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(54) **SUCTION BRUSH FOR VACUUM CLEANER**

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(57) **ABSTRACT**

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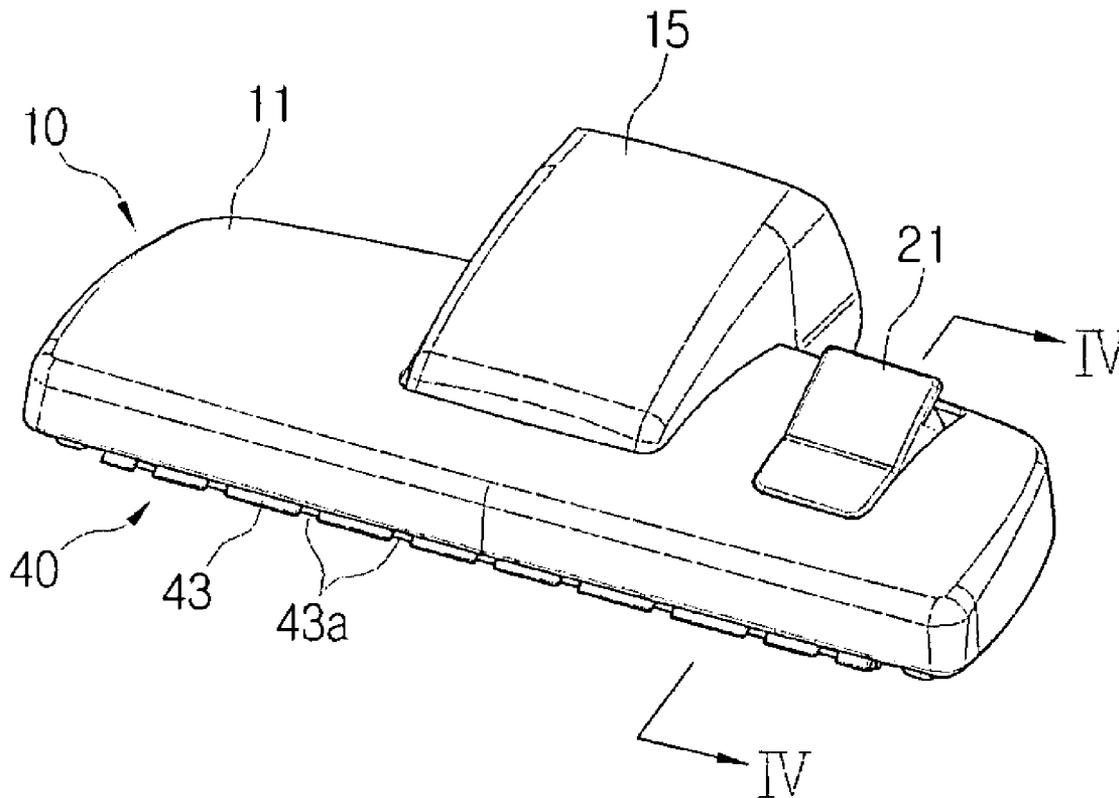
A suction brush for a vacuum cleaner includes blocking members mounted front and rear, to a brush body bottom surface to seal off the periphery of a suction inlet formed thereon and to generate a high suction force between a surface to be cleaned and the suction inlet during cleaning, wherein the front blocking member is pivotably mounted to the brush body when one end thereof is connected thereto, and includes blocking arms to maintain the high suction force between the suction inlet and the surface to be cleaned while being alternately brought into close contact therewith when the brush body moves forwards or backwards; and the first blocking arm includes a plurality of air suction apertures to restrict passage of air flowing into the suction inlet while the first blocking arm is in close contact with the surface to be cleaned when the brush body moves forwards.

