A suction port assembly for use in a vacuum cleaner is foldable so that it can clean a surface being cleaned in close contact. Accordingly, the cleaner can easily clean the cleaning surface even with a slope or angle, while maintaining a suction efficiency of the cleaner constantly. Additionally, damage to the suction port assembly due to collision with the cleaning surface can be avoided.
SUCTION PORT ASSEMBLY OF VACUUM CLEANER

CROSS-REFERENCE TO RELATED APPLICATIONS


BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] The present invention relates to a vacuum cleaner, and more particularly, to a suction port assembly of a vacuum cleaner which draws in contaminant-laden air from a surface being cleaned.

[0004] 2. Description of the Related Art

[0005] Generally, a vacuum cleaner cleans a surface being cleaned by use of a suction force which is generated by the driving of a vacuum source mounted inside a vacuum cleaner body. The vacuum cleaner generally includes a main body housing a contaminant chamber and a vacuum source, a suction port assembly facing the surface being cleaned and drawing in contaminant, an extension pipe guiding the contaminant drawn in through the suction port assembly into the main body, and a flexible hose.

[0006] The suction port assembly usually has a fixed configuration, and therefore, is inconvenient to use in the places such as slopes, and it is also difficult to maintain a constant level of suction efficiency. Additionally, the suction port assembly often collides with the surface being cleaned and damaged.

[0007] The above problems particularly occur in cleaning of stairways, and the problem worsens when the stairway is covered by a carpet which attracts more dusts.

SUMMARY OF THE INVENTION

[0008] The present invention has been developed in order to solve the above drawbacks and other problems associated with the conventional arrangement. An aspect of the present invention is to provide a suction port assembly of a vacuum cleaner which is capable of cleaning a surface of a certain angle.

[0009] It is another aspect of the present invention to provide a suction port assembly of a vacuum cleaner, which is capable of cleaning a carpet-covered stairway with ease.

[0010] In order to achieve the above mentioned aspects and/or other features of the present invention, it is an aspect of the present invention to have a suction port assembly for use in a vacuum cleaner, which is foldable for close contact with a sloped or angled surface being cleaned. A plurality of assembly bodies may be articulately connected with each other.

[0011] The plurality of assembly bodies comprise a first assembly body, and a second assembly body rotatably engaged with respect to the first assembly body. The second body is rotatable to a variety of interior angles with respect to the first assembly body in accordance with the slope angle of the surface being cleaned.

[0012] The first and the second assembly bodies are positioned at an interior angle of at least 60 degrees. The internal angle varies from approximately 0 degree to approximately 180 degrees.

[0013] According to one aspect of the present invention, the first assembly body comprises a suction path interconnecting to an extension pipe of the vacuum cleaner, the first and the second assembly bodies each have first and second suction holes defined at the lower sides, respectively, and the first and the second suction holes are interconnected with the suction path, respectively.

[0014] The first and the second assembly bodies comprise a plurality of bristles formed along a lower sides thereof, respectively.

[0015] For the articulately connection of the assembly bodies, there are provided a hinge groove defined in the first assembly body, a hinge protrusion formed on the second assembly body for advancement into the hinge groove, a hinge pin for engaging the hinge groove and the hinge protrusion, and an elastic member disposed on the hinge pin.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] The above aspects and features of the present invention will be more apparent by describing certain embodiments of the present invention with reference to the accompanying drawings, in which:

[0017] FIG. 1 is a view schematically showing a vacuum cleaner having a suction port assembly according to an embodiment of the present invention;

[0018] FIG. 2 is an exploded perspective view of the suction port assembly of FIG. 1;

[0019] FIG. 3 is a view illustrating a suction port assembly according to another embodiment of the present invention; and

[0020] FIG. 4 is a view illustrating a second assembly body of the suction port assembly of FIG. 3 being folded onto a first assembly body.

DETAILS DESCRIPTION OF THE EXEMPLARY EMBODIMENTS

[0021] Certain embodiments of the present invention will be described in greater detail with reference to the accompanying drawings.

[0022] In the following description, some drawing reference numerals are used for the same elements even in different drawings. The matters defined in the description such as a detailed construction and elements are nothing but the ones provided to assist in a comprehensive understanding of the invention. Thus, it is apparent that the present invention can be carried out without those defined matters. Also, well-known functions or constructions are not described in detail since they would obscure the invention in unnecessary detail.

[0023] Referring to FIG. 1, a vacuum cleaner 100 having a suction port assembly 200 according to an embodiment of the present invention includes a cleaner body 110 housing a contaminant chamber (not shown) and a vacuum source (not shown), an operation part 130 for operating the vacuum cleaner 100, a suction port assembly 200 drawing in con-
taminant-laden air from the surface being cleaned by use of suction force generated from the vacuum cleaner (not shown), a flexible hose 120 connecting the cleaner body 110 with the operation part 130, and an extension pipe 140 connecting the operation part 130 with the suction port assembly 200.

According to the construction as described above, contaminants of the first cleaning surface 10 are drawn through the suction path 213 via the first suction hole 212, while the contaminants of the second cleaning surface 20 are drawn to the suction path 213 via the second and the first suction holes 222 and 212.

