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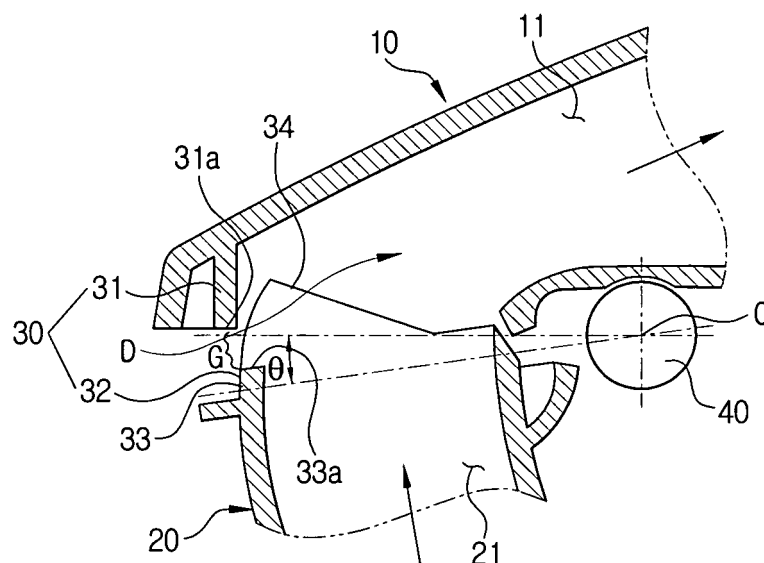
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(54) **Nozzle assembly for a vacuum cleaner and vacuum cleaner employing same**

(57) A nozzle assembly (1) for a vacuum cleaner (100) includes a nozzle body (10) having a suction pathway (11) in fluid communication with a cleaner body (110) of the vacuum cleaner (100), a nozzle having a suction port (21) in fluid communication with the suction pathway of the brush body, the nozzle being disposed to rotate at

the brush body; and a sealing part (30) sealing between the suction pathway (11) and the suction port (21) for the nozzle to rotate with respect to the nozzle body. The sealing part forms a gap for outside air to enter the suction pathway of the nozzle body through as the nozzle rotates with respect to the nozzle body.

FIG. 8



Description

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims the benefit of priority under 35 U.S.C. § 119 to Korean Patent Application No. 2005-89821, filed September 27, 2005, the disclosure of which is incorporated herein by reference in its entirety.

BACKGROUND OF THE INVENTION

Field of the Invention

[0002] The present invention relates to a vacuum cleaner. More particularly, the present invention relates to a brush assembly for a vacuum cleaner.

Description of the Related Art

[0003] Generally, a vacuum cleaner includes a brush assembly, an extension pipe, a handle, a suction hose, and a cleaner body. The brush assembly has a suction port facing a cleaning surface and sucking dust, or dirt, and the like (hereinafter referred to collectively as contaminants) with air. The extension pipe is in fluid communication with the brush assembly to guide the sucked contaminants and air. The suction hose guides the air with contaminants moving through the extension pipe to the cleaner body. The cleaner body has a vacuum generator for generating suction force.

[0004] In the vacuum cleaner, a motor of the vacuum generator disposed in the cleaner body generates suction force. Contaminants on the cleaning surface are sucked with air through the suction port formed in the brush assembly by the suction force. Contaminants and air sucked through the suction port are moved to the cleaner body through the extension pipe and the suction hose. Contaminants that enter the cleaner body are separated from air and then collected in a dust collector. Therefore, air and contaminants pass through the brush assembly, the extension pipe, the suction hose, and the cleaner body.

[0005] When cleaning using the vacuum cleaner described above, a user grasps the handle to push or pull the brush assembly. When the brush assembly is pushed forward, the suction port of the brush assembly approaches the cleaning surface as a result of the applied force while the suction force applies negative pressure to the suction port. As a result, the user should push the handle forward with a fairly strong force for the brush assembly to move forward. However, when pulling the brush assembly, the suction port of the brush assembly receives the applied force in a direction that causes separation from the cleaning surface so that the applied force cancels out the suction force. Consequently, high negative pressure is not applied to the suction port of the brush assembly. The user can pull the handle backward with a weak force for the brush assembly to move backward.

When the user pushes or pulls the brush assembly with the handle, force (hereinafter, referred to as handling force) that the user should apply to the handle is different. In other words, a handling force required to push the brush assembly forward is greater than a handling force required to pull the brush assembly backward. Therefore, it is inconvenient for the user to push the brush assembly forward. Furthermore, when cleaning a soft surface such as a carpet, it is hard to push the brush assembly forward because the cleaning surface sticks to the brush assembly.

SUMMARY OF THE INVENTION

[0006] The present invention has been developed in order to overcome the above drawbacks and other problems associated with the conventional arrangement. An aspect of the present invention is to provide a brush assembly for a vacuum cleaner and a vacuum cleaner employing the same that requires weaker force than the conventional art to push the brush assembly forward.

[0007] To this end, a first non-limiting aspect of the invention provides a brush assembly for a vacuum cleaner comprising, which includes: a brush body having a suction pathway in fluid communication with a cleaner body of the vacuum cleaner; a brush having a suction port in fluid communication with the suction pathway of the brush body, the brush being disposed to rotate at the brush body; and a sealing part configured to seal between the suction pathway and the suction port for the brush to rotate with respect to the brush body, the sealing part forming a gap for outside air to enter the suction pathway of the brush body through as the brush rotates with respect to the brush body.