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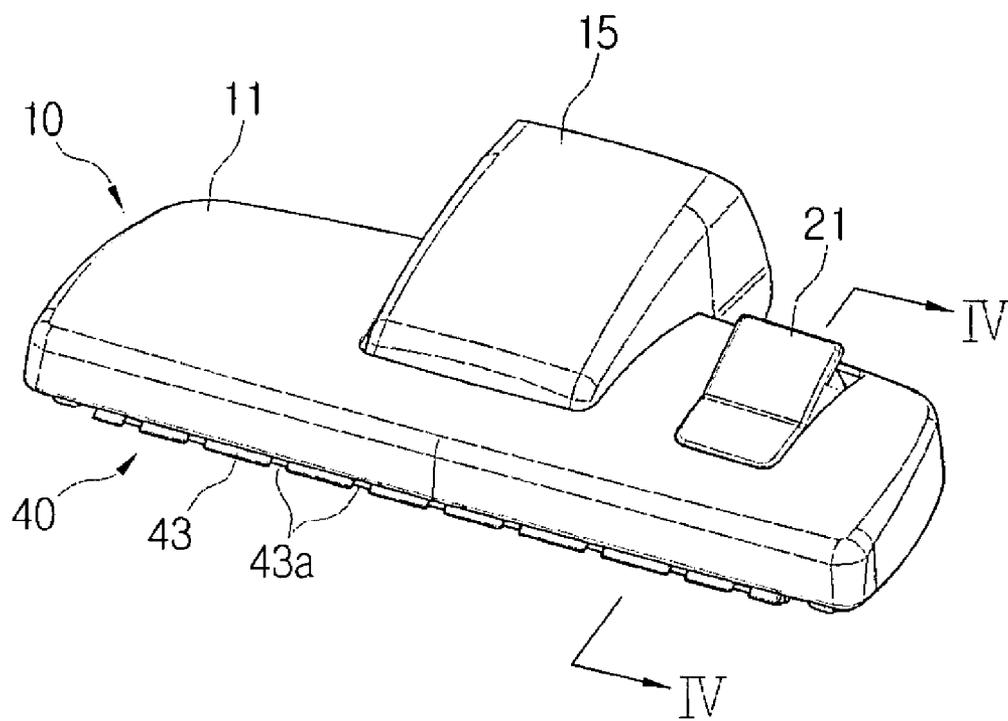
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May 28, 2007 (KR) ..... 2007-51370



