



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
04.04.2007 Bulletin 2007/14

(51) Int Cl.:
A47L 9/06 (2006.01)

(21) Application number: **06290382.8**

(22) Date of filing: **08.03.2006**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK YU

(30) Priority: **30.09.2005 KR 2005091918**

(71) Applicant: **Samsung Gwangju Electronics Co., Ltd.**
Gwangju-city (KR)

(72) Inventors:
• **Lee, Hyun-ju**
Gwangsan-gu
Gwangju-gu, Gwangju-city (KR)
• **Uratani, Hiroyuki**
Gwangsan-gu
Gwangju-city (KR)
• **Yang, Dong-houn**
Seo-gu
Gwangju-city (KR)

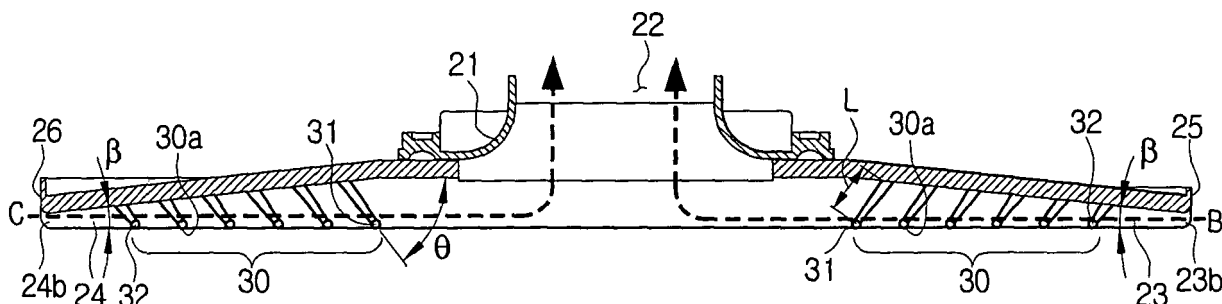
(74) Representative: **Blot, Philippe Robert Emile et al**
Cabinet Lavoix
2, place d'Estienne d'Orves
75441 Paris Cedex 09 (FR)

(54) **Nozzle assembly for a vacuum cleaner with surface agitation means**

(57) The present invention relates to a nozzle assembly for a vacuum cleaner that has low noise, and is capable of separating off contaminants attached on a cleaning surface. The nozzle assembly (10) includes a nozzle body (20) being in fluid communication with a cleaner body of the vacuum cleaner, including a suction port (22) having suction force applied to; a first and second suction

fluid ways (23,24) formed to both sides of the suction port, contaminants-laden air being sucked through the first and second suction fluid way; and a plurality of separating members (30) disposed inside the first and second suction fluid ways, parallel to the first and second suction fluid ways, and inclined top ends thereof pointing to the suction port.

FIG. 4



Description

BACKGROUND OF THE INVENTION

Field of The Invention

[0001] 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

[0002] Generally, a vacuum cleaner applies suction force to a brush assembly, which moves in contact with a cleaning surface, so as to suck air with contaminants from the cleaning surface, thereby performing cleaning. Therefore, the brush assembly has a shape capable of sucking smoothly air with contaminants (hereinafter, referred to as contaminants-laden air) from the cleaning surface.

[0003] The brush assembly includes a brush body. An example of the brush assembly is shown in Fig. 1. Referring to Fig. 1, the brush body 1 has on a bottom surface thereof a suction port 2 being in fluid communication with a cleaner body (not shown) of the vacuum cleaner. A pair of suction fluid ways 3 and 4, that is, pathways for contaminants-laden air to be sucked through, is formed on the bottom surface of the brush body 1 to both sides of the suction port 2. A cross section of the suction fluid way 3 and 4 is formed in a flatten U shape on the bottom surface of the brush body 1. An end of each of the suction fluid ways 3 and 4 is opened to a side 5 or 6 of the brush body 1, and the other end thereof is opened to the suction port 2.

[0004] Therefore, when the vacuum cleaner operates suction force to be generated, contaminants-laden air enters in a direction of arrow A of Fig. 1 from sides 5 and 6 of the pair of suction fluid ways 3 and 4, and then flows to the suction port 2. Contaminants-laden air sucked into the suction port 2 flows to the cleaner body of the vacuum cleaner. Contaminants of contaminants-laden air are separated and collected by a contaminants collector (not shown). Clean air having contaminants removed is discharged out of the cleaner body.

[0005] However, because the brush body 1 of the conventional brush assembly (not shown) has suction fluid ways 3 and 4 formed in a substantially straight-line shape, both contaminants-laden air currents being sucked through the pair of suction fluid ways 3 and 4 clashes with each other so as to generate considerable noise. Therefore, it is desirable to reduce the clash noise to make operation more pleasant for the user.

[0006] Furthermore, when there are contaminants that can not be separated from the cleaning surface by the suction force of the vacuum cleaner, the user separates contaminants from the cleaning surface by his hands and then sucks the separated contaminants by the vacuum cleaner. Therefore, it is inconvenient for the user to per-

form cleaning.

SUMMARY OF THE INVENTION

[0007] 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 capable of reducing noise occurring as air is sucked through a suction port.

[0008] Another aspect of the present invention is to provide a brush assembly for a vacuum cleaner capable of separating off contaminants attached on a cleaning surface, and then sucking the separated contaminants.

[0009] The above aspect and/or other feature of the present invention can substantially be achieved by providing a brush assembly for a vacuum cleaner, which includes a brush body being in fluid communication with a cleaner body of the vacuum cleaner, including a suction port having suction force applied to; a first and second suction fluid ways formed to both sides of the suction port, contaminants-laden air being sucked through the first and second suction fluid way; and a plurality of separating members disposed inside the first and second suction fluid ways, parallel to the first and second suction fluid ways, and inclined top ends thereof pointing to the suction port.

[0010] According to an embodiment of the present invention, angle between the plurality of separating members and bottom surfaces of the first and second suction fluid ways is approximately 40 to 50 degrees.

[0011] According to an embodiment of the present invention, the plurality of separating members is made from an elastic material.

[0012] According to an embodiment of the present invention, the plurality of separating members is formed in a conical shape.

[0013] According to an embodiment of the present invention, each of the plurality of separating members further comprises a separating head disposed on a top end of the respective separating members.

[0014] According to an embodiment of the present invention, the separating head is formed in a sphere shape.

[0015] With the brush assembly for the vacuum cleaner according to an embodiment of the present invention as described above, contaminants-laden air is dispersed by the plurality of separating members so that noise generated by air sucked into the suction port decreases.

[0016] Furthermore, the brush assembly for the vacuum cleaner according to the present invention can separate off and suck contaminants attached on the cleaning surface because the plurality of separating members separates off contaminants attached on the cleaning surface.

[0017] Furthermore, with the brush assembly for the vacuum cleaner according to the present invention, inclination of the plurality of separating members reduces contaminants such as hair from being caught in the plu-

ality of separating members.

[0018] Furthermore, the brush assembly for the vacuum cleaner according to the present invention can prevent the plurality of separating members from damaging a cleaning surface because the plurality of separating members is made from an elastic material.

[0019] Other objects, advantages and salient features of the invention will become apparent from the following detailed description, which, taken in conjunction with the annexed drawings, discloses preferred embodiments of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] 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:

[0021] FIG. 1 is a bottom view illustrating a brush body of a conventional brush assembly for a vacuum cleaner,

[0022] Fig. 2 is a perspective view illustrating a brush assembly for a vacuum cleaner according to an embodiment of the present invention,

[0023] Fig. 3 is a bottom view illustrating a brush body of the brush assembly of Fig. 2,

[0024] Fig. 4 is a sectional view illustrating the brush assembly of Fig. 3, taken along IV-IV line in Fig. 3,

[0025] Fig. 5 is a view illustrating another example of a separating member of the brush assembly of Fig. 3,

[0026] Fig. 6 is a sectional view illustrating a brush assembly for a vacuum cleaner according to another embodiment of the present invention,

[0027] Fig. 7 is a view illustrating a state that a plurality of separating members separates off contaminants attached on a cleaning surface, and

[0028] Fig. 8 is a sectional view illustrating a brush assembly for a vacuum cleaner according to still another embodiment of the present invention.

[0029] Throughout the drawings, like reference numerals will be understood to refer to like parts, components and structures.

DETAILED DESCRIPTION OF THE EXEMPLARY EMBODIMENTS

[0030] Hereinafter, certain exemplary embodiments of the present invention will be described in detail with reference to the accompanying drawings.

[0031] The matters defined in the description, such as a detailed construction and elements thereof, are provided to assist in a comprehensive understanding of the invention. Thus, it is apparent that the present invention may be carried out without those defined matters. Also, well-known functions or constructions are omitted to provide a clear and concise description of exemplary embodiments of the present invention.

[0032] Referring to Figs. 2 to 4, a brush assembly 10

for a vacuum cleaner according to an embodiment of the present invention includes a brush body 20, a plurality of separating members 30, a cover 12, and a pair of wheels 15.

[0033] The brush body 20 includes a head part 21 and a leg part 29. The head part 21 and the leg part 29 form in substantially a T shape. A back end of the leg part 29 of the brush body 20 is connected to an extension pipe 90. The extension pipe 90 connects a cleaner body (not shown) of the vacuum cleaner and the brush assembly 10 so that it makes contaminants-laden air being sucked through the brush assembly 10 move to the cleaner body. Also, a contaminants passage (not shown) is disposed inside the leg part 29 of the brush body 20, and in fluid communication with the cleaner body via the extension pipe 90. A suction port 22 is formed at a center of the head part 21 of the brush body 20. The suction port 22 is formed on a bottom surface of the head part 21 of the brush body 20, and in fluid communication with the contaminants passage. Therefore, the suction port 22 is in fluid communication with the cleaner body via the contaminants passage and the extension pipe 90.

[0034] Furthermore, a first and second suction fluid ways 23 and 24 are formed to both sides of the suction port 22 on the bottom surface of the brush body 20, respectively. Therefore, contaminants on the cleaning surface around both sides 25 and 26 of the brush body 20 are sucked into the suction port 22 through the first and second suction fluid ways 23 and 24 with air. The first and second suction fluid ways 23 and 24 are formed in a flatten U shape on the bottom surface of the brush body 20. An end of each of the first and second suction fluid ways 23 and 24 is opened to a side of the head part 21 of the brush body 20, and the other end thereof is opened to the suction port 22. Also, bottom surfaces of the first and second suction fluid ways 23 and 24 are inclined upwardly to the suction port 22 as shown in Fig. 4.

[0035] The plurality of separating members 30 are disposed inside the first and second suction fluid ways 23 and 24 and substantially parallel to both sidewalls 23a and 24a of the first and second suction fluid ways 23 and 24. At this time, the separating members 30 are preferably disposed on substantially a centerline of the first and second suction fluid ways 23 and 24 by regular intervals as shown in Figs. 3. Each of the plurality of separating members 30 has such a length L that a top end 30a of the separating member 30 touches a cleaning surface. In other words, the length L of each of the plurality of separating members 30 is different each other corresponding to an inclined angle β of the first and second suction fluid ways 23 and 24 as shown in Fig. 4. Therefore, a separating member 31 nearest the suction port 22 is tallest, and the separating members 30 get shorter as going to an entrance 23b and 24b of the first and second suction fluid ways 23 and 24. In other words, a separating member 32 nearest the entrance 23b and 24b of the first and second suction fluid ways 23 and 24 among the plurality of separating members 30 is shortest. At this

time, it is preferable that the plurality of separating members 30 is made from an elastic material so that the plurality of separating members 30 can separate off contaminants attached on a cleaning surface without damaging the cleaning surface. The elastic separating members 30 are particularly effective because the separating members 30 may beat off the cleaning surface when cleaning a soft cleaning surface such as a carpet. For the separating members 30, plastic having a predetermined elasticity such as urethane or silicone is preferably used.

[0036] Furthermore, it is preferable that the separating members 30 are formed in a conical shape that a diameter thereof decreases from a bottom surface of the head part 21 of the brush body 20 to a cleaning surface. If the separating members 30 take in a conical shape, the separating members 30 may more effectively separate contaminants from a cleaning surface. The plurality of separating members 30 is formed in conical shapes having different specifications, respectively. However, it is preferable that the plurality of separating members 30 has a common specification. In other words, all the plurality of separating members 30 has a same conical angle α (see Fig. 7). Or, each of the plurality of separating members 30 is formed in a conical shape that a diameter d (see Fig. 7) of a top end thereof is the same with the others and a diameter D (see Fig. 7) of a bottom end thereof is the same with the others.

[0037] Furthermore, the top end of the separating members 30 may be formed in a curved surface 30a' as shown in Fig. 5, and preferably, a separating head 40 is disposed on the top end of the separating member 30. Preferably, width of the separating head 40 is greater than diameter of the top end of the separating member 30. Such the separating head 40 makes a contact area between the separating member 30 and the cleaning surface larger so that the separating members 30 can more easily separate off contaminants attached on the cleaning surface. If the separating head 40 is formed in a sphere shape, preferably, the diameter W (see Fig. 7) of the separating head 40 is smaller than the diameter D of the bottom end of the separating member 30, and greater than the diameter d of the top end of the separating member 30.

[0038] Furthermore, the plurality of separating members 30 is inclined for the top end thereof pointing to the suction port 22. Inclination of the separating member 30 reduces contaminants such as hairs, fur, or thread from being caught in the plurality of separating members 30. Cases that contaminants are caught in the plurality of separating members 30 so as to block the first or second suction fluid ways 23 and 24 are less occurred when the plurality of separating members 30 are inclined with respect to a cleaning surface than when the plurality of separating members 30 are vertical to a cleaning surface. Preferably, the plurality of separating members 30 is inclined by an angle θ , as much as approximately 40 to 50 degrees with respect to the bottom surfaces of the first

and second suction fluid ways 23 and 24.

[0039] Furthermore, the plurality of separating members 30 may be formed in one body with the brush body 20 as shown in Fig. 4. Or, each of the plurality of separating members 30 may be mounted inside of the first and second suction fluid ways 23 and 24 using a locking member (not shown) such as a bolt.

[0040] For convenience of assembly and manufacture of the plurality of separating members, the plurality of separating members is preferably molded as a separating member unit 50 being a sub assembly as shown in Fig. 6. Referring to Fig. 6, the separating member unit 50 has a base 51 and a plurality of separating members 52. The plurality of separating members 52 is integrally molded with the base 51. However, they may separately mold the plurality of separating members 52 and the base 51, and then assemble the plurality of separating members 52 and the base 51 into the separating member unit 50. Also, appearance of the plurality of separating members 52 is the same as that of the plurality of separating members 30 of above-described embodiment, and therefore a detailed description thereof is not repeated for conciseness.

[0041] At this time, the first and second suction fluid ways 23 and 24 of the brush body 21 have a first and second unit assembly recess 53 and 54 that the separating member unit 50 is assembled with. Therefore, merely assembling the separating member units 50 with the first and second unit assembly recesses 53 and 54 can assemble the plurality of separating members 52 with the head part 21 of the brush body 20.

[0042] The cover 12 is disposed on an upper portion of the head part 21 of the brush body 20 for appearance of the brush assembly 10.

[0043] The pair of wheels 15 is disposed at the leg part 29 of the brush body 20 for the brush assembly 10 to smoothly move.

[0044] Hereinafter, operation and function of the brush assembly 10 for the vacuum cleaner according to an embodiment of the present invention will be explained with reference to attached drawings.

[0045] As operating the vacuum cleaner (not shown), a vacuum generator (not shown) of the cleaner body (not shown) generates suction force. The suction force is applied to the suction port 22 of the brush body 20 through the extension pipe 90.

[0046] As the suction force applies to the suction port 22 of the brush body 20, contaminants-laden air is sucked through both sides 25 and 26 of the brush body 20, and then flows to the suction port 22 as arrows B and C of Fig. 4. At this time, the first and second suction fluid ways 23 and 24 flow the contaminants-laden air sucked through the both sides 25 and 26 of the brush body 20 to the suction port 22. Then the plurality of separating members 30 disperses the sucked contaminants-laden air. Therefore, the noise, which is occurred as both contaminants-laden air currents sucked through the both sides 25 and 26 clash directly with each other in the suc-

tion port 22, can be reduced.

[0047] Furthermore, contaminants sucked with air are scarcely caught in the plurality of separating members 30 because the plurality of separating members 30 is inclined with respect to a cleaning surface as shown in Fig. 4.

[0048] Furthermore, when there are contaminants attached on a cleaning surface, the separating heads 40 formed on the top ends of the separating members 30 remove effectively the contaminants attached on the cleaning surface as a user moves the brush assembly 10 forward and backward. For example, in a case that there is a contaminant 17 attached on a cleaning surface 16 and not separated off by suction force, as the brush assembly 10 moves forward, some separating members 30 are hitched on the attached contaminant 17 as shown in Fig. 7. As the user moves the brush assembly 10 forward, the some separating members 30 hitched on the contaminant 17 are bent backwardly. Then the contaminant 17 attached on the cleaning surface 16 receives force by the separating heads 40 of the some separating members 30. As the brush assembly 10 moves more forward, the elastic force of the separating members 30 separate the contaminant 17 from the cleaning surface 16. When the contaminant 17 can not be separated off merely by moving the brush assembly 10 forward, the user moves the brush assembly 10 backward so as to separate off the attached contaminant 17.

[0049] Furthermore, when the separating heads 40 are hitched by a thing fixed on the cleaning surface 16 not contaminants attached on the cleaning surface 16, the separating members 30 move over the thing as bent so that the separating members 30 may not damage the cleaning surface 16.

[0050] The contaminants separated by the plurality of separating members 30 as described above are sucked into the suction port 22 through the first and second suction fluid ways 23 and 24. The contaminants and air sucked into the suction port 22 flow to the extension pipe 90 through the contaminants passage (not shown) of the leg part 29 of the brush body 20. Then, the contaminants-laden air is sucked into the cleaner body (not shown) through the extension pipe 90. Contaminants of the contaminants-laden air sucked into the cleaner body are separated and collected by the contaminants collector (not shown). Clean air is discharged out of the cleaner body.

[0051] Fig. 8 shows a brush assembly for a vacuum cleaner according to still another embodiment of the present invention. In the brush assembly 80 for the vacuum cleaner according to still another embodiment of the present invention of Fig. 8, bottom surfaces of first and second suction fluid ways 82 and 83 of the brush body 81 is substantially parallel with respect to a cleaning surface. Therefore, the plurality of separating members 84 has substantially same length. Except that length of the plurality of separating members 84 is substantially same, the structure of the brush assembly 80 for the vacuum cleaner is the same as that of the brush assembly 10 for

vacuum cleaner described above, and therefore a detailed description thereof is not repeated for conciseness.

[0052] 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 comprising:
 - a brush body being in fluid communication with a cleaner body of the vacuum cleaner, the brush body including a suction port having suction force applied to;
 - a first and second suction fluid ways formed to both sides of the suction port, contaminants-laden air being sucked through the first and second suction fluid way; and
 - a plurality of separating members disposed inside the first and second suction fluid ways and parallel to the first and second suction fluid ways, the plurality of separating members inclined top ends thereof pointing to the suction port.
2. The brush assembly of claim 1, wherein angle between the plurality of separating members and bottom surfaces of the first and second suction fluid ways is approximately 40 to 50 degrees.
3. The brush assembly of any of claims 1 and 2, wherein the plurality of separating members is made from an elastic material.
4. The brush assembly of any of claims 1 to 3, wherein the plurality of separating members is formed in a conical shape.
5. The brush assembly of any of claims 1 to 4, wherein each of the plurality of separating members further comprises a separating head disposed on a top end of the respective separating members.
6. The brush assembly of claim 5, wherein the separating head is formed in a sphere shape.

FIG. 1

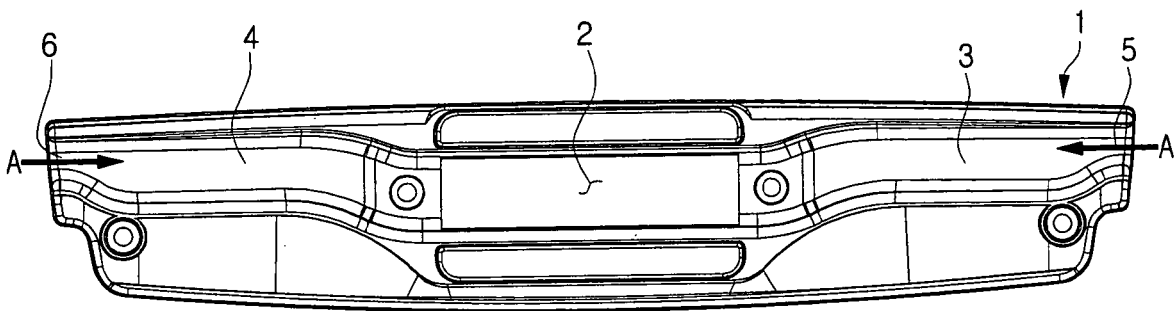


FIG. 2

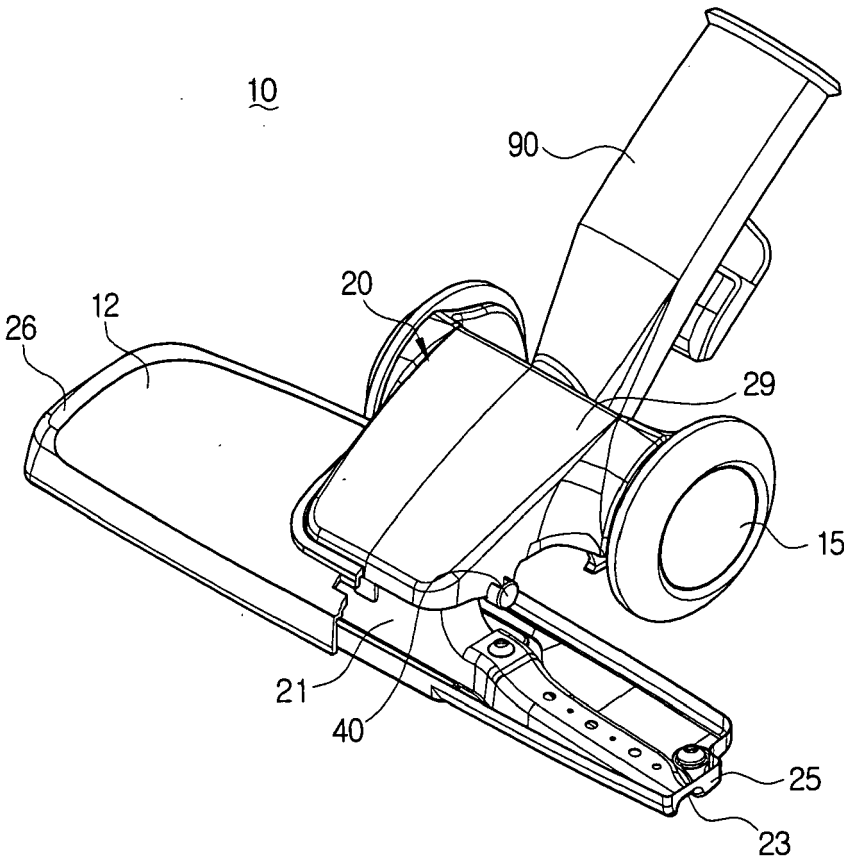


FIG. 3

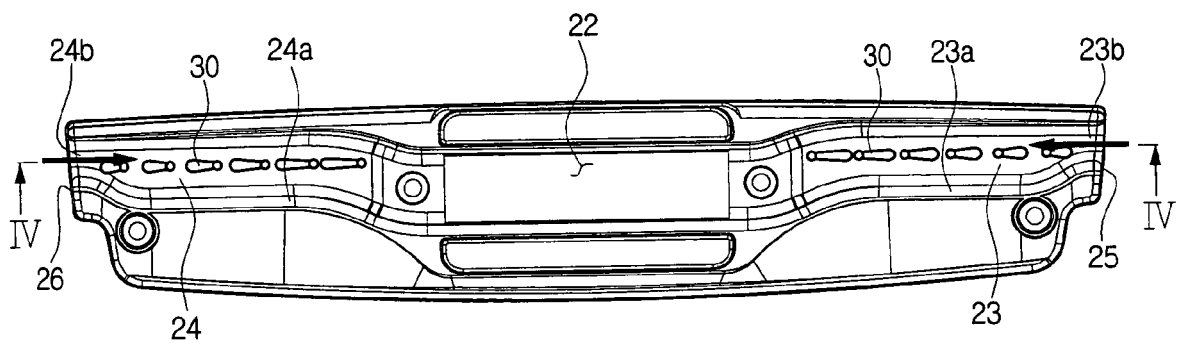


FIG. 4

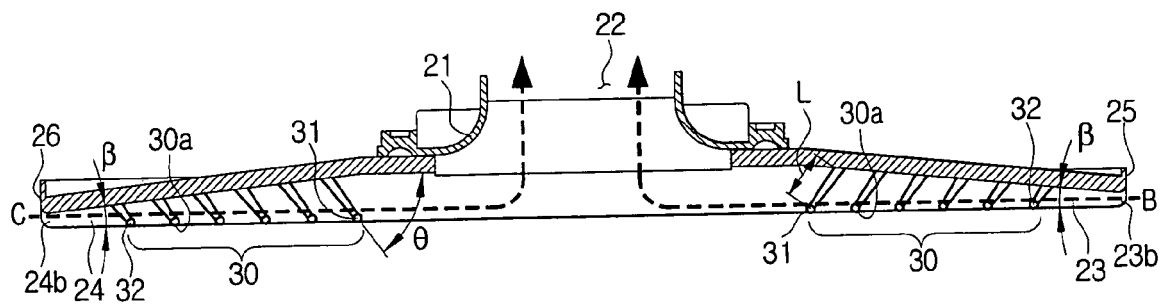


FIG. 5

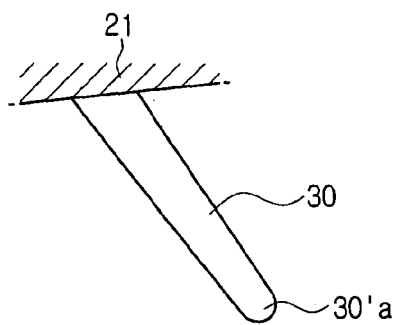


FIG. 6

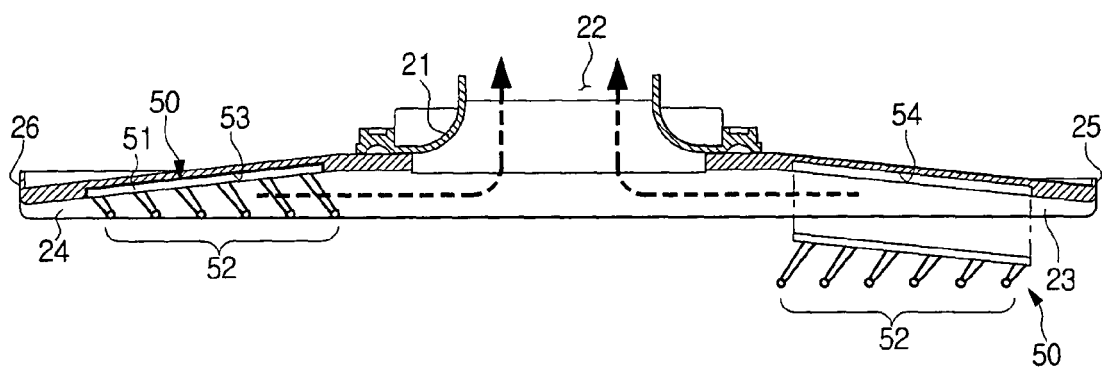


FIG. 7

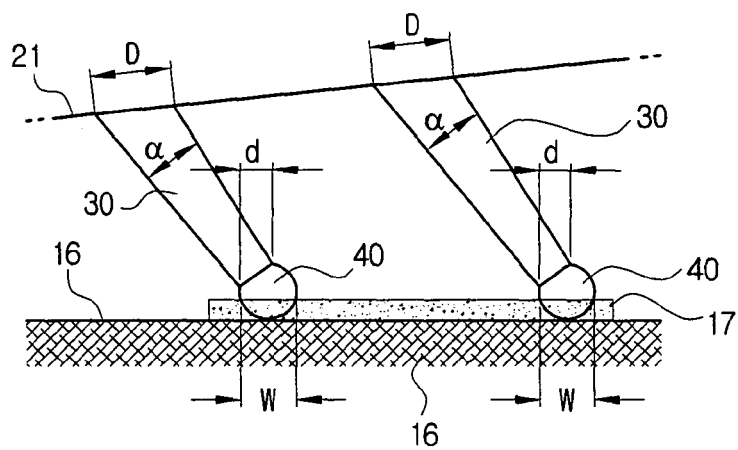


FIG. 8