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assembly body 220 is moved by the pushing force of the user in the direction indicated by arrow A, the interior angle 02 decreases.

[0040] When the angle 01 of the second cleaning surface 20 with respect to the first cleaning surface 10 is small, the user pulls the extension pipe 140 in the direction indicated by arrow F3, and therefore, retrieves the first assembly body 210 in the direction indicated by arrow F4. In such a situation, as the second assembly body 220 is moved by the urging force of the elastic member 240 in the direction indicated by the arrow F5, the interior angle 02 increases.

[0041] According to the increase and decrease of the slope angle 01, the interior angle 02 between the first and the second assembly bodies 210 and 220 is varied, and according to the variance of the interior angle 02, the first assembly body 210 may be brought into tight contact with the first cleaning surface 10, or the second assembly body 220 may be brought into tight contact with the second cleaning surface 20. Accordingly, suction efficiency deterioration of the cleaning is prevented, and damage to the suction port assembly 200 due to collision with the cleaning surfaces 10 and 20 can also be avoided.

[0042] The operation of the suction port assembly 200 as shown in FIG. 1 will now be described in greater detail.

[0043] Referring to FIGS. 1 and 2, the user varies the interior angle 02 in accordance with the slope angle 01, to clean the cleaning surfaces 10 and 20 in one cleaning operation. More specifically, the user pushes the extension pipe 140 in the direction indicated by arrow F1. Accordingly, the first assembly body 210 contacts the first cleaning surface 10, and advances in the direction of arrow F2, while the second assembly body 220 is turned in the direction of arrow A, and contacts with the second cleaning surface 20. In a state that the first assembly body 210 contacts the first cleaning surface 10, and the second assembly body 220 contacts the second cleaning surface 20, the suction port assembly 200 is moved in the direction either of arrow E or arrow F, to clean the first and the second cleaning surfaces 10 and 20.

[0044] During operation, the bristles 250 along the outer side of the first suction hole 212 hits and scratch the contaminants off from the first cleaning surface 10, so that the contaminants can be drawn to the suction path 213 via the first suction hole 212 which is defined at the lower side of the first assembly body 210.

[0045] At the same time, the bristles 250 formed along the outer side of the second suction hole 222 hit and scratch contaminants off from the second cleaning surface 20, so that the contaminants can be drawn into the suction path 213 via the second suction hole 222 which is defined at the lower side of the second assembly body 220, and the first suction hole 212 interconnected with the second suction hole 222.

[0046] After that, the contaminants at the suction path 213 are collected in the dust chamber (not shown) of the cleaner body 110 via the extension pipe 140 and the flexible hose 120.

[0047] Meanwhile, the suction port assembly 300 may be structured for the stairway cleaning purpose, as shown in FIG. 3. A reference numeral 400 denotes a carpet covering the stairway 300.

[0048] When constructed for stairway cleaning purpose, the suction port assembly 300 has the first and the second assembly bodies 310 and 320 at the interior angle 04 constantly more than 60 degrees. More preferably, the interior angle 04 may be fixed to 90 degrees. To this end, the right open corner 310a (see FIG. 4) of the first assembly body 310 and the left open corner 320b (see FIG. 4) of the second assembly body 320 are contacted with each other to provide for direct communication of the suction therebetween. By fixing the interior angle 04 to 90 degrees, the slope angle 03 between the first and the second cleaning surfaces 30 and 40 can be maintained at 90 degrees, and therefore, the interior angle 04 does not change in operation. Furthermore, by doing as described above, the elastic member 240 (see FIG. 2) may be omitted from the suction port assembly 300 for the stairway cleaning operation, because the interior angle 04 is not required to be automatically adjusted.

[0049] In addition, if the interior angle 04 is fixed to a limit of 90 degrees, the suction port assembly 300 can be stowed with increased convenience when not in use, because the second assembly body 320 can be turned 90 degrees toward the first assembly body 310 so that the second assembly body 320 can be folded onto the first assembly body 310. The top of the second assembly 320 is preferably adapted with a recess so as to allow for the folding of the second assembly completely over the first assembly 310 as shown in FIG. 4. The other structures will not be explained hereinbelow for these are similar to those of the suction port assembly 200 as described above with reference to FIG. 1.

[0050] The operation of the suction port assembly 300 of FIG. 3 will now be described in greater detail below.

[0051] Referring to FIG. 3, the user of the cleaner contacts the first assembly body 310 to the first cleaning surface 30, and the second assembly body 320 to the second cleaning surface 40, respectively. Unlike the structure of the suction port assembly as shown in FIGS. 1 and 2, because the slope angle 03 and the interior angle 04 are fixed to 90 degrees, the user does not need to force the extension pipe 140 to vary the interior angle 04 in accordance with the slope angle 03.

[0052] With the first assembly body 310 contacting the first cleaning surface 30 and the second assembly body 320 contacting the second cleaning surface 40, the suction port assembly 300 is moved in the direction of arrow G or arrow H, and cleans the first and the second cleaning surfaces 30 and 40. The rest of the cleaning operation will be omitted for this is similar to that which has been described above with reference to FIGS. 1 and 2.

[0053] With the suction port assembly of a vacuum cleaner as explained so far, the operator of the cleaner can clean the cleaning surfaces even with slopes, with maintained suction efficiency. Further, damage to suction port assembly due to collision with the cleaning surface, can be avoided.

[0054] The vacuum cleaner having a suction port assembly according to the present invention is especially effective for the cleaning of stairways with slope angles of 90 degrees, or carpeted areas which attract more dusts and therefore require frequent cleaning operations.

[0055] The foregoing embodiment and advantages are merely exemplary and are not to be construed as limiting the present invention. The present teaching can be readily
applied to other types of apparatuses. Also, the description of the embodiments of the present invention is intended to be illustrative, and not to limit the scope of the claims, and many alternatives, modifications, and variations will be apparent to those skilled in the art.

What is claimed is:

1. A suction port assembly for use with a vacuum cleaner having a vacuum source and an extension pipe, the suction port assembly comprising:
   - a body in fluid communication with the vacuum source and being foldable for contact with a non-linear surface being cleaned.
2. The suction port assembly of claim 1, wherein the body comprises a plurality of assembly bodies articulately connected with each other.
3. The suction port assembly of claim 2, wherein the plurality of assembly bodies comprises first and second assembly bodies, the second assembly body being rotatably connected to the first assembly body, and wherein the second assembly body is rotatable through a plurality of interior angles with respect to the first assembly body in accordance with an angle of the non-linear surface being cleaned.
4. The suction port assembly of claim 3, wherein the first and the second assembly bodies are positionable at an interior angle of at least 60 degrees with respect to each other.
5. The suction port assembly of claim 3, wherein the interior angle varies from approximately 0 degrees to approximately 180 degrees.
6. The suction port assembly of claim 3, wherein the interior angle can be varied from approximately 0 degrees to approximately 90 degrees.
7. The suction port assembly of claim 3, wherein the first assembly body comprises a suction path in fluid communication with the extension pipe of the vacuum cleaner, wherein the first and the second assembly bodies each have first and second suction holes defined at lower sides thereof, respectively, and wherein the first and the second suction holes are interconnected with the suction path, respectively.
8. The suction port assembly of claim 7, wherein the first and the second assembly bodies each comprise a plurality of bristles formed along the lower sides thereof, respectively.
9. The suction port assembly of claim 2, wherein the plurality of assembly bodies are articulately connected with each other via a hinge.
10. The suction port assembly of claim 3, further comprising:
    - a hinge groove of the first assembly body;
    - a hinge protrusion of the second assembly body for advancement into the hinge groove; and
    - a hinge pin for connecting the hinge groove and the hinge protrusion.
11. The suction port assembly of claim 10, further comprising an elastic member operably connected to the hinge pin.
12. A vacuum cleaner comprising:
    - a vacuum source; and
    - a suction port assembly comprising a body in fluid communication with the vacuum source and being foldable for contact with a non-linear surface being cleaned.
13. The vacuum cleaner of claim 12, wherein the body comprises a plurality of assembly bodies articulately connected with each other.
14. The vacuum cleaner of claim 13, wherein the plurality of assembly bodies comprises first and second assembly bodies, the second assembly body being rotatably connected to the first assembly body, and wherein the second assembly body is rotatable through a plurality of interior angles with respect to the first assembly body in accordance with an angle of the non-linear surface being cleaned.
15. The vacuum cleaner of claim 14, wherein the internal angle varies from approximately 0 degrees to approximately 180 degrees.
16. The vacuum cleaner of claim 14, wherein the internal angle can be varied from approximately 0 degrees to approximately 90 degrees.
17. The vacuum cleaner of claim 14, further comprising an extension pipe in fluid communication with the vacuum source, wherein the first assembly body comprises a suction path in fluid communication with the extension pipe, wherein the first and second assembly bodies each have first and second suction holes defined at lower sides thereof, respectively, and wherein the first and second suction holes are interconnected with the suction path, respectively.
18. The vacuum cleaner of claim 17, wherein the first and second assembly bodies each comprise a plurality of bristles formed along the lower sides thereof, respectively.
19. The vacuum cleaner of claim 14, wherein the suction port assembly further comprises a hinge assembly having a hinge groove, a hinge protrusion for advancement into the hinge groove, a hinge pin for connecting the hinge groove and the hinge protrusion, and an elastic member, wherein the hinge assembly rotatably connects the first and second assembly bodies, and wherein the elastic member biases the first and second assembly bodies.
20. A method of cleaning a non-linear surface comprising:
    - providing suction from a suction source to a suction port assembly;
    - pivoting a first portion of the suction port assembly with respect to a second portion of the suction port assembly at an angle that corresponds to the non-linear surface being cleaned; and
    - moving the suction port assembly along the non-linear surface so that the first and second portions of the suction port assembly simultaneously remain in proximity to the non-linear surface.

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