# FIG. 1





# FIG. 3

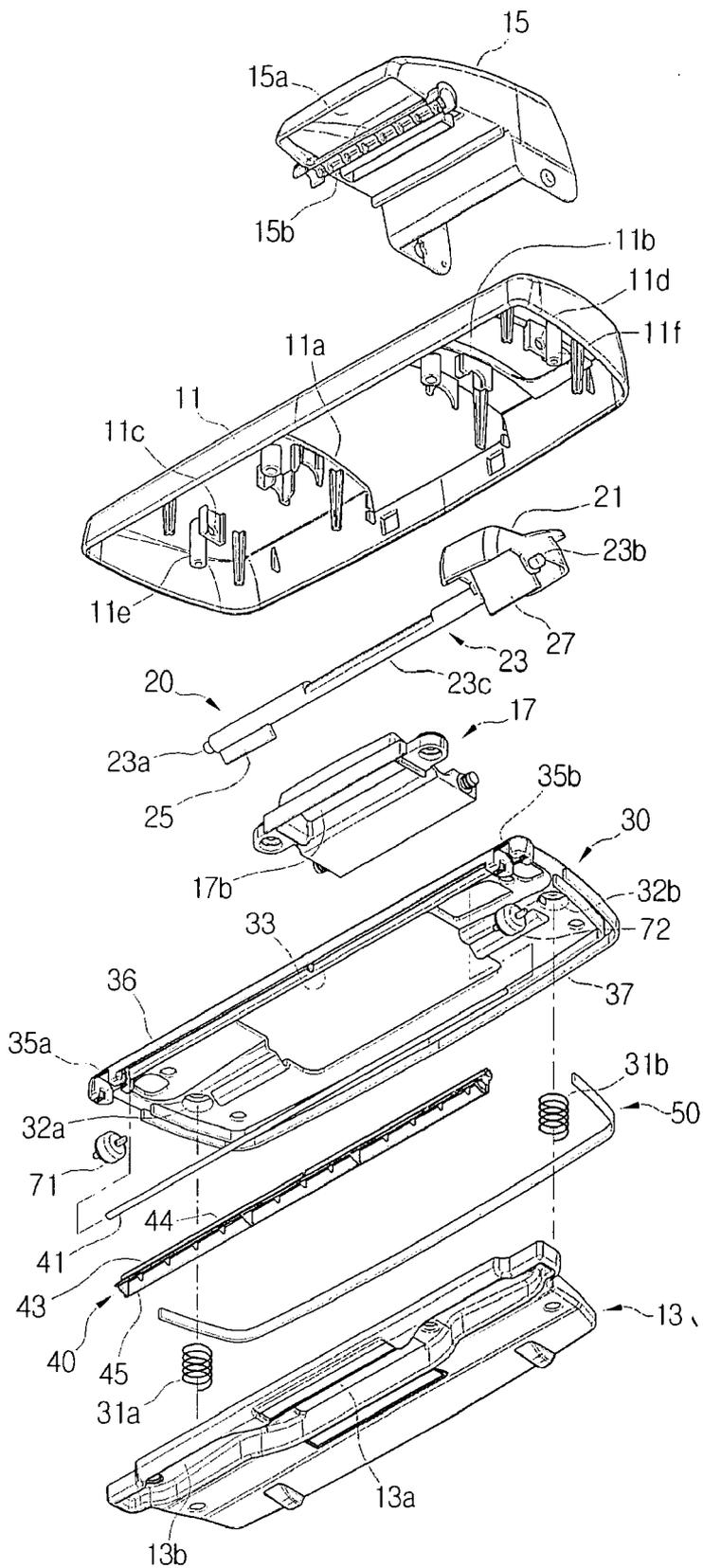


FIG. 4

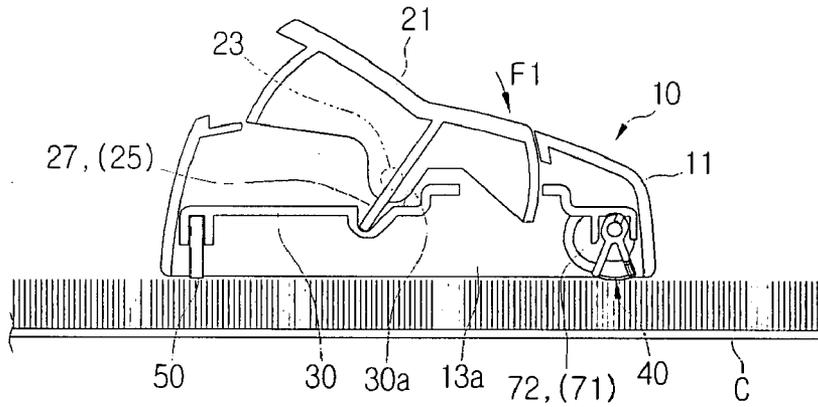


FIG. 5

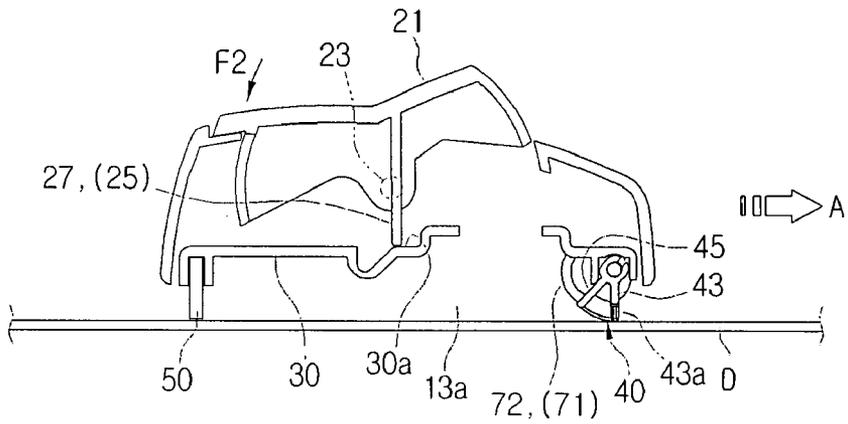
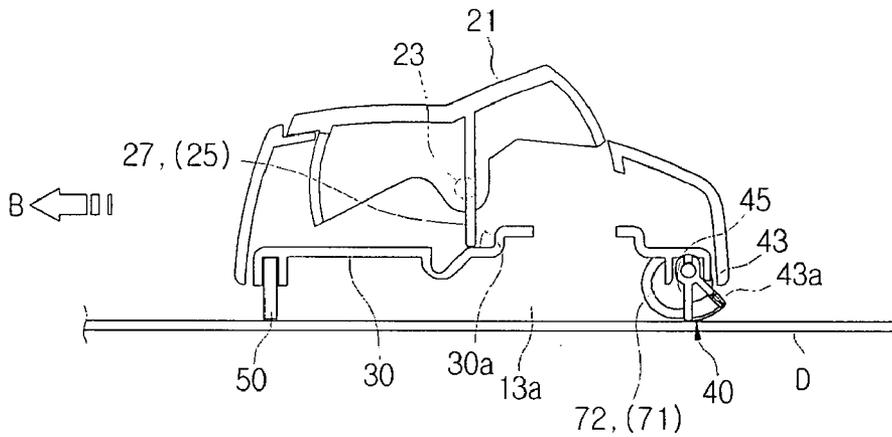


FIG. 6



**SUCTION BRUSH FOR VACUUM CLEANER**

**CROSS-REFERENCE TO RELATED APPLICATIONS**

[0001] This application claims the benefit under 35 U.S.C. § 119(a) of Korean Patent Application No. 10-2007-0051370, filed May 28, 2007, in the Korean Intellectual Property Office, the entire disclosure of which is incorporated herein by reference.

