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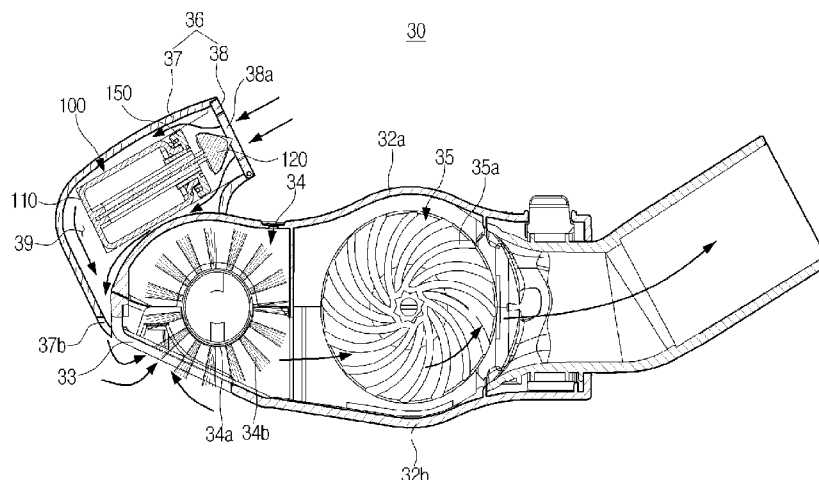
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(54) Title: SUCTION NOZZLE AND VACUUM CLEANER HAVING THE SAME

[Fig. 3]



(57) Abstract: A suction nozzle and a vacuum cleaner having the suction nozzle are disclosed. A suction nozzle according to an exemplary embodiment of the invention includes an external casing which comprises at least one suction port for drawing in dirt or dust from a surface being cleaned and a mounting chamber adjacent to the suction port; and, an injection assembly which is detachably attached to the mounting chamber and injects a surface-improving material onto a surface being cleaned using a suction force.

Description

SUCTION NOZZLE AND VACUUM CLEANER HAVING THE SAME

Technical Field

- [1] The present invention relates to a suction nozzle which injects a surface-improving material and a vacuum cleaner having the same.

Background Art

- [2] Vacuum cleaners are devices which generally draw in dirt from a surface being cleaned using a suction force generated by a vacuum source, and collect the dirt. Various types of vacuum cleaners have been developed and used, and performance of the vacuum cleaners has steadily improved.
- [3] However, there is demand from users for a vacuum cleaner that simultaneously performs other operations in addition to a cleaning operation, regardless of achievement of performance. For example, if a surface being cleaned is made of some kind of fabric, such as a carpet or bedding, a user may desire to remove a disgusting smell or bacteria from the surface, at the same time as clearing the surface using a vacuum cleaner.
- [4] Accordingly, there is a need to develop a vacuum cleaner having functions other than the function of cleaning a surface.

Disclosure of Invention

Technical Problem

- [5] The present invention is intended to provide a suction nozzle capable of concurrently performing other operations in addition to a cleaning operation, and a vacuum cleaner having the same.

Technical Solution

- [6] In order to achieve the above-described aspects of the present invention, the present invention provides a suction nozzle for a vacuum cleaner including an external casing which comprises at least one suction port for drawing in dirt or dust from a surface being cleaned and a mounting chamber adjacent to the suction port; and an injection assembly which is detachably attached to the mounting chamber and injects a surface-improving material onto a surface being cleaned using a suction force.
- [7] In order to achieve the above-described aspects of the present invention, the present invention provides a vacuum cleaner including a cleaner body having a vacuum source for generating a suction force and a suction nozzle for drawing in dirt or dust from a surface being cleaned, wherein the suction nozzle includes an external casing which comprises at least one suction port for drawing in dirt or dust from a surface being

cleaned and a mounting chamber adjacent to the suction port; and an injection assembly which is detachably attached to the mounting chamber and injects a surface-improving material onto a surface being cleaned using a suction force.

- [8] The external casing may include a main casing on which the suction port is formed; and a mounting casing which is disposed on an external surface of the main casing and which houses the mounting chamber.
- [9] At least one injection opening through which the surface-improving material is injected may be formed on a first side of the mounting casing, and at least one air inlet through which outside air enters the mounting chamber may be formed on a second side.
- [10] The injection assembly may include a storage receptacle which comprises a storage chamber for storing the surface-improving material therein and an entrance through which the surface-improving material enters and exits; a opposing body which is disposed to be opposite the entrance at a specific distance so that a discharge way for discharging the evaporated surface-improving material is formed between the opposing body and the entrance; and a valve means which impedes fluid communication between the storage chamber and the discharge way when the outside air does not flow into the mounting casing, and which maintains the fluid communication between the storage chamber and the discharge way when the outside air flows into the mounting casing.
- [11] The valve means may include a valve member which selectively moves to a first position where the valve means impedes the fluid communication between the storage chamber and the discharge way and a second position where the valve means maintains the fluid communication between the storage chamber and the discharge way; and an elastic member which presses the valve member toward the opposing body, wherein the valve member is moved from the first position to the second position by compression of the outside air flowing into the mounting casing.
- [12] The opposing body may include an opposing surface which is disposed opposite the entrance of the storage receptacle; and an inclined surface which is formed to be inclined to the opposing surface and which guides the outside air flowing into the mounting casing to the valve member.
- [13] The storage receptacle may include a storage part which comprises the storage chamber; and an entrance part which protrudes from the storage part and comprises the entrance on an end of the entrance part, wherein the valve member may include a contact part which comprises a contact surface which contacts to the opposing surface of the opposing body if the valve member is disposed to the first position; an insertion part which protrudes from a center of the contact part and is inserted into the entrance part of the storage receptacle; and a penetrating hole which penetrates the contact part

and the insertion part in order to fluidly communicate with the storage chamber of the storage receptacle, wherein the elastic member is a coil spring, is disposed so as to surround outside of the entrance part, and presses the contact part toward the opposing body.