[0008] A second non-limiting aspect of the invention provides vacuum cleaner that includes: a cleaner body configured to generate suction force; an extension pipe assembly in fluid communication with the cleaner body, the extension pipe assembly forming a passage for contaminants; and a brush assembly in fluid communication with the extension pipe assembly, the brush assembly being configured to draw in the contaminants, wherein the brush assembly includes, a brush body having a suction pathway in fluid communication with the extension pipe assembly, a brush having a suction port in fluid communication with the suction pathway of the brush body, the brush being disposed to rotate at the brush body, and a sealing part configured to enable outside air to enter the suction pathway of the brush body as the brush assembly moves in a first direction, and configured to prevent outside air from entering the suction pathway of the brush body as the brush assembly moves in a second direction.

[0009] Yet another non-limiting aspect of the invention provides a brush assembly, that includes: a brush body; a brush; and means for forming a gap through which air passes.

[0010] Other objects, advantages and salient features

of the invention will become apparent from the following detailed description, which, taken in conjunction with the attached drawings, discloses non-limiting embodiments of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] These and/or other aspects and advantages of the invention will become apparent and more readily appreciated from the following description of the embodiments, taken in conjunction with the accompanying drawings of which:

[0012] FIG 1 is a perspective view illustrating a brush assembly for a vacuum cleaner according to a non-limiting embodiment of the present invention,

[0013] Fig. 2 is a sectional view illustrating the brush assembly of Fig. 1,

[0014] Fig. 3 is a cut-out, perspective view illustrating the brush assembly of Fig. 1,

[0015] Fig. 4 is a partial sectional view illustrating the brush assembly of Fig. 2 taken along a line IV-IV in Fig. 2,

[0016] Fig. 5 is a view illustrating a non-limiting example of the brush assembly of Fig. 1,

[0017] Fig. 6 is a view illustrating another non-limiting example of the brush assembly of Fig. 1,

[0018] Fig. 7 is a cut-out perspective view illustrating the brush inclined with respect to the brush body,

[0019] Fig. 8 is a partial sectional view illustrating an exemplary relationship between an upper sealing and an under sealing when pushing the brush assembly of Fig. 1,

[0020] Fig. 9 is a partial sectional view illustrating an exemplary relationship between an upper sealing and an under sealing when pulling the brush assembly of Fig. 1, and

[0021] Fig. 10 is a perspective view illustrating a vacuum cleaner employing a brush assembly according to the present invention.

[0022] Throughout the drawings, like reference numerals will be understood to refer to like elements.

DETAILED DESCRIPTION OF THE EXEMPLARY EMBODIMENTS

[0023] Hereinafter, certain exemplary embodiments of the present invention will be described in detail with reference to the accompanying drawings. Referring to FIG 1, a brush assembly 1 for a vacuum cleaner according to an embodiment of the present invention may include a brush body 10, a brush 20, and a sealing part 30.

[0024] The brush body 10 may include a suction pathway 11 in fluid communication with a cleaner body 110 (see Fig. 10). The suction pathway 11 may form a passage through which the sucked air and contaminants move and may be disposed inside the brush body 10. An end of an extension pipe 121 in fluid communication with the suction pathway 11 may be connected with a side of the brush body 10. The brush 20 may be disposed at the other end of the suction pathway 11 to rotate with respect

to the brush body 10 within a predetermined angle range. Furthermore, a pair of wheels 5 may be disposed at both sides of the brush body 10 for the brush body 10 to move on the cleaning surface.

[0025] The brush 20 sucks contaminants from the cleaning surface, and may include a suction port 21 in fluid communication with the suction pathway 11 of the brush body 10. The brush may be disposed at the brush body 10 to rotate. In this embodiment, the brush 20 may be disposed to rotate with respect to the brush body 10 within a predetermined angle range via a pivot point, e.g., a hinge, 40 disposed at a side of an upper portion of the suction port 21. It may be preferable that the brush 20 can rotate with respect to the brush body 10 by approximately 15-20 degrees. Also, a cover 29 may be disposed on the brush 20 to improve the appearance.

[0026] The sealing part 30 may be configured to seal between the suction pathway 11 and the suction port 21 so that air and contaminants sucked into the suction port 21 can move to the suction pathway 11 as the brush 20 rotates with respect to the brush body 10. The sealing part 30 may form a gap G (see Fig. 5), through which outside air may directly enter the suction pathway 11 of the brush body 10 as the brush 20 rotates over a predetermined angle with respect to the brush body 10. The sealing part 30 may include an upper sealing 31 formed at the suction pathway 11, and an under sealing 32 extending upward from a top end of the suction port 30 and configured to slide on the upper sealing 31.