**BACKGROUND OF THE INVENTION**

[0002] 1. Field of the Invention

[0003] The present disclosure relates generally to a suction brush for a vacuum cleaner. More particularly, the present disclosure relates to a suction brush for a vacuum cleaner which is constructed in order to draw in dust while in contact with a surface to be cleaned.

[0004] 2. Description of the Related Art

[0005] Generally, a suction brush of a vacuum cleaner is in fluid communication with a main body of the cleaner through a flexible hose and an extension pipe. The vacuum cleaner draws in dust from a surface to be cleaned using a suction force generated by a suction motor mounted in the main body while maintaining a predetermined vacuum pressure between the surface to be cleaned and the suction brush.

[0006] As disclosed in Japanese Laid-open Patent No. 7-163495 and Korean Patent No. 662642, front and rear blocking members made of soft material to prevent air suction are mounted in the front and rear portions of a bottom surface of a suction brush using a suction inlet of the suction brush as a center, so that the vacuum pressure between the surface to be cleaned and the suction brush can be maintained at the maximum level to increase the suction force, making it possible to improve suction efficiency during cleaning of relatively smooth wooden or linoleum floors, or other floors.

[0007] When such a suction brush, including front and rear blocking members respectively mounted in the front and rear portions thereof, moves forwards or backwards across the surface to be cleaned, the blocking members block the periphery of the suction inlet from the outside, and accordingly a predetermined sealed space may be provided between the surface to be cleaned and the suction brush, so that the suction force can be maintained at the maximum level within this space.

[0008] In addition, when the conventional suction brush moves forwards, the front blocking member opens most of the front of the suction inlet, and when the conventional suction brush moves backwards, the front blocking member seals off the front of the suction inlet. Accordingly, it is easy to operate the suction brush.

[0009] However, most of the front of the suction inlet is opened when the suction brush moves forwards, and thus the suction force generated from the periphery of the suction inlet is significantly less than in a situation when the suction brush moves backwards, so the dust suction efficiency may be reduced.

[0010] Additionally, since the front and rear blocking members of the conventional suction brush are in contact with the surface to be cleaned, if the surface to be cleaned is a carpet, the carpet may be damaged by the front and rear blocking members, and may become attached to the bottom surface of the suction brush due to the high vacuum pressure

generated between the carpet and the suction inlet by the front and rear blocking member, making it more difficult to operate the suction brush.

**SUMMARY OF THE INVENTION**

[0011] An aspect of the present disclosure is to address at least the above problems and/or disadvantages and to provide at least the advantages described below. Accordingly, an aspect of the present disclosure is to provide a suction brush for a vacuum cleaner, which is capable of preventing the suction force at the periphery of a suction inlet from being reduced and which is capable of maintaining a high level of operability of the suction brush when the suction brush moves forwards.

[0012] Another aspect of the present disclosure is to provide a suction brush for a vacuum cleaner, in which the suction force is regulated according to the state of a surface to be cleaned so that a high level of operability of the suction brush can be maintained on the surface to be cleaned.

[0013] According to an aspect of an exemplary embodiment of the present disclosure, there is provided a suction brush for a vacuum cleaner, the suction brush including a front blocking member and a rear blocking member mounted in a front portion and a rear portion, respectively, of a bottom surface of a brush body to seal off the periphery of a suction inlet formed on the bottom surface of the brush body and to generate a high suction force between a surface to be cleaned and the suction inlet during cleaning, wherein the front blocking member is pivotably mounted to the brush body when one end thereof is connected to the brush body, and includes a first blocking arm and a second blocking arm to maintain the high suction force between the suction inlet and the surface to be cleaned while being alternately brought into close contact with the surface to be cleaned when the brush body moves forwards or backwards; and the first blocking arm includes a plurality of air suction apertures to restrict passage of air flowing into the suction inlet while the first blocking arm is in close contact with the surface to be cleaned when the brush body moves forwards.