- [14] The injection assembly may further include a sealing member which seals a gap between a contact surface of the valve member and an opposing surface of the opposing body when the valve member is disposed to the second position, wherein a sealing member containing groove having a configuration corresponding to that of the sealing member is concavely formed on the contact surface of the valve member so that the sealing member is inserted on the contact surface of the valve member, wherein a contact rib having a configuration corresponding to that of the sealing member is protruding on the opposing surface of the opposing body so that the valve member contacts to the sealing member if the valve member is disposed to the second position.
- [15] The injection assembly may further include a coupling rod which extends from the center of the opposing body and is coupled with an interior bottom of the storage part of the storage receptacle.
- [16] The surface-improving material may be a volatile liquid material, and the injection assembly may further include a porous member which surrounds at least one part of the coupling rod, and absorbs the surface-improving material in the storage chamber and thus pumps up the surface-improving material to a vicinity of the entrance of the receptacle.
- [17] The mounting casing may include a recipient part in which the injection opening is formed on a side and a mounting opening for the entrance of the injection assembly is formed on another side, and houses the injection assembly therein; and a mounting door which opens or closes the mounting opening, wherein the at least one air inlet is formed on the mounting door.
- [18] The surface being cleaned may include a carpet or bedding, and the surface-improving material comprises one of an aromatic solution, an antimicrobial solution, a fabric protectant, and a fabric softener.

Advantageous Effects

- [19] According to an aspect of the present invention, an injection assembly is assembled to a suction nozzle of a vacuum cleaner and thus a surface-improving material is concurrently injected while cleaning dust from the surface. Accordingly, the condition of the surface being cleaned may be improved by the use of the surface-improving material while being cleaned.
- [20] According to another aspect of the present invention, the injection assembly is de-

tachably attached to the suction nozzle and also may be easily disassembled. Accordingly, the surface-improving material may be replenished in the receptacle in the injection assembly whenever the need arises.

Brief Description of Drawings

- [21] FIG. 1 is a perspective view illustrating a vacuum cleaner according to an exemplary embodiment of the present invention;
- [22] FIG. 2 is an enlarged perspective view illustrating a suction nozzle of the vacuum cleaner of FIG. 1;
- [23] FIG. 3 is a sectional view illustrating a suction nozzle of FIG. 2 in a case where the vacuum cleaner is driven;
- [24] FIG. 4 is an exploded perspective view illustrating an injection assembly of FIG. 3;
- [25] FIG. 5 is a sectional view illustrating the injection assembly of FIG. 3 in a case where the vacuum cleaner is not driven;
- [26] FIG. 6 is a sectional view illustrating the injection assembly of FIG. 3 in a case where the vacuum cleaner is driven.

Best Mode for Carrying out the Invention

- [27] Hereinbelow, a vacuum cleaner according to an exemplary embodiment of the present invention will be explained in detail with reference to the accompanying drawings.
- [28] FIG. 1 is a perspective view illustrating a vacuum cleaner according to an exemplary embodiment of the present invention.
- [29] Referring to FIG. 1, the vacuum cleaner according to an exemplary embodiment of the present invention comprises a cleaner body 10, a connection part 20, and a suction nozzle 30.
- [30] The cleaner body 10 houses a vacuum source (not shown) therein, which generates a suction force and includes a dust separating apparatus (not shown) which separates dirt or dust from air drawn in from a surface being cleaned and collects the dirt or dust.
- [31] The connection part 20 connects the cleaner body 10 to the suction nozzle 30 and guides dust-laden air drawn in by the suction nozzle 30 to the cleaner body 10. The connection part 20 includes a handle part 40 which is grasped and manipulated by a user, a suction hose 50 which is made of elastic material and connects the cleaner body 10 with the handle part 40, and an extension pipe 60 which connects the handle part 40 with the suction nozzle 30.
- [32] The suction nozzle 30 moves along a surface being cleaned during a cleaning operation and draws in dust-laden air from the surface using a suction force generated by a vacuum source of the cleaner body 10.
- [33] FIG. 2 is an enlarged perspective view illustrating the suction nozzle of the vacuum

cleaner of FIG. 1, and FIG. 3 is a sectional view illustrating the suction nozzle of FIG. 2 in a case where the vacuum cleaner is driven.

[34] Referring to FIGS. 2 and 3, the suction nozzle 30 includes an external casing 31 which forms the external appearance of the suction nozzle 30, and a plurality of parts which are housed inside the external casing 31, that is a drum brush 34, a driving fan 35, and an injection assembly 100.

[35] The external casing 31 includes a main casing 32 which is connected to the extension pipe 60 of the vacuum cleaner and a mounting casing 36 which is disposed on the external surface of the main casing 32.

[36] The main casing 32 includes an upper casing 32a and a lower casing 32b which are connected complementarily to each other. A plurality of suction ports 33 are formed on the front end of the lower casing 32b, and dust-laden air is thereby drawn in from the surface being cleaned.

[37] The mounting casing 36 is disposed on the external surface of the upper casing 32a. A mounting chamber 39 housing the injection assembly 100, which is explained below, is formed inside the mounting casing 36. An injection opening 37b through which a vapor material generated from the injection assembly 100 is injected is formed on a portion of the mounting casing 36, and a plurality of air inlets 38a through which outside air enters the mounting chamber 39 are formed on another portion of the mounting casing 36.

[38] Referring to FIG. 3, the mounting casing 36 is disposed on the front end of the upper casing 32a of the main casing 32, and thus the injection opening 37b of the mounting casing 36 is positioned adjacent to the suction ports 33 formed on the lower casing 32b. Part of the suction force transmitted from the cleaner body 10 to the suction ports 33 may be effectively applied to the injection opening 37b of the mounting casing 36. Therefore, when the suction force is applied to the suction ports 33, outside air may enter the mounting casing 36 through the air inlet 38a fluidly communicating with the injection opening 37b.