[0027] In this non-limiting embodiment of the present invention, the upper and under sealing 31 and 32 may each be formed in a substantially rectangular pipe shape. A front wall 33 of the under sealing 32 may be lower than both sidewalls 34, 35 thereof. The front wall 33 among four walls 33, 34, 35, 36 of the under sealing 32 may be farthest away from a rotation center C on which the brush 20 rotates with respect to the brush body 10 (namely, the hinge 40). The under sealing 32 may be bent based on the hinge 40 so that the under sealing 32 can slide smoothly inside the upper sealing 31 as the brush 20 rotates with respect to the brush body 10. Therefore, as the brush 20 rotates with respect to the brush body 10 at the predetermined angle θ , a gap G through which outside air enters is formed between a top end 33a of the front wall 33 of the under sealing 32 and a bottom end 31a of the upper sealing 31, as shown in Fig. 5. At this time, as the brush 20 may become inclined downward with respect to the brush body 10 over approximately 2 degrees, the top end 33a of the front wall 33 of the under sealing 32 and the bottom end 31a of the upper sealing 31 may form gap G through which outside air enters. As the brush 20 rotates with respect to the brush body 10 by a maximum angle, the gap G has a maximum size. In the brush assembly 1 according to this embodiment, as the brush 20 rotates with respect to the brush body 10 by approximately 15-20 degrees, the gap G formed by the sealing part 30 may have a maximum size.

[0028] Furthermore, in addition to the exemplary meth-

od for forming the gap G in the sealing part 30 described above, various gap-forming methods are possible. Another gap forming method may be to form at least one outside air hole 39 so that outside air may enter through on the front wall 33' of the under sealing 32 as shown in Fig. 6. As the brush 20 rotates with respect to the brush body 10, the bottom end 31a of the upper sealing 31 may open or close the at least one outside air hole 39.

[0029] Hereinafter, operation of the brush assembly 1 for the vacuum cleaner according to an embodiment of the present invention will be explained with reference to accompanying drawings. In this non-limiting example, the vacuum cleaner is being used to clean a surface that is soft, such as a soft carpet. As a user grasps the handle 123 (see Fig. 10) of the extension pipe assembly 120 (see Fig. 10) and pushes it forwards, the brush assembly 1 is enabled to move on the carpet in a direction of arrow A of Fig. 7 by the pair of wheels 5.

[0030] At this time, the brush assembly 1 may receive approximately simultaneously both a first down force applied when the user pushes the handle 123 forward, and the second down force applied by the suction force operating in the suction port 21 of the brush 20. Therefore, as the user pushes the handle 123 forward, the brush 20 of the brush assembly 1 may rotate downward with respect to the brush body 10 based on the hinge 40 so that the gap G through which outside air D enters the suction pathway 11 of the brush body 10 is formed on the sealing part 30. In other words, as the brush 20 rotates with respect to the brush body 10, the under sealing 32 of the brush 20 may separate from the upper sealing 31 of the brush body 10 so that gap G may be formed between the top end 33a of the front wall 33 of the under sealing 32 and the bottom end 31a of the upper sealing 31 as shown in Figs. 7 and 8. Outside air D may then directly enter the suction pathway 11 through the gap G between the under sealing 32 and the upper sealing 31, so that negative pressure applied to the suction port 21 decreases. As a result, a magnitude of the force required for the user to push the brush assembly 1 is decreased as compared with the conventional vacuum cleaner. Consequently, it is easier to clean soft cleaning surface such as a carpet.

[0031] As the user pulls the handle 123, the brush assembly 1 may be caused to move on the carpet in a direction of arrow B of Fig. 3 by a pair of wheels 5. At this time, the brush assembly 1 receives both an upward force caused when the user pulls the handle 123 backwards, and downward force caused by the suction force operating in the suction port 21 of the brush 20. Then when the user pulls the brush assembly 1, the upward force and the downward force applied to the brush assembly 1 cancel each other so that magnitude of force required to pull the brush assembly 1 is smaller than the force required to push it. Therefore, when pulling the brush assembly 1, the brush 20 does not rotate with respect to the brush body 10 and may remain parallel with the cleaning surface as shown in Fig. 3. At this time, the under

sealing 32 of the sealing part 30 may be positioned on the upper sealing 31 (as shown in Fig. 9) so that outside air cannot directly enter the suction pathway 11 of the brush body 10 through the sealing part 30. As a result, the user may not have to apply much force to pull the brush assembly 1.

[0032] Hereinafter, a vacuum cleaner 100 having a brush assembly 1 for a vacuum cleaner according to a second non-limiting embodiment of the present invention will be explained with reference to Fig. 10. Referring to Fig. 10, the vacuum cleaner 100 according to another non-limiting embodiment of the present invention may include a cleaner body 110, an extension pipe assembly 120, and a brush assembly 1.

[0033] The cleaner body 110 generates suction force to suck in contaminants. To this end, the cleaner body 110 may include a vacuum generator (not shown) for generating suction force. Also, the cleaner body 110 may include a dust collector (not shown) that separates and collects contaminants from air sucked via the brush assembly 1 and the extension pipe assembly 120.

[0034] The extension pipe assembly 120 may enable the cleaner body 110 to be in fluid communication with the brush assembly 1. The extension pipe assembly 120 may include an extension pipe 121, a handle 123, and a suction hose 122. The extension pipe 121 may be configured to guide the sucked contaminants and may be in fluid communication with the brush assembly 1. The handle 123 may be grasped by the user to push or pull the brush assembly 1 when in use. The suction hose 122 may guide air containing contaminants guided through the extension pipe 121 to the cleaner body 110.