[0014] The front and rear blocking members may be raised or lowered along the brush body to be pressed onto or raised from the surface to be cleaned. The front and rear blocking members may be used selectively according to the type or the state of surface to be cleaned.

[0015] The brush body may be raisably and lowerably mounted in the suction brush, and may comprise a moving plate in which the front and rear blocking members are mounted. In order to raise and lower the moving plate, the suction brush may further comprise a button unit exposed on the brush body; a first pressure tab and a second pressure tab to transfer a pressurizing force from the button unit to the moving plate if a user pushes a front portion or a rear portion of the button unit; and a rotation shaft which is rotatably mounted widthwise within the brush body, wherein the button unit is disposed integrally with one side of the rotation shaft, and the first and second pressure tabs protrude at the same angle from opposite sides of the rotation shaft.

[0016] The suction brush may further comprise a first wheel and a second wheel which are rotatably engaged with opposite ends of the front bottom surface of the brush body and are rested on the surface to be cleaned when the front and rear blocking members are lowered, so that the brush body moves smoothly over the surface to be cleaned against the suction force.

[0017] The first and second blocking arms may be made of soft materials in order to increase the adhesion between the surface to be cleaned and the first and second blocking arms.

#### BRIEF DESCRIPTION OF THE DRAWING FIGURES

[0018] The above aspect and other features of the present disclosure will become more apparent by describing in detail exemplary embodiments thereof with reference to the attached drawing figures, wherein;

[0019] FIG. 1 is a perspective view illustrating a suction brush for a vacuum cleaner according to an exemplary embodiment of the present disclosure;

[0020] FIG. 2 is an exploded perspective view illustrating the top of a suction brush for a vacuum cleaner according to an exemplary embodiment of the present disclosure;

[0021] FIG. 3 is an exploded perspective view illustrating the bottom of a suction brush for a vacuum cleaner according to an exemplary embodiment of the present disclosure;

[0022] FIG. 4 is a schematic perspective view, taken along line IV-IV in FIG. 1, illustrating a first cleaning mode of a suction brush for a vacuum cleaner according to an exemplary embodiment of the present disclosure;

[0023] FIG. 5 is a schematic perspective view illustrating the situation when a suction brush according to an exemplary embodiment of the present disclosure moves forward in a second cleaning mode; and

[0024] FIG. 6 is a schematic perspective view illustrating the situation when a suction brush according to an exemplary embodiment of the present disclosure moves backwards in a second cleaning mode.

[0025] Throughout the drawings, the same drawing reference numerals will be understood to refer to the same elements, features, and structures.

#### DETAILED DESCRIPTION OF THE INVENTION

[0026] Hereinafter, a suction brush for a vacuum cleaner according to exemplary embodiments of the present disclosure will be described in detail with reference to the accompanying drawing figures.

[0027] FIG. 1 is a perspective view illustrating a suction brush for a vacuum cleaner according to an exemplary embodiment of the present disclosure, and FIGS. 2 and 3 are exploded perspective views illustrating the top and bottom, respectively, of the suction brush of FIG. 1.

[0028] Referring to FIGS. 1 to 3, the suction brush according to an exemplary embodiment of the present disclosure includes a brush body 10, a plunger member 20, a moving plate 30, a front blocking member 40 and a rear blocking member 50.

[0029] The brush body 10 includes a top cover 11, a bottom cover 13 and an air guide cover 15. The bottom cover 13 is mounted below the top cover 11. The air guide cover 15 is connected to a first through hole 11a formed in an upper center of the top cover 11 so as to guide dust-laden air flowing from a surface to be cleaned through a suction inlet 13a of the bottom cover 13 to an extension pipe (not shown) extending from a body (not shown) of a vacuum cleaner. The bottom cover 13 includes a guide groove 13b, which is disposed widthwise on a bottom surface thereof to guide dust on the surface to be cleaned to the suction inlet 13a. In this situation, the suction inlet 13a is in fluid communication with the air guide cover 15 and is disposed substantially at the center of

the guide groove 13b. The air guide cover 15 includes an inlet 15a and a fixing unit 17. The inlet 15a is disposed on a front bottom surface of the air guide cover 15 so that dust-laden air flowing in the suction inlet 13a is drawn in through the inlet 15a, and the fixing unit 17 is detachably mounted on a lower portion of the air guide cover 15 to hold the plunger member 20 in a hinged state. The fixing unit 17 includes a connecting opening 17b to connect the suction inlet 13a of the bottom cover 13 and the inlet 15a of the air guide cover 15.