[39] The mounting casing 36 consists of a recipient part 37 and a mounting door 38. The recipient part 37 includes a mounting chamber 39 therein and is fixedly mounted to the upper casing 32a. The injection opening 37b is formed on a portion of the recipient part 37 and a mounting opening 37a having a semicircular shape is formed on another portion.

[40] The mounting door 38 is formed in a shape corresponding to the shape of the mounting opening 37a, and is hinged with the recipient part 37 to open and close the mounting opening 37a. Accordingly, a user opens the mounting door 38 and attaches the injection assembly 100 to the recipient part 37 or detaches the injection assembly 100 from the recipient part 37. The plurality of air inlets 38a described above are

formed in the mounting door 38.

[41] The drum brush 34 is rotatably mounted in an inner space of the main casing 32, and includes a drum brush body 34a having a cylindrical shape and a plurality of bristles 34b planted radially around the circumference thereof. The drum brush 34 rotates during a cleaning operation, thereby causing the plurality of bristles 34b to strike a surface being cleaned, such as a carpet or bedding. Therefore, dirt or dust attached to the surface being cleaned, such as a carpet or bedding, is easily detached and the cleaning efficiency may be enhanced.

[42] The driving fan 35 is disposed in the inner space of the main casing 32 so that the rotating shaft is parallel with the rotating shaft of the drum brush 34. The driving fan 35 includes a plurality of blades 35a which enable the driving fan 35 to be rotated by air sucked into the main casing 32. The rotating force of the driving fan 35 is transferred to the drum brush 34 through a belt member (not shown) and thus the drum brush 34 is rotated along with the rotation of the driving fan 35.

[43] The injection assembly 100 is housed in the mounting chamber 39 in the mounting casing 36, and when the vacuum cleaner is driven, the injection assembly 100 injects a surface-improving material onto a surface being cleaned through the injection opening 37b of the mounting casing 36.

[44] Such an injection assembly 100 is explained in detail with reference to FIGS. 4, 5, and 6.

[45] FIG. 4 is an exploded perspective view illustrating the injection assembly of FIG. 3, FIG. 5 is a sectional view illustrating the injection assembly of FIG. 3 in a case where the vacuum cleaner is not driven, and FIG. 6 is a sectional view illustrating the injection assembly of FIG. 3 in a case where the vacuum cleaner is driven. In FIG. 6, a solid line arrow A schematically represents the flow of outside air adjacent to the injection assembly 100, and a dotted line arrow B schematically represents the flow of the evaporated surface-improving material.

[46] The injection assembly 100 includes a receptacle 110, an opposing body 120, a coupling rod 130, a valve means 140, a sealing member 170, and a porous member 180.

[47] The receptacle 110 stores a surface-improving material I therein. The receptacle 110 consists of a storage part 111 having a rectangular parallelepiped shape and an entrance part 115 having a cylindrical shape. The storage part 111 includes a storage chamber 112 which stores a surface-improving material I and a female thread part 113 coupled with the coupling rod 130, which forms a protrusion on the bottom interior part of the storage part 111. The entrance part 115 is formed integrally with the storage part 111 and includes an entrance hole 116 through which the surface-improving material I flows into or out of the storage chamber 112.

- [48] The surface-improving material I stored in the receptacle 110 may be an aromatic material made of volatile liquid which removes a bad smell from a surface being cleaned. Accordingly, if the entrance hole 116 of the receptacle 110 is opened so as to be externally exposed, the surface-improving material I evaporates and flows outward. According to another exemplary embodiment of the present invention, the surface-improving material I may be any of various materials to improve the surface condition, such as an antimicrobial solution, a fabric softener, or a fabric conditioner, instead of the aromatic solution. While the surface-improving material I is a liquid in this exemplary embodiment of the present invention, it may also be a volatile solid.
- [49] The opposing body 120 is formed approximately in a conical shape and disposed apart from the entrance part 115 of the receptacle 110 at a specific distance. The opposing body 120 includes an opposite surface 121 which is disposed opposite the entrance part 115 and an inclined surface 123 which is formed so as to be inclined to the opposite surface 121. The opposite surface 121 forms a discharge way W (referring to FIG. 6) through which the evaporated surface-improving material I existing in the entrance part 115 is discharged from the receptacle 110. The inclined surface 123 has a function to guide outside air entering the mounting casing 36 to a valve member 150.
- [50] The coupling rod 130 is formed in a bar shape and extends from the center of the opposite surface 121 of the opposing body 120. A male thread part 131 to be screwed and fitted into the female thread part 113 formed on the bottom interior of the receptacle 110 is integrally formed with an end part of the coupling rod 130. The coupling rod 130 and the opposing body 120 may be detachably attached to the receptacle 110.
- [51] The valve means 140 includes the valve member 150 and an elastic member 160.
- [52] The valve member 150 includes a contact part 151 disposed opposite the opposite surface 121 of the opposing body 120, an insertion part 153 protruding from the center of the contact part 151 and having a cylindrical shape, an elastic member containing part 155 protruding from the circumference of the contact part 151, and a penetrating hole 157 penetrating the contact part 151 and the insertion part 153.
- [53] The contact part 151 is formed approximately in a circular plate shape, and the penetrating hole 157 passes through the center of the contact part 151. The contact part 151 includes a contact surface 152 which is selectively attached to the opposite surface 121 or detached from the opposite surface 121 of the opposing body 120. A groove 152a containing a sealing member 170 is concavely formed on the contact surface 152.
- [54] The insertion part 153 is slidably inserted into the entrance part 115 of the receptacle 110. The internal diameter of the entrance part 115 is approximately the same as the external diameter of the insertion part 153 so that the insertion part 153 slides easily into the entrance part 115. The penetrating hole 157 passes through the center of the

insertion part 153.