[0035] The brush assembly 1 may be in fluid communication with the extension pipe 121 of the extension pipe assembly 120 and may suck contaminants from the cleaning surface. The brush assembly 1 may include a brush body 10, a brush 20, and a sealing part 30. The brush body 10 may have a suction pathway 11 in fluid communication with the extension pipe 121. The brush 20 may have a suction port 21 in fluid communication with the suction pathway 11 of the brush body 10, and may be disposed to rotate with respect to an end of the brush body 10 by a predetermined angle. As the brush assembly 1 moves in a direction, the brush 20 may rotate with respect to the brush body 10 so that the sealing part 30 may form a gap G for outside air to directly enter the suction pathway 11 of the brush body 10 through. Then as the brush assembly 1 moves in a reverse direction, the sealing part 30 may close the gap G. The sealing part 30 may include an upper sealing 31 formed at a bottom end of the suction pathway 11, and an under sealing 32 extending from the top end of the suction port 21 of the brush 20 and sliding on the upper sealing 31. As the brush assembly 1 moves in a direction, the brush 20 may rotate with respect to the brush body 10 so that a gap G through which air may enter the suction pathway 11 of the brush body 10 may be formed between a bottom end 31a of the upper sealing 31 and a top end 33a of the

under sealing 32. In the present embodiment, when the handle 123 is pushed, the brush assembly 1 may move forward to allow the gap G of the sealing part 30 to open. When the handle 123 is pulled, the brush assembly 1 may move backward to allow the gap G of the sealing part 30 to close. The brush body 10, the brush 20, and the sealing part 30 included as part of the brush assembly 1 may be the same as the above description.

[0036] When cleaning a carpet, a user powers on the vacuum cleaner 100, grasps the handle 123 of the extension pipe assembly 120, and then pushes or pulls the brush assembly 1 so as to clean the carpet. As the user grasps and pushes the handle 123, the brush assembly 1 is moved forward. Then, the brush 20 may rotate with respect to the brush body 10, thereby inclining downwardly with respect to the brush body 10. As a result, a gap G may be formed between the under sealing 32 of the brush 20 and the upper sealing 31 of the brush body 10. As the gap G is formed between the under sealing 32 and the upper sealing 31, outside air D may directly enter the suction pathway 11 through the gap G as shown in Fig. 8. As outside air D directly enters the suction pathway 11, the negative pressure applied to the suction port 21 may decrease, so that magnitude of force required for the user to push the brush assembly 1 is decreased. As a result, with the present invention, it is more convenient for the user to clean the carpet as compared with the conventional vacuum cleaner.

[0037] In more detail, when the user pulls the handle 123, the brush assembly 1 is moved backward. At this time, the brush 20 may remain parallel with the brush body 10 as shown in Fig. 3. As the brush assembly 1 moves backward, magnitude of the negative pressure applied to the suction port 21 is small (as described above), so that a magnitude of the force required for the user to pull the brush assembly 1 is not great.

[0038] In other words, when cleaning carpet using the vacuum cleaner 100 according to an embodiment of the present invention, the user is required to apply less force as compared with the conventional vacuum cleaner. When pulling the brush assembly 1, the user can clean by applying a force of substantially equal magnitude to the force required for the conventional vacuum cleaner. Therefore, with the present invention, it is more convenient for the user to clean the carpet as compared with the conventional vacuum cleaner.

[0039] While the embodiments of the present invention have been described, additional variations and modifications of the embodiments may occur to those skilled in the art once they learn of the basic inventive concepts. Therefore, it is intended that the appended claims shall be construed to include both the above embodiments and all such variations and modifications that fall within the spirit and scope of the invention.

Claims

1. A brush assembly for a vacuum cleaner, the brush assembly comprising:

a brush body having a suction pathway in fluid communication with a cleaner body of the vacuum cleaner;
a brush having a suction port in fluid communication with the suction pathway of the brush body, the brush being disposed to rotate at the brush body; and
a sealing part configured to seal between the suction pathway and the suction port for the brush to rotate with respect to the brush body, the sealing part forming a gap for outside air to enter the suction pathway of the brush body through as the brush rotates with respect to the brush body.

2. The brush assembly of claim 1, wherein the sealing part comprises:

an upper sealing part formed at the suction pathway; and
an under sealing part extending from a top end of the suction port, the under sealing sliding on the upper sealing,

wherein, as the brush rotates with respect to the brush body at a predetermined angle, the gap is formed between the upper sealing and the under sealing so that outside air enters the suction pathway through the gap.

3. The brush assembly of claim 2, wherein the brush includes a hinge disposed at a side of the suction port, and has at least an outside air hole formed at a part of the under sealing opposite to the hinge.

4. The brush assembly of claim 2, wherein the upper sealing and under sealing are substantially formed as rectangular pipes, and a top end of one wall of the under sealing and a bottom end of the upper sealing form the gap.

5. The brush assembly of claim 4, wherein the one wall of the under sealing is farthest away from a rotation center of the brush.

6. The brush assembly of claim 5, wherein the one wall of the under sealing forms the gap between the top end thereof and the bottom end of the upper sealing as the brush inclines 2 degrees or more downward with respect to the brush body.

