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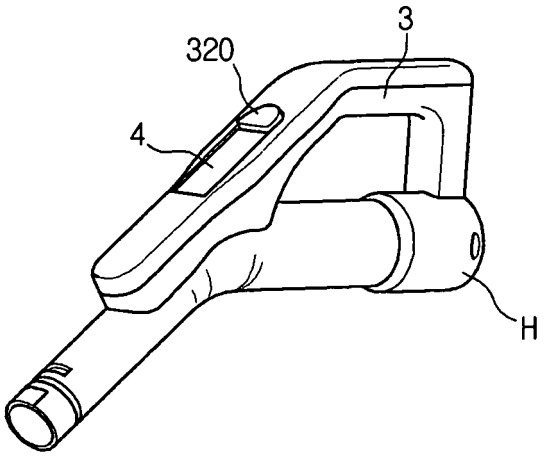
(54) **Suction flow speed control apparatus and vacuum cleaner having the same**

(57) A suction flow speed control apparatus of a vacuum cleaner is provided. The suction flow speed control apparatus includes a first suction flow path (100), one end of which is connected to the main body (1) of the vacuum cleaner, and the other end of which is connected to a nozzle unit (2). The apparatus includes a second section flow path (200) which is formed inside a hand grip (3) disposed on a flow path connection device (18), and which includes a first port (210) connected to the outside and a second port (220) connected the first suction flow path. An opening/closing unit (300) is provided for opening and closing the second port (220).

FIG. 1



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Description

[0001] This invention relates to a vacuum cleaner, and in particular to a suction flow speed control apparatus of a vacuum cleaner.

[0002] Recently, as user convenience is increasingly gaining attention, vacuum cleaners are becoming equipped with various devices designed to enhance user convenience. Most complaints about vacuum cleaners are related to the noise of the suction motor, which rotates at high speed, and the noise produced when air is sucked in at high speed through its nozzle unit.

[0003] If a vacuum cleaner is set in an acoustic mode to reduce noise produced by the motor or by air suction, and the cleaner is cleaning a smooth fabric surface such as a carpet or a woven fabric, the suction power of the nozzle unit needs to be reduced so as to prevent the fabric from sticking to the nozzle unit. In order to weaken the suction power of the nozzle unit, electric control devices are widely deployed to control the suction motor to rotate at a lower speed. The devices required to control the speed of the suction motor include a controlling unit, and a switching unit, electric wires being provided to connect the controlling unit and the switching unit. However, such parts deployed to control the speed of the suction motor not only increase the unit price of a cleaner, but also increase the number of assembly workers required for production. In addition, if a part is defective, a user cannot solve the resulting problem without help from a technician. Moreover extra money needs to be spent to replace the defective part with a new one.

[0004] The present invention provides a suction flow speed control apparatus of a vacuum cleaner, the apparatus comprising: a first suction flow path which is formed in a flow path connection device, one end of which is connected to a main body of a vacuum cleaner, and the other end of which is connected to a nozzle unit; a second suction flow path which is formed inside a hand grip disposed on the flow path connection device, and which includes a first port fluidly communicating with the outside, and a second port fluidly communicating with the first suction flow path; and an opening/closing unit for opening and closing the second port.

[0005] Preferably, the first port is disposed on the back of the hand grip in the form of a grille, and the second port is an exhaust grille formed on the front of the first port.

[0006] Advantageously, the second port includes a first soundproof device installed on the exhaust grille. Conveniently, the first sound proof device is made of porous material.

[0007] In a preferred embodiment, the opening/closing unit comprises a sliding device for controlling the opening area of the second port, and a control knob which is exposed to the exterior of the hand grip, and is connected to the sliding device, and the control knob controls the sliding movement of the sliding device. Advantageously, the control knob is made of transparent material.

[0008] Preferably the apparatus further comprises a display unit which shows the strength of suction, the display unit being disposed on the opposite side of the hand grip to the control knob, and the control knob being slidable on the upper part of the display unit.