- [55] An elastic member containing groove 156 is concavely formed on the elastic member containing part 155, and an end of the elastic member 160 is mounted in the elastic member containing groove 156.
- [56] The elastic member 160 serves as a spring having the form of a coil and is disposed to surround an external surface of the entrance part 115 of the receptacle 110, and an end of the elastic member 160 is inserted in the elastic member containing groove 156 of the valve member 150. The elastic member 160 presses the valve member 150 towards the opposing body 120.
- [57] Referring to FIG. 5, if outside air does not flow into the mounting casing 36 (referring to FIG. 3) through the air inlet 38a (referring to FIG. 2), the valve member 150 is positioned in the first position where the valve member 150 contacts the opposing body 120 by elastic force of the elastic member 160. In this situation, a fluid communication between the penetrating hole 157 of the valve member 150 and the discharge way W (referring to FIG. 6) is prevented, and accordingly a fluid communication between the storage chamber 112 of the receptacle 110 and the discharge way W is prevented. If the valve member 150 is positioned in the first position, the discharge way W is clogged. Accordingly, although the surface-improving material I of the receptacle 110 evaporates, the evaporated surface-improving material I does not leak out toward the mounting chamber 39 (referring to FIG. 3) of the mounting casing 36.
- [58] Referring to FIG. 6, if outside air flows into the mounting casing 36 through the air inlet 38a, the outside air presses the contact surface 152 of the valve member 150, and accordingly the elastic member 160 is compressed and concurrently the valve member 150 is positioned in the second position wherein the valve member 150 is apart from the opposing body 120. The penetrating hole 157 of the valve member 150 fluidly communicates with the discharge way W, and thus the storage chamber 112 of the receptacle 110 fluidly communicates with the discharge way W. If the valve member 150 is positioned in the second position, the discharge way W is opened. Accordingly, the surface-improving material I which has evaporated in the receptacle 110 may flow into the mounting chamber 39 of the mounting casing 36 through the discharge way W.
- [59] The sealing member 170 is inserted into the groove 152a formed on the contact surface 152 of the valve member 150. A contact rib 122 having a configuration corresponding to that of the sealing member 170 (referring to FIG. 5) protrudes from the opposite surface 121 of the opposing body 120. If the valve member 150 is positioned in the first position, the sealing member 170 contacts with the contact rib 122, thereby causing a minute gap between the valve member 150 and the opposing body 120 to be sealed.

- [60] The porous member 180 is a sponge having a connecting hole 181 therein made of polyurethane and embraces the coupling rod 130. Referring to FIG. 5, an end of the porous member 180 is disposed on the bottom of the receptacle 110 and another end of the porous member 180 is disposed on the entrance part 115 of the receptacle 110. The porous member 180 absorbs the liquid surface-improving material I stored in the receptacle 110 and pumps up the surface-improving material I to the entrance part 115. Accordingly, the amount of the surface-improving material I discharged from the receptacle 110 to the mounting chamber 39 of the mounting casing 36 may be increased.
- [61] If the surface-improving material I is solid in form, unlike that of the exemplary embodiment of the present invention, the porous member 180 may not be provided.
- [62] The operation of the vacuum cleaner according to the exemplary embodiment of the present invention will be explained with reference to FIGS. 3, 5, and 6. As described above, FIG. 5 illustrates a case in which the vacuum cleaner is not driven, and FIGS. 3 and 6 illustrates a case in which the vacuum cleaner is driven.
- [63] If the vacuum cleaner according to the exemplary embodiment of the present invention is not driven, the vacuum source of the cleaner body 10 does not generate the suction force, and thus no suction force is applied to the suction ports 33 of the lower casing 32b and the injection opening 37b of the mounting casing 36. In this situation, referring to FIG. 5, as the elastic force of the elastic member 160 toward the opposing body 120 is the only force applied to the valve member 150 of the injection assembly 100, the valve member 150 is positioned in the first position where the valve member 150 contacts the opposing body 120.
- [64] If the valve member 150 is positioned in the first position, the discharge way W formed in a space between the entrance part 115 of the receptacle 110 and the opposite surface 121 of the opposing body 120 is clogged. The storage chamber 112 of the receptacle 110 does not fluidly communicate with the mounting chamber 39 of the mounting casing 36, and accordingly the surface-improving material I is prevented from being discharged outside the receptacle 110.
- [65] If the vacuum cleaner according to the exemplary embodiment of the present invention is driven, the vacuum source of the cleaner body 10 generates the suction force and such suction force is applied to the suction ports 33 of the lower casing 32b as shown in FIG. 3. Accordingly, outside air is drawn into the main casing 32 together with the dust or dirt through the suction ports 33 and the driving fan 35 is made to rotate by the outside air, thereby driving the rotation of the drum brush 34.
- [66] Part of the suction force generated by the vacuum source is applied to the injection opening 37b of the mounting casing 36. Accordingly, outside air enters the mounting casing 36 through the plurality of air inlets 38a formed on the mounting casing 36. The air flowing into the mounting casing 36 passes through the mounting chamber 39 in the

mounting casing 36 and is injected onto the surface being cleaned through the injection opening 37b.

[67] Part of the air entering the mounting casing 36 presses the valve member 150 of the injection assembly 100 toward the receptacle 110 while the air passes through the mounting chamber 39 in the mounting casing 36. Then, the elastic member 160 is compressed and the valve member 150 is positioned in the second position where the valve member 150 is disposed apart from the opposing body 120 as shown in FIG. 6. In this situation, the discharge way W between the entrance part 115 of the receptacle 110 and the opposite surface 121 of the opposing body 120 is opened and accordingly the storage chamber 112 of the receptacle 110 fluidly communicates with the mounting casing 36 of the mounting chamber 39 (referring to FIG. 3).