7. The brush assembly of claim 4, wherein the under sealing is bent based on a rotation center of the

brush.

8. The brush assembly of claim 1, wherein as the brush assembly moves in a first direction, the brush rotates with respect to the brush body so that the gap is formed in the sealing part, and as the brush assembly moves in a second direction, the gap is closed.

9. A vacuum cleaner, comprising:

a cleaner body configured to generate suction force;
an extension pipe assembly in fluid communication with the cleaner body, the extension pipe assembly forming a passage for contaminants; and
a brush assembly in fluid communication with the extension pipe assembly, the brush assembly being configured to draw in the contaminants,

wherein the brush assembly comprises,
a brush body having a suction pathway in fluid communication with the extension pipe assembly,
a brush having a suction port in fluid communication with the suction pathway of the brush body, the brush being disposed to rotate at the brush body, and
a sealing part configured to enable outside air to enter the suction pathway of the brush body as the brush assembly moves in a first direction, and configured to prevent outside air from entering the suction pathway of the brush body as the brush assembly moves in a second direction.

10. The vacuum cleaner of claim 9, wherein the sealing part comprises:

an upper sealing formed at the suction pathway of the brush body; and
an under sealing extending from a top end of the suction port of the brush, the under sealing sliding on the upper sealing, and

wherein, as the brush assembly moves in the first direction, the brush rotates with respect to the brush body at a predetermined angle so that the gap is formed between the upper sealing and the under sealing.

11. A brush assembly, comprising:

a brush body;
a brush; and
means for forming a gap through which air passes.

12. The brush assembly of claim 11, wherein the brush body further comprises a suction pathway.

13. The brush assembly of claim 12, wherein the gap enables air to travel through the suction pathway.

14. The brush assembly of claim 11, wherein the means for forming a gap includes:

first means for sealing; and
second means for sealing.

15. The brush assembly of claim 14, wherein the first means for sealing is slideable relative to the second means for sealing.

16. The brush assembly of claim 14, wherein at least one of the first means for sealing and the second means for sealing is flexible.

