vacuum cleaner moves in a first

direction, the front block part blocking the contaminant suction path and the rear block part opening the contaminant suction path as the vacuum cleaner moves in a second direction.

18. The vacuum cleaner according to claim 17, wherein the front block part comprises a block board and a rotation protrusion extended from a leading end of the block board so that as the vacuum cleaner moves in the first direction the leading end of the block board distances from the cleaning surface.

19. The vacuum cleaner according to claim 18, wherein the rear block part comprises a rear block board having a plane surface and a protrusion surface, the rear block board bending as the vacuum cleaner moves in the first direction so that the plane surface is pressed against the cleaning surface and bending as the vacuum cleaner moves in the second direction so that the protrusion surface is pressed against the cleaning surface.

20. The vacuum cleaner according to claim 17, wherein the front and rear block parts selectively open or block the contaminant suction path by a friction force against the cleaning surface.

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