[68] If the discharge way W is opened, the surface-improving material I in a liquid state which is pumped up to the entrance part 115 by the porous member 180 is actively evaporated and the evaporated surface-improving material I flows together with the outside air which has entered the mounting chamber 36 and is injected onto the surface being cleaned through the injection opening 37b. The surface-improving material I injected onto the surface being cleaned adheres to the surface and thus improves the surface conditions. If the surface-improving material I is an aromatic material as described in this exemplary embodiment of the present invention, bad smells in the surface being cleaned may be removed. A material having other functions may also be applied to other exemplary embodiments of the present invention as described above.

[69] As described above, according to the exemplary embodiment of the present invention, if the injection assembly is assembled to the suction nozzle of the vacuum cleaner, the material can be concurrently injected during the cleaning operation. Therefore, the condition of the surface being cleaned may be improved according to the application of the surface-improving material during the cleaning operation of the surface being cleaned.

[70] The injection assembly is detachably attached to the suction nozzle and may also be easily taken apart. Accordingly, the surface-improving material may be replenished in the receptacle in the injection assembly whenever the need arises.

[71] Although a few embodiments of the present general inventive concept have been shown and described, it will be appreciated by those skilled in the art that changes may be made in these embodiments without departing from the principles and spirit of the general inventive concept, the scope of which is defined in the appended claims and their equivalents.

Claims

- [1] A suction nozzle for a vacuum cleaner, comprising:
an external casing which comprises at least one suction port for drawing in dirt or dust from a surface being cleaned and a mounting chamber adjacent to the suction port; and
an injection assembly which is detachably attached to the mounting chamber and injects a surface-improving material onto a surface being cleaned using a suction force.
- [2] The suction nozzle of claim 1, wherein the external casing comprises:
a main casing on which the suction port is formed; and
a mounting casing which is disposed on an external surface of the main casing and which houses the mounting chamber.
- [3] The suction nozzle of claim 2, wherein at least one injection opening through which the surface-improving material is injected is formed on a first side of the mounting casing, and at least one air inlet through which outside air enters the mounting chamber is formed on a second side.
- [4] The suction nozzle of claim 3, wherein the injection assembly comprises:
a storage receptacle which comprises a storage chamber for storing the surface-improving material therein and an entrance through which the surface-improving material enters and exits;
a opposing body which is disposed to be opposite the entrance at a specific distance so that a discharge way for discharging the evaporated surface-improving material is formed between the opposing body and the entrance; and
a valve means which impedes fluid communication between the storage chamber and the discharge way when the outside air does not flow into the mounting casing, and which maintains the fluid communication between the storage chamber and the discharge way when the outside air flows into the mounting casing.
- [5] The suction nozzle of claim 4, wherein the valve means comprises:
a valve member which selectively moves to a first position where the valve means impedes the fluid communication between the storage chamber and the discharge way and a second position where the valve means maintains the fluid communication between the storage chamber and the discharge way; and
an elastic member which presses the valve member toward the opposing body, wherein the valve member is moved from the first position to the second position by compression of the outside air flowing into the mounting casing.
- [6] The suction nozzle of claim 5, wherein the opposing body comprises:

an opposing surface which is disposed opposite the entrance of the storage receptacle; and

an inclined surface which is formed to be inclined to the opposing surface and which guides the outside air flowing into the mounting casing to the valve member.

- [7] The suction nozzle of claim 6, wherein the storage receptacle comprises:
a storage part which comprises the storage chamber; and
an entrance part which protrudes from the storage part and comprises the entrance on an end of the entrance part,
wherein the valve member comprises:
a contact part which comprises a contact surface which contacts to the opposing surface of the opposing body if the valve member is disposed to the first position;
an insertion part which protrudes from a center of the contact part and is inserted into the entrance part of the storage receptacle; and
a penetrating hole which penetrates the contact part and the insertion part in order to fluidly communicate with the storage chamber of the storage receptacle, wherein the elastic member is a coil spring, is disposed so as to surround outside of the entrance part, and presses the contact part toward the opposing body.

- [8] The suction nozzle of claim 7, wherein the injection assembly further comprises a sealing member which seals a gap between a contact surface of the valve member and an opposing surface of the opposing body when the valve member is disposed to the second position,
wherein a sealing member containing groove having a configuration corresponding to that of the sealing member is concavely formed on the contact surface of the valve member so that the sealing member is inserted on the contact surface of the valve member,
wherein a contact rib having a configuration corresponding to that of the sealing member is protruding on the opposing surface of the opposing body so that the valve member contacts to the sealing member if the valve member is disposed to the second position.

- [9] The suction nozzle of claim 5, wherein the injection assembly further comprises a coupling rod which extends from the center of the opposing body and is coupled with an interior bottom of the storage part of the storage receptacle.