17. The brush assembly of claim 11, wherein the brush is configured to rotate about a hinge.

FIG. 1

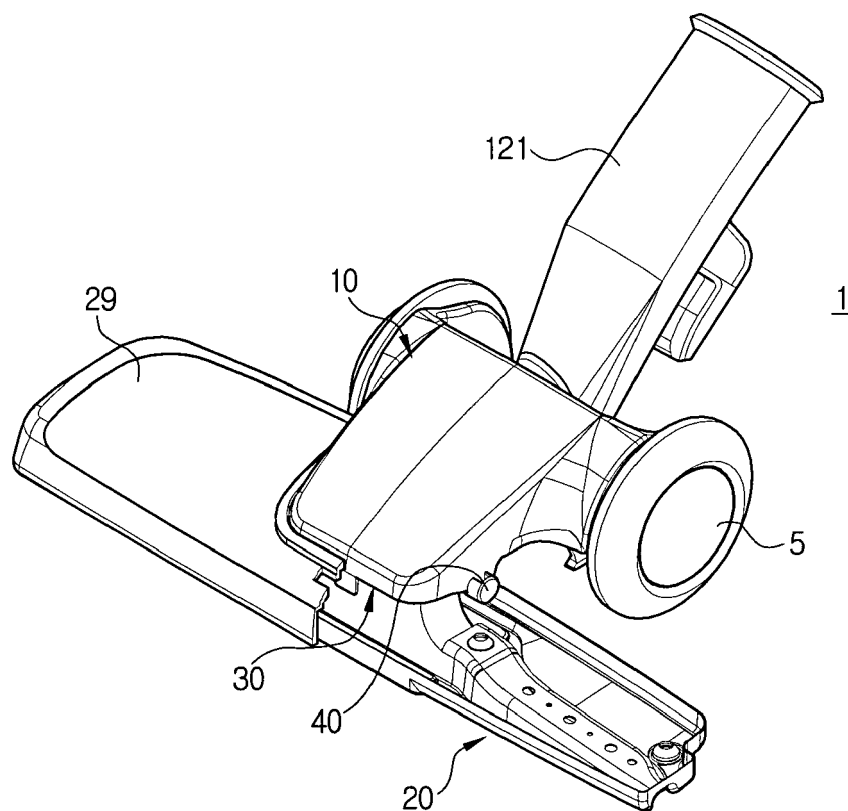


FIG. 2

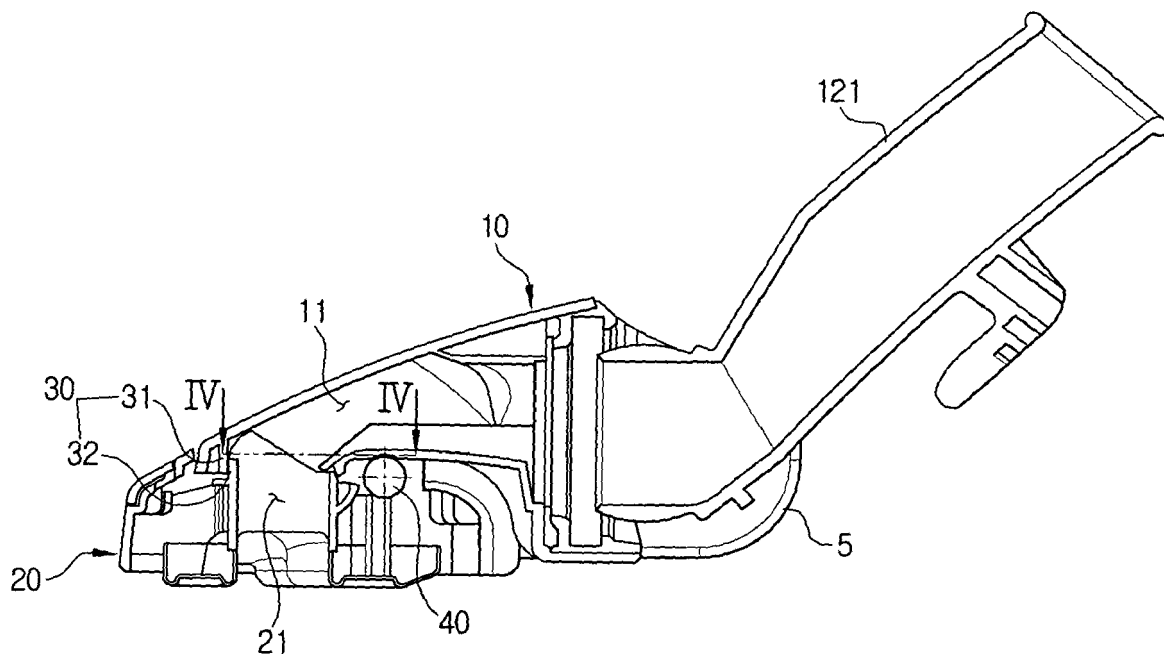


FIG. 3

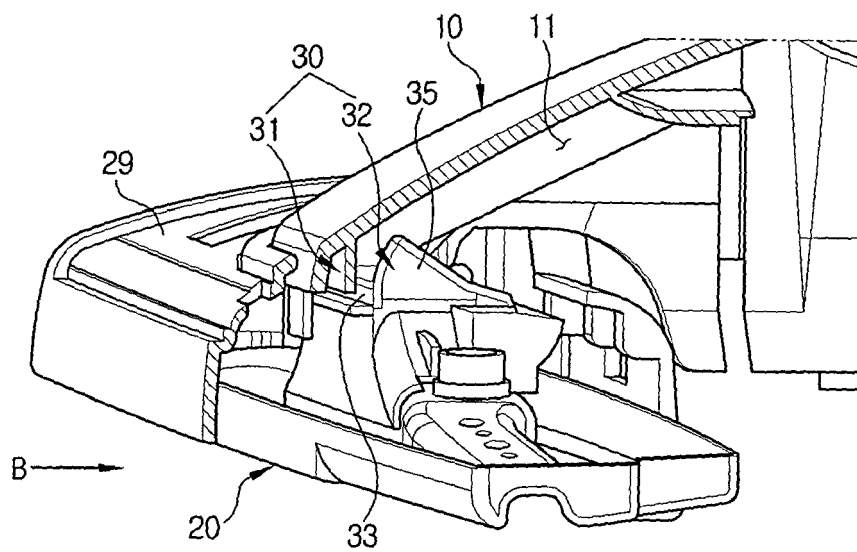