[0009] Advantageously, the second suction flow path includes at least one second soundproof device between the first port and the second port. Conveniently, the second soundproof device is a rib device protruding vertically into the air which flows in through the first port.

[0010] The invention also provides a vacuum cleaner comprising: a main body equipped with a suction motor; a nozzle unit for sucking in air containing contaminants by the suction pressure of the suction motor; and a suction power controller which is installed in a suction flow path formed between the main body and the nozzle unit, wherein the suction power controller comprises: a first flow path which is formed on a flow path connection device, one end of which is connected to the main body of the vacuum cleaner, and the other end of which is connected to the nozzle unit; a second flow path which is formed inside a hand grip disposed on the flow path connection device and which includes a first port fluidly communicating with the outside, and a second port fluidly communicating with the first flow path; and an opening/closing unit for opening and closing the second port.

[0011] The invention will now be described in greater detail, by way of example, with reference to the drawings, in which:

Figures 1 and 2 are schematic views illustrating a vacuum cleaner hand grip provided with a suction flow speed control apparatus constructed according to the invention;

Figures 3a and 3b are schematic views illustrating the opening / closing unit of the suction flow speed control apparatus of Figures 1 and 2;

Figure 4 is a schematic perspective view illustrating a soundproof device forming part of the apparatus of Figures 1 and 2;

Figure 5 is a schematic plan view of the hand grip of Figures 1 and 2;

Figure 6 is a schematic view illustrating a control knob forming part of the hand grip;

Figure 7 is a schematic part-sectioned view of the hand grip; and

Figure 8 is a schematic view of a vacuum cleaner equipped with the suction flow speed control apparatus of Figures 1 and 2.

[0012] Reference will now be made in detail to an exemplary embodiment of the present invention illustrated in the drawings, wherein like reference numerals refer to

like elements throughout.

[0013] Referring to the drawings, a suction flow speed control apparatus includes a first suction flow path 100, a second suction flow path 200 and an opening/closing unit 300 (see Figures 3A, 3B, 4 and 7).

[0014] The first suction flow path 100 is formed on a flow path connection device H (see Figure 1). One end of the flow path connection device H is connected to the main body of a vacuum cleaner 1 (see Figure 8),and the other end is connected to a nozzle unit 2. Air containing contaminants sucked into the nozzle unit 2 through the first suction flow path 100 are moved to the inside of the main body 1 of the vacuum cleaner.

[0015] The second suction flow path 200 is formed inside a hand grip 3 disposed on the flow path connection device H, and includes a first port 210 and a second port 220 (see Figure 7).

[0016] The first port 210 fluidly communicates with the exterior of the hand grip 3, and sucks in air through the second suction flow path 200. As illustrated in Figure 2, the first port 210 on the back of the hand grip 3 occupies a predetermined position and is formed as a grille.

[0017] The second port 220 is formed inside the hand grip 3, and fluidly communicates with the first suction flow path 100. The second port 220 is selectively opened/closed by the opening/closing unit 300, (see Figures 3A, 3B, and 4), and includes an exhaust grille 221 and a first soundproof device 222. The exhaust grille 221 (see Figure 7) comprises a plurality of holes. The first soundproof device 222 is disposed on the upper part of the exhaust grille 221, and prevents contaminants from entering as well as filtering out contaminants in the air which flows in through the first flow path 100.

[0018] The opening/closing unit 300 selectively opens or closes the second port 220, and moves the air sucked in through the first port 210 into the first suction flow path 100 through the second port 220.

[0019] The opening/closing unit 300 includes a sliding device 310 and a control knob 320. The sliding device 310 slides in tandem with the movement of the control knob 320, and controls the opening area of the second port 220. The amount of air penetrating the second port 220 is determined according to the location of the sliding device 310. The sliding device 310 is established in the form of a trench 311 with the upper part open as illustrated in Figures 3A and 3B. Air which flows in through the first port 210 is moved into the second port 220 through the trench 311.