- [10] The suction nozzle of claim 9, wherein the surface-improving material is a volatile liquid material, and the injection assembly further comprises a porous member which surrounds at least one part of the coupling rod, and absorbs the surface-improving material in the storage chamber and thus pumps up the

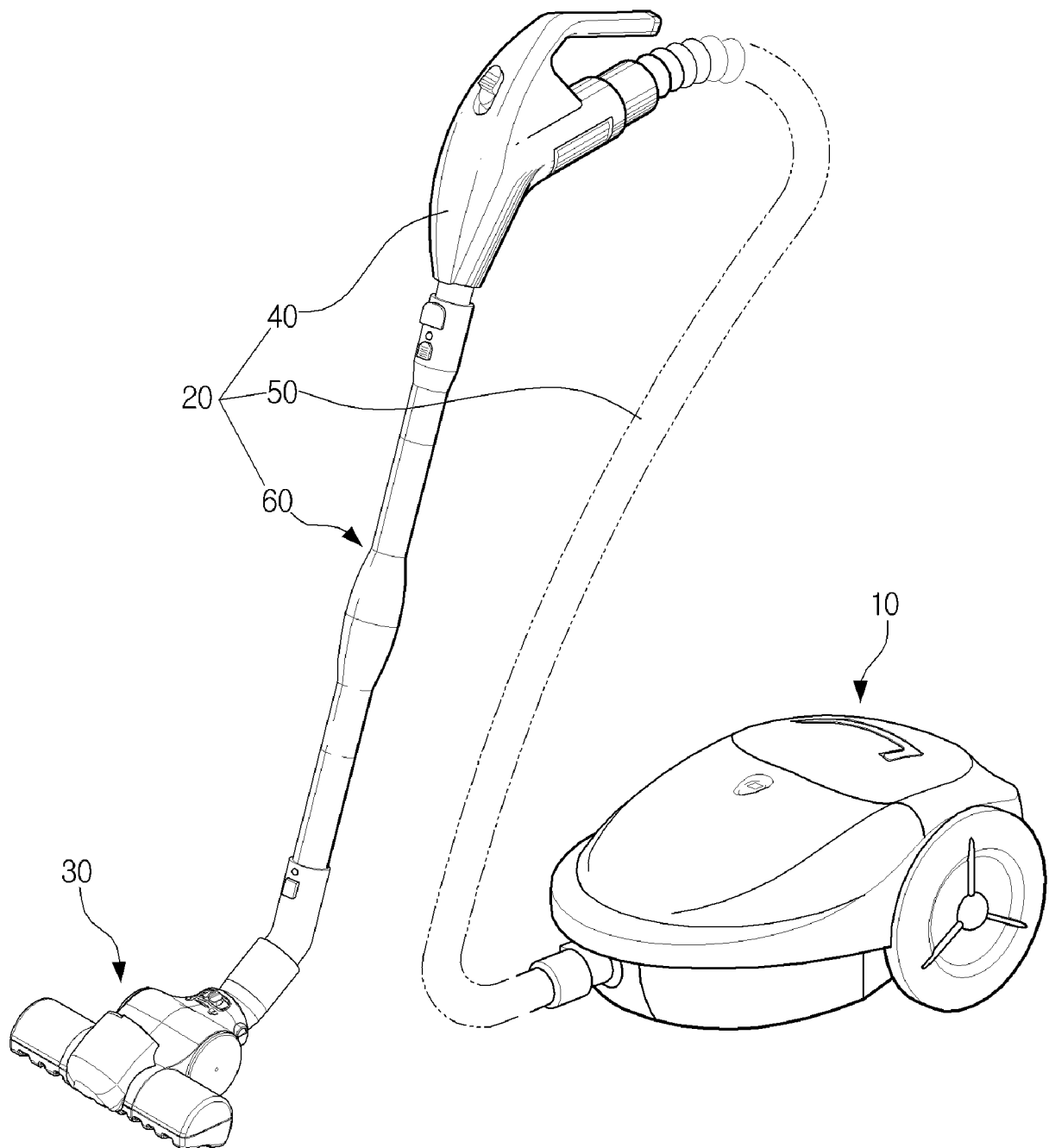
- surface-improving material to a vicinity of the entrance of the receptacle.
- [11] The suction nozzle of claim 3, wherein the mounting casing comprises:
a recipient part in which the injection opening is formed on a side and a mounting opening for the entrance of the injection assembly is formed on another side, and houses the injection assembly therein; and
a mounting door which opens or closes the mounting opening,
wherein the at least one air inlet is formed on the mounting door.
- [12] The suction nozzle of one of claims 1 to 11, wherein the surface being cleaned comprises a carpet or bedding, and the surface-improving material comprises one of an aromatic solution, an antimicrobial solution, a fabric protectant, and a fabric softener.
- [13] A vacuum cleaner which comprises a cleaner body having a vacuum source for generating a suction force and a suction nozzle for drawing in dirt or dust from a surface being cleaned, wherein the suction nozzle comprises:
an external casing which comprises at least one suction port for drawing in dirt or dust from a surface being cleaned and a mounting chamber adjacent to the suction port; and
an injection assembly which is detachably attached to the mounting chamber and injects a surface-improving material onto a surface being cleaned using a suction force.
- [14] The vacuum cleaner of claim 13, wherein the external casing comprises:
a main casing on which the suction port is formed; and
a mounting casing which is disposed on an external surface of the main casing and which houses the mounting chamber,
wherein at least one injection opening through which the surface-improving material is injected is formed on a first side of the mounting casing, and at least one air inlet through which outside air enters the mounting chamber is formed on a second side.
- [15] The vacuum cleaner of claim 14, wherein the injection assembly comprises:
a storage receptacle which comprises a storage chamber for storing the surface-improving material therein and an entrance through the surface-improving material enters and exits;
an opposing body which is disposed to be opposite the entrance at a specific distance so that a discharge way for discharging the evaporated surface-improving material is formed between the opposing body and the entrance; and
a valve means which impedes fluid communication between the storage chamber and the discharge way when the outside air does not flow into the mounting casing, and which maintains the fluid communication between the storage

chamber and the discharge way when the outside air flows into the mounting casing.