FIG. 4

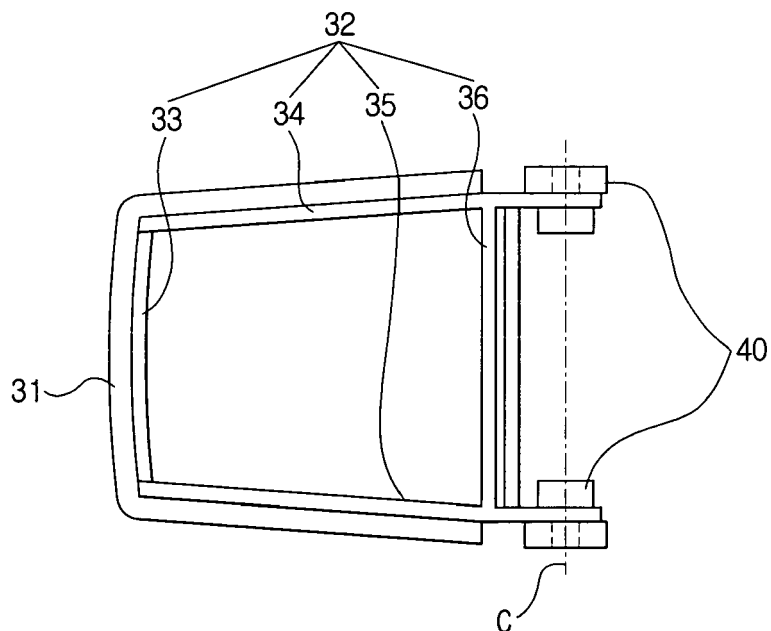


FIG. 5

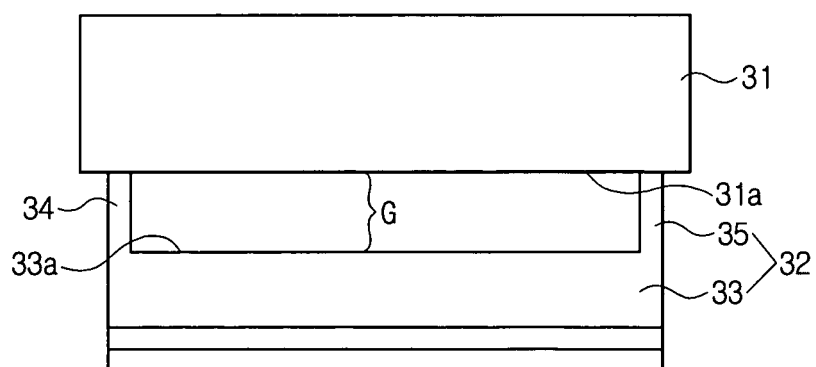


FIG. 6

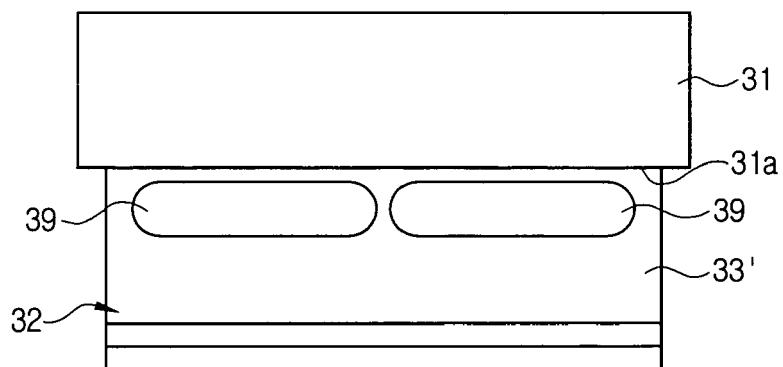


FIG. 7

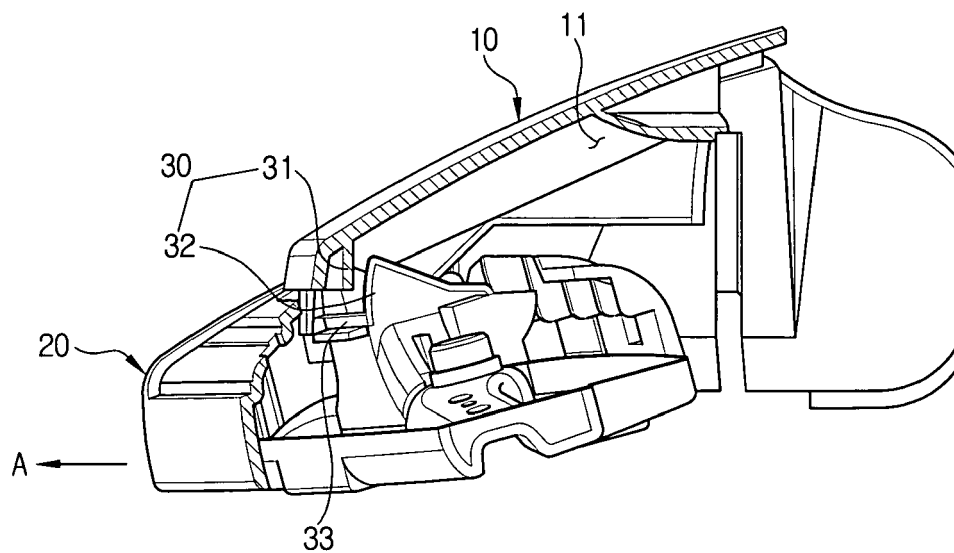


FIG. 8