[0030] The plunger member 20 includes a button unit 21, a rotation shaft 23, a first pressure tab 25 and a second pressure tab 27. The button unit 21 is formed integrally with one side of the rotation shaft 23 and is exposed to the outside of the top cover 11 through a second through hole 11b so that a user can operate the suction brush.

[0031] If a user pushes the button unit 21 of the brush body 10 forwards or backwards, the button unit 21 may switch the suction brush between the first cleaning mode and the second cleaning mode. The first cleaning mode is a mode suitable for cleaning a carpet, in which the front and rear blocking members 40 and 50 may be raised and inserted into the top cover 11, and the second cleaning mode is a mode suitable for cleaning wooden or linoleum floors, or other floors, in which the front and rear blocking members 40 and 50 may be lowered and protrude downwardly from the outside of the top cover 11. The rotation shaft 23 includes rotation projections 23a and 23b extending from opposite ends thereof. The rotation projections 23a and 23b are engaged with support ribs 11c and 11d so that the rotation shaft 23 can be rotatably supported, and at the same time, a center 23c of the rotation shaft 23 is slidably inserted into a first groove 15b disposed widthwise on the air guide cover 15 at the periphery of the inlet 15a of the air guide cover 15, and into a second groove 17a of the fixing unit 17, which corresponds to the first groove 15b. The first and second pressure tabs 25 and 27 protrude at the same angle from opposite sides of the rotation shaft 23 so that the moving plate 30 is pressed or released by rotating the rotation shaft 23 clockwise or counterclockwise by operation of the button unit 21.

[0032] The moving plate 30 is disposed so as to be raised and lowered along a first guide shaft 11e and a second guide shaft 11f of the top cover 11, which penetrate a first hole 32a and a second hole 32b of the moving plate 30, respectively, in a space formed between the top cover 11 and the bottom cover 13. In this situation, the moving plate 30 is elastically connected to the bottom cover 13 by a first coil spring 31a and a second coil spring 31b, which enclose support projections 13c and 13d of the bottom cover 13. Upper ends of the first and second coil springs 31a and 31b are supported by the first and second holes 32a and 32b. Additionally, the moving plate 30 includes a third through hole 33 in a center portion thereof through which the fixing unit 17 penetrates, so that the moving plate 30 can move smoothly up and down between the top cover 11 and the bottom cover 13 without interference by the fixing unit 17. The first and second pressure tabs 25 and 27 of the plunger member 20 are inserted into opposite sides of the third through hole 33, respectively, and at the same time, a first pressure slit 34a and a second pressure slit 34b pressurized by the first and second pressure tabs 25 and 27, respectively, are formed. Additionally, the moving plate 30 includes a first cavity 35a and a second cavity 35b, into which a first wheel 71 and a second wheel 72, respectively, are rotatably mounted, formed at opposite ends of the front bottom surface thereof. When the front blocking member 40 moves in close

contact with the surface to be cleaned, the first and second wheels 71 and 72 enable the suction brush to move smoothly, so it is possible to enhance the operability for the suction brush.

[0033] The front blocking member 40 includes a first blocking arm 43 and a second blocking arm 45, which are pivotably mounted on the moving plate 30 by a hinge shaft 41. The hinge shaft 41 is rotatably fitted in a third cavity 36 formed widthwise on the front bottom surface of the moving plate 30. The first and second blocking arms 43 and 45 have a length substantially equal to that of the third cavity 36, and upper ends of the first and second blocking arms 43 and 45 are connected by a connecting unit 44 so as to maintain a predetermined angle relative to each other. In this situation, the connecting unit 44 includes a groove 44a so that the connecting unit 44 can be detachably mounted to the hinge shaft 41. The first blocking arm 43 includes a plurality of air suction apertures 43a at regular intervals in order to prevent air from flowing into the suction inlet 13a, but the second blocking arm 45 does not include separate suction apertures. Additionally, the first and second blocking arms 43 and 45 are disposed at the front and rear, respectively, of the front blocking member 40 and accordingly may be alternately brought into close contact with the surface to be cleaned when the suction brush in the second cleaning mode moves forwards and backwards, respectively. In order to increase the adhesion between the surface to be cleaned and the first and second blocking arms 43 and 45, the first and second blocking arms 43 and 45 may be made of soft synthetic resins having a predetermined elasticity.