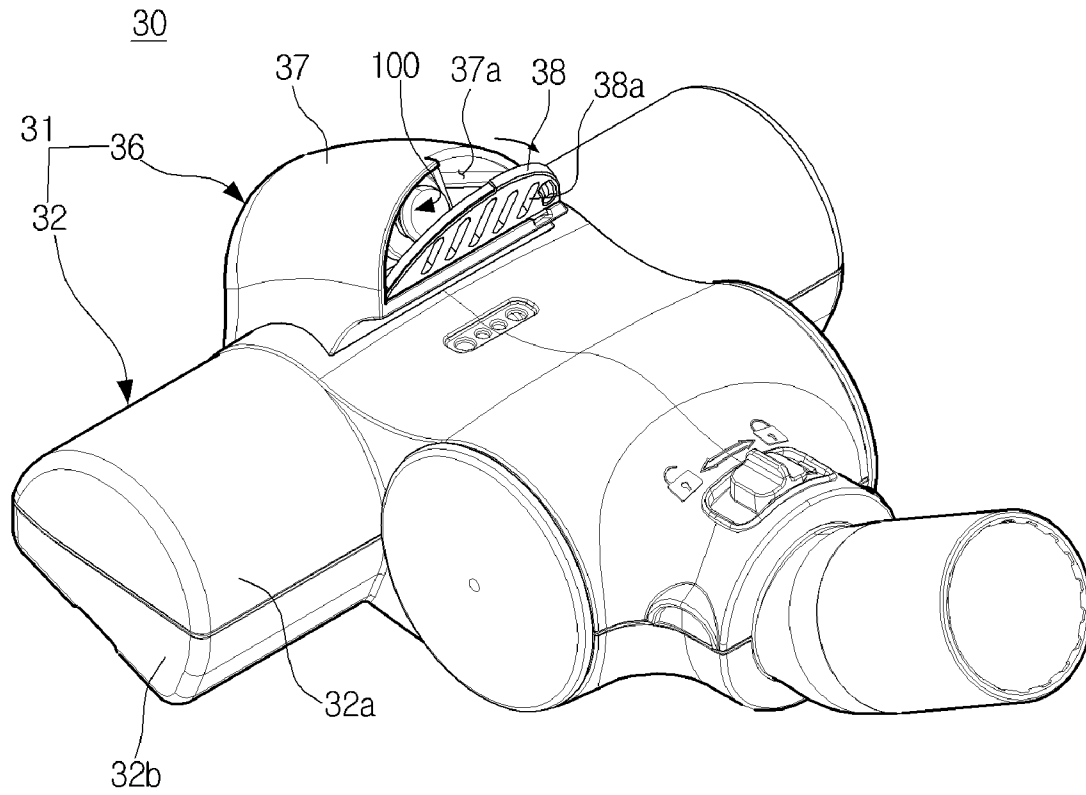
- [16] The vacuum cleaner of claim 15, wherein the valve means comprises:
a valve member which selectively moves to a first position where the valve means impedes the fluid communication between the storage chamber and the discharge way and a second position where the valve means maintains the fluid communication between the storage chamber and the discharge way; and
an elastic member which presses the valve member toward the opposing body, wherein the valve member is moved from the first position to the second position by compression of the outside air flowing into the mounting casing.
- [17] The vacuum cleaner of claim 16, wherein the storage receptacle comprises:
a storage part which comprises the storage chamber; and
an entrance part which protrudes from the storage part and comprises the entrance on an end of the entrance part,
wherein the valve member comprises:
a contact part which comprises a contact surface which contacts to the opposing surface of the opposing body if the valve member is disposed to the first position;
an insertion part which protrudes from a center of the contact part and is inserted into the entrance part of the storage receptacle; and
a penetrating hole which penetrates the contact part and the insertion part in order to fluidly communicate with the storage chamber of the storage receptacle, wherein the elastic member is a coil spring, is disposed so as to surround outside of the entrance part, and presses the contact part toward the opposing body.
- [18] The vacuum cleaner of claim 16, wherein the injection assembly further comprises a coupling rod which extends from the center of the opposing body and is coupled with an interior bottom of the storage part of the storage receptacle.
- [19] The vacuum cleaner of claim 18, wherein the surface-improving material is a volatile liquid material, and the injection assembly further comprises a porous member which surrounds at least one part of the coupling rod, and absorbs the surface-improving material in the storage chamber and thus pumps up the surface-improving material to a vicinity of the entrance of the receptacle.
- [20] The vacuum cleaner of claim 14, wherein the mounting casing comprises:
a recipient part in which the injection opening is formed on a side and a mounting opening for the entrance of the injection assembly is formed on another side, and houses the injection assembly therein; and
a mounting door which opens or closes the mounting opening,

wherein the at least one air inlet is formed on the mounting door.

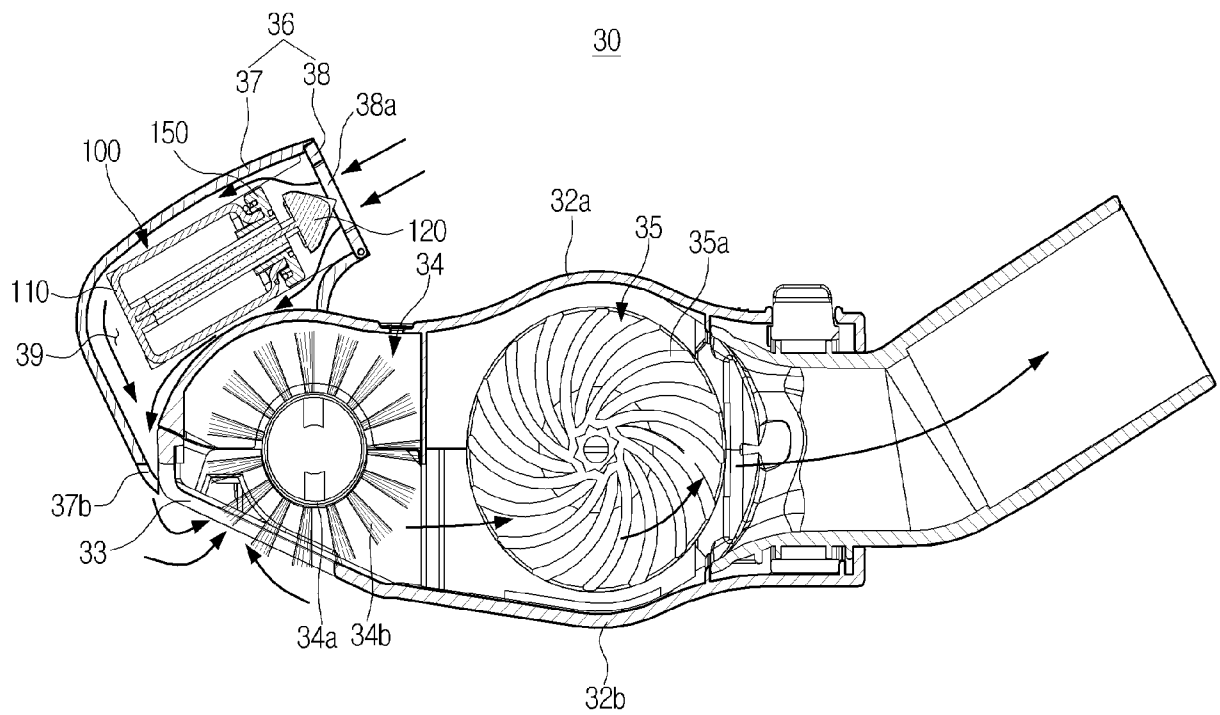
[Fig. 1]