[0020] The control knob 320 is exposed to the exterior of the hand grip 3, and is connected to the sliding device 310. Accordingly, if a user slides the control knob 320, the sliding device 310 moves together with the sliding knob.

[0021] As illustrated in Figures 5 and 6, a display unit 4, which shows the strength of suction, is disposed on the opposite side of the hand grip 3 to the control knob 320. The display unit 4 indicates the strength of suction to be "strong", "medium", or "weak" according to the location of the control knob 320. The control knob 320 consists of a transparent window so that a user can conveniently check the information of the display unit 4.

[0022] As illustrated in Figure 7, at least one second soundproof device 230 is installed between the first port 210 and the second port 220 in the second suction flow path 200. The second soundproof device 230 is provided to reduce the speed of air sucked in from the outside, and comprises a plurality of ribs protruding vertically into the air which flows in through the first port 210.

[0023] As illustrated in Figure 8, the vacuum cleaner of the present invention comprises the main body 1, the nozzle unit 2, and the flow path connection device H on which the hand grip 3 is installed. The nozzle unit 2 is connected to the flow path connection device H through an extension tube 5, and the flow path connection device is connected to the main body 1 through a flexible hose 6. Since no separate controller or switching unit is required to control the suction power of the nozzle unit 2, there is no need to install separate electric wires in the flexible hose 6.

[0024] The operation of the suction flow speed control apparatus of the present invention will be explained with reference to Figures 7 and 8.

[0025] Once operation of the vacuum cleaner starts, air containing contaminants sucked in through the nozzle unit 2 passes through the extension tube 5 and the first flow path 100 inside the flow path connection device H to reach the main body 1.

[0026] If a user desires to weaken the suction power of the nozzle unit 2, by reducing the flow speed of the air containing contaminants, the user moves the control knob 320 in the direction of the arrow shown in Figure 7, and opens the second port 220. Air from the outside is sucked into the first port 210 due to the suction pressure of the suction motor (not shown) in the main body 1. The air sucked in from the outside flows into the first flow path 100 through the second port 220, thereby reducing the flow speed of the air which contains contaminants that has been sucked in through the nozzle unit 2. Accordingly, the suction power is weakened.

[0027] The first soundproof device 222 in the second port 220 is made of a porous material such as sponge, and reduces the noise which may be generated when the air sucked in from the first port 210 passes though the grille 221, and it also prevents foreign substances from entering through the first port 210.

[0028] The second soundproof device 223 comprises a plurality of ribs disposed between the first port 210 and the second port 220, and reduces the flow speed of the air which flows in through the first port 210 into the second flow path 200, and thus reduces the noise which may be generated due to air friction when air from outside is sucked in through the second port 220.

[0029] According to the exemplary embodiment of the present invention, the flow speed of the air sucked in through the nozzle unit 2 can be controlled without controlling the rotational speed of the suction motor, simpli-

fying the structure of the vacuum cleaner. In particular, since there is no need for electric wires to connect the flexible hose 6 and the hand grip 3 to the main body 1 of the cleaner, the unit price for manufacturing can be reduced, the number of electronic parts can be minimised, and user inconvenience due to defective parts can also be minimised.

[0030] Although one embodiment of the present invention has been shown and described, it should be appreciated, by those skilled in the art, that changes may be made to this embodiment without departing from the scope of the invention.

Claims

1. A suction flow speed control apparatus of a vacuum cleaner, the apparatus comprising:

a first suction flow path (100) which is formed in a flow path connection device (H), one end of which is connected to a main body (1) of a vacuum cleaner, and the other end of which is connected to a nozzle unit (2);
a second suction flow path (200) which is formed inside a hand grip (3) disposed on the flow path connection device, and which includes a first port (210) fluidly communicating with the outside, and a second port (220) fluidly communicating with the first suction flow path; and
an opening/closing unit (300) for opening and closing the second port.

2. Apparatus according to claim 1, wherein the first port (210) is disposed on the back of the hand grip (3) in the form of a grille.