[0034] The rear blocking member 50 is fitted into a fourth cavity 37 which is formed along the rear bottom surface and part of the opposite ends of the bottom surface of the moving plate 30. The front and rear blocking members 40 and 50 seal off the periphery of the suction inlet 13a, and thus the high suction force between the suction inlet 13a and the surface to be cleaned can be maintained.

[0035] Hereinafter, operations of the suction brush of the vacuum cleaner configured as described above according to the exemplary embodiment of the present disclosure in the first cleaning mode and the second cleaning mode will be described with reference to FIGS. 4 to 6.

[0036] Referring to FIG. 4, the first cleaning mode involves the front and rear blocking members 40 and 50 being raised and prevented from coming into contact with a surface C to be cleaned that may be damaged by the front and rear blocking members 40 and 50, such as a carpet.

[0037] If a user pushes the front portion of the button unit 21 in direction F1 in order to operate the suction brush in the first cleaning mode, the rotation shaft 23 may rotate a predetermined angle in a direction in which the button unit 21 is pushed (namely, towards the front of the brush body 10), and simultaneously, the first and second pressure tabs 25 and 27 may pivot upwards to release pressure on the moving plate 30. Accordingly, the moving plate 30 may be raised along the first and second guide shafts 11e and 11f (referring to FIG. 3) by the first and second coil springs 31a and 31b (referring to FIG. 2) and the front and rear blocking members 40 and 50 may be lifted from the surface to be cleaned.

[0038] If the suction brush is operated in the first cleaning mode as described above, it is possible to easily operate the suction brush while maintaining a predetermined suction force between the suction inlet 13a and surface C.

[0039] Referring to FIGS. 5 and 6, the second cleaning mode is selected when there is a need to clean a surface D to be cleaned that is unlikely to be damaged by the front and rear blocking members 40 and 50, for example wooden or linoleum floors.

[0040] If a user pushes the rear of the button unit 21 in direction F2 in order to operate the suction brush in the second cleaning mode, the rotation shaft 23 may rotate a predetermined angle in a direction in which the button unit 21 is pushed (namely, towards the rear of the brush body 10), and simultaneously, the first and second pressure tabs 25 and 27 may pivot downwards. In this situation, the first and second pressure tabs 25 and 27 may press the first and second pressure slits 34a and 34b downwards, and the moving plate 30 may be lowered along the first and second guide shafts 11e and 11f (referring to FIG. 3) against the elastic force exerted by the first and second coil springs 31a and 31b (referring to FIG. 2). Subsequently, the first and second pressure tabs 25 and 27 may be detached from the first and second pressure slits 34a and 34b and may continuously press a part 30a of an upper surface of the moving plate 30, so the front and rear blocking members 40 and 50 may come into tight contact with surface D.

[0041] If the suction brush moves forwards in direction A while in the second cleaning mode, the first and second blocking arms 43 and 45 may be pivoted about the hinge shaft 41 towards the rear of the brush body 10 due to friction between the surface D and the first and second blocking arms 43 and 45, so that the first blocking arm 43 can substantially come into contact perpendicularly with the surface D and the second blocking arm 45 can be raised from the surface D, as shown in FIG. 5. In this situation, the first blocking arm 43 may draw air into the suction inlet 13a only through the plurality of air suction apertures 43a, so that the degree of opening of the suction inlet 13a may be limited relative to a conventional suction brush. Accordingly, pressure loss between the suction inlet 13a and surface D can be minimized and the suction force can be maintained.

[0042] Additionally, the suction brush may be guided to move smoothly over the surface D, in order to prevent difficulties in operating the suction brush, using a relatively high suction force generated between the suction force 13a and the surface D by the first blocking arm 43 when the first and second wheels 71 and 72 are in contact with the surface D.

[0043] On the other hand, if the suction brush moves backwards in direction B while in the second cleaning mode, the first and second blocking arms 43 and 45 may be pivoted about the hinge shaft 41 towards the front of the brush body 10 due to friction between the surface D and the first and second blocking arms 43 and 45, so the second blocking arm 45 can come into contact substantially perpendicularly with the surface D, and the first blocking arm 43 can be raised from the surface D, as shown in FIG. 6. In this situation, the second blocking arm 45 and the rear blocking member 50 may seal off the periphery of the suction inlet 13a to maintain the suction force at the maximum level. The second blocking arm 45 may draw air into the suction inlet 13a along with dust on the surface D, making it possible to maximize suction efficiency.

[0044] As described above, when the suction brush moves backwards, it is also possible to prevent difficulties in operating the suction brush, using a high suction force generated between the suction inlet 13a and the surface D by the second

blocking arm 45 while the first and second wheels 71 and 72 are in contact with the surface D.

[0045] As apparent from the foregoing description, according to the exemplary embodiments of the present disclosure, the suction brush may be operated in the first cleaning mode or the second cleaning mode according to the properties of a surface to be cleaned, e.g. the rigidity thereof, the material thereof, or the like, so it is possible to prevent the surface to be cleaned from being damaged and to maximize the dust suction efficiency.

[0046] In addition, when the suction brush moves forwards in the second cleaning mode, the first blocking tab of the front blocking member can prevent the suction force at the periphery of the suction inlet from being reduced, and, simultaneously, the first and second wheels can cause the suction brush to move smoothly across the surface to be cleaned to increase the operability for the suction brush.

[0047] Although representative embodiments of the present disclosure have been shown and described in order to exemplify the principle of the present disclosure, the present disclosure is not limited to the specific exemplary embodiments. It will be understood that various modifications and changes can be made by one skilled in the art without departing from the spirit and scope of the disclosure as defined by the appended claims. Therefore, it shall be considered that such modifications, changes and equivalents thereof are all included within the scope of the present disclosure.

What is claimed is:

- 1. A suction brush for a vacuum cleaner, comprising:
  - a front blocking member and a rear blocking member mounted in a front portion and a rear portion, respectively, of a bottom surface of a brush body to seal off a periphery of a suction inlet formed on the bottom surface of the brush body and to generate a high suction force between a surface to be cleaned and the suction inlet during cleaning, wherein the front blocking member is pivotably mounted on the brush body when one end thereof is connected to the brush body; and
  - a first blocking arm and a second blocking arm to maintain the high suction force between the suction inlet and the surface to be cleaned while being alternately brought into close contact with the surface to be cleaned when the brush body moves forwards or backwards, wherein the first blocking arm comprises a plurality of air suction apertures to restrict passage of air flowing into the suction inlet while the first blocking arm is in close contact with the surface to be cleaned when the brush body moves forwards.
- 2. The suction brush as claimed in claim 1, wherein a blocking member is capable of being raised or lowered relative to the surface to be cleaned.
- 3. The suction brush as claimed in claim 2, wherein the brush body is raisably and lowerably mounted in the suction brush, and comprises a moving plate in which the front and rear blocking members are mounted.

- 4. The suction brush as claimed in claim 3, further comprising a plunger member comprising:
  - a button unit exposed on the brush body;
  - a first pressure tab and a second pressure tab to transfer a pressurizing force from the button unit to the moving plate if a user pushes a front portion or a rear portion of the button unit; and
  - a rotation shaft which is rotatably mounted widthwise within the brush body,
 wherein the button unit is disposed integrally with one side of the rotation shaft, and the first and second pressure tabs protrude at the same angle from opposite sides of the rotation shaft.
- 5. The suction brush as claimed in claim 2, further comprising a first wheel and a second wheel which are rotatably engaged with opposite ends of the bottom surface of the brush body and are rested on the surface to be cleaned when the front and rear blocking members are lowered, so that the brush body moves smoothly, against the suction force, over the surface to be cleaned.
- 6. The suction brush as claimed in claim 1, wherein the first and second blocking arms are made of soft materials in order to increase the adhesion between the surface to be cleaned and the first and second blocking arms.
- 7. A suction brush comprising
  - a brush body;
  - a suction inlet disposed on a bottom surface of the brush body; and
  - a blocking member mounted to, and disposed about a bottom surface of, the brush body.
- 8. The suction brush as claimed in claim 7, wherein the blocking member is pivotably mounted to the brush body and disposed about a bottom surface of the brush body; and wherein the blocking member comprises a plurality of blocking arms.
- 9. The suction brush as claimed in claim 8, wherein the plurality of blocking arms are capable of assuming positions relative to the brush body and relative to a surface over which the brush body travels, according to the direction of travel of the brush body over the surface, and wherein assumption of the positions by the blocking arms prevents reduction of a suction force at a periphery of the suction inlet.
- 10. The suction brush as claimed in claim 9, wherein assumption of the positions by the blocking arms is capable of regulating the suction force at the periphery of the suction inlet.
- 11. The suction brush as claimed in claim 8, wherein the blocking member can be configured by a user to permit modulation of a suction force around a periphery of the suction inlet.

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