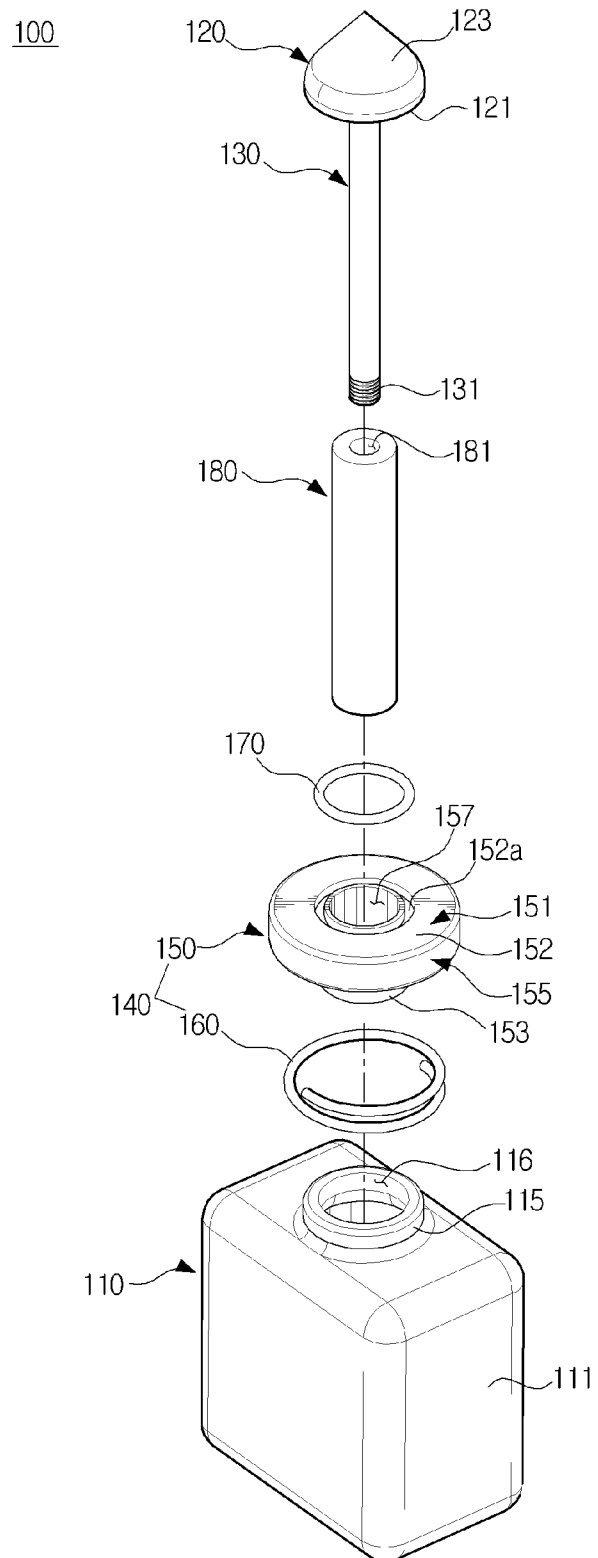
[Fig. 2]



[Fig. 3]



[Fig. 4]



A. CLASSIFICATION OF SUBJECT MATTER*A47L 9/04(2006.01)i*

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC A47L 9/00; A47L 9/04

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

Korean Utility models and applications for Utility models since 1975

Japanese Utility models and applications for Utility models since 1975

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

eKOMPASS(KIPO internal) "Keyword : cleaner, jet, spray, inject, and similar terms"

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	KR 10-2001-0060464 A (LG ELECTRONICS INC.) 07 JUL. 2001 See the whole document	1, 2, 12,13
A	KR 10-2002-0082367 A (LG ELECTRONICS INC.) 31 OCT. 2002 See the whole document	1 - 20
A	US 2003-0126715 A1 (Mark D. Krymsky, Eugene Finkel) 10 JUL. 2003 See Paragraph 14 - Paragraph 24; Figure 2.	1 - 20
A	US 2003-0014829 A1 (Donglei Wang) 23 JAN.. 2003 See Paragraph 15.- Paragraph 21; Figure 1.	1 - 20



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

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Date of the actual completion of the international search

25 NOVEMBER 2009 (25.11.2009)

Date of mailing of the international search report

26 NOVEMBER 2009 (26.11.2009)

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INTERNATIONAL SEARCH REPORT

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