3. Apparatus according to claim 1 or claim 2, wherein the second port (220) is an exhaust grille (221) formed on the front of the first port (210).

4. Apparatus according to claim 3, wherein the second port (220) includes a first soundproof device (222) installed on the exhaust grille (221).

5. Apparatus according to claim 4, wherein the first soundproof device (222) is made of porous material.

6. Apparatus according to any one of claims 1 to 5, wherein the opening/closing unit (300) comprises a sliding device (310) for controlling the opening area of the second port (220), and a control knob (320) which is exposed to the exterior of hand grip (3),and is connected to the sliding device, and the control knob controlling the sliding movement of the sliding device.

7. Apparatus according to claim 6, wherein the control knob (320) is made of transparent material.

8. Apparatus according to claim 6 or claim 7, further comprising a display unit (4) which shows the strength of suction, the display unit being disposed on the opposite side of the hand grip (3) to the control knob (320), and the control knob being slidable on the upper part of the display unit.

9. Apparatus according to any one of claims 1 to 8. wherein the second suction flow path (200) includes at least one second soundproof device (230) between the first port (210) and the second port (220).

10. Apparatus according to claim 9, wherein the second soundproof device (230) is a rib device protruding vertically into the air which flows in through the first port (210).

11. A vacuum cleaner comprising:

a main body (1) equipped with a suction motor;
a nozzle unit (2) for sucking in air containing contaminants by the suction pressure of the suction motor; and
a suction power controller which is installed in a suction flow path formed between the main body and the nozzle unit,

wherein the suction power controller comprises:

a first flow path (100) which is formed on a flow path connection device (H), one end of which is connected to the main body of the vacuum cleaner, and the other end of which is connected to the nozzle unit;
a second flow path (200) which is formed inside a hand grip (3) disposed on the flow path connection device and which includes a first port (210) fluidly communicating with the outside, and a second port (220) fluidly communicating with the first flow path; and
an opening/closing unit (300) for opening and closing the second port.

12. A vacuum cleaner according to claim 11, wherein the first port (210) is disposed on the back of the hand grip (3) in the form of a grille, and the second port (220) includes a exhaust grille (221) formed on the front of the first port (210), and a first soundproof device (222) which is installed on the exhaust grille and made of a porous material.

13. A vacuum cleaner according to claim 11 or claim 12, wherein the opening/closing unit (300) comprises a sliding device (310) for controlling the opening area of the second port (220), and a control knob (320) which is exposed to the exterior of the hand grip (3),

is connected to the sliding device, and controls the sliding movement of the sliding device; and
wherein the control knob is made of a transparent material.

14. A vacuum cleaner according to claim 13, further comprising a display unit (4) formed on the opposite side of the hand grip (3) to the control knob (320), the display unit displaying the strength of the suction of the vacuum cleaner, and the control knob sliding on the upper part of the display unit.

15. A vacuum cleaner according to any one of claims 11 to 14, wherein the second suction flow path (200) includes at least one second soundproof device (230) between the first port (210) and the second port (220) and the second soundproof device is a rib device protruding vertically into the air which flows in through the first port.

FIG. 1

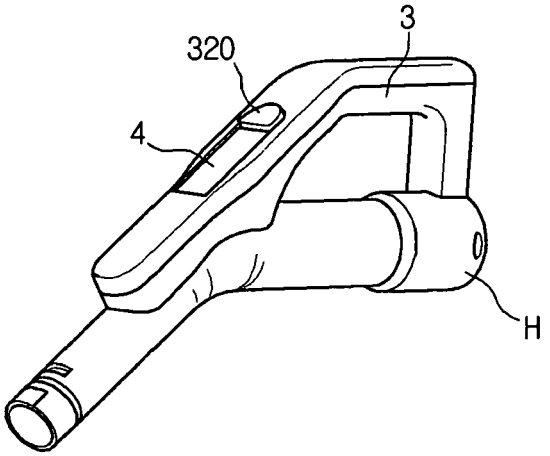

FIG. 2