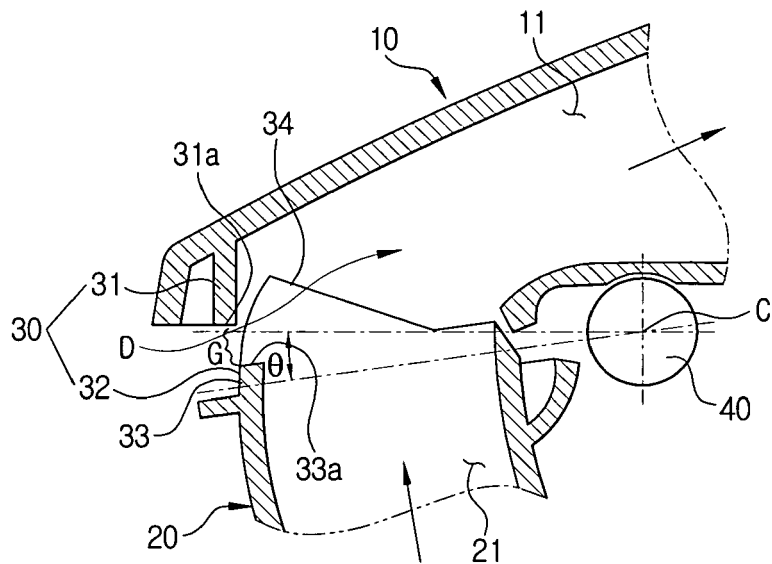


FIG. 9

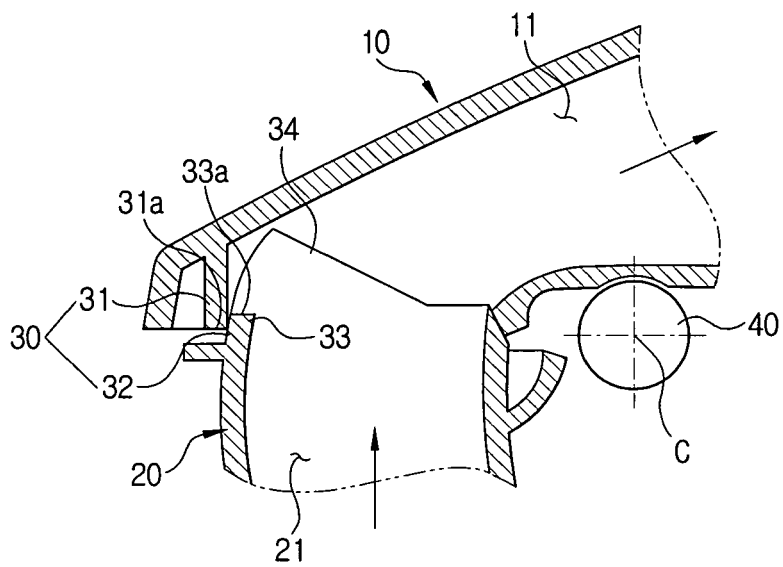
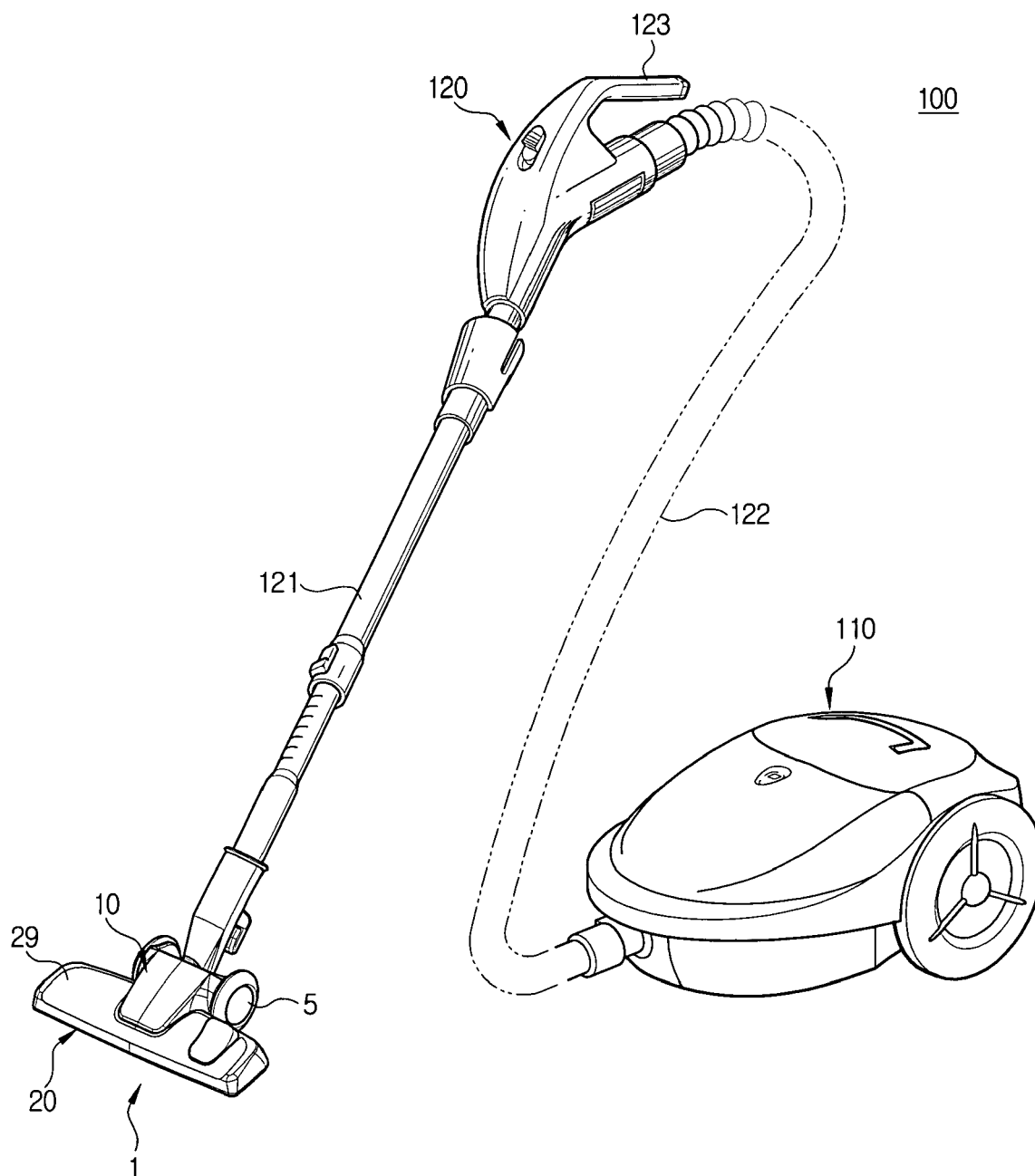


FIG. 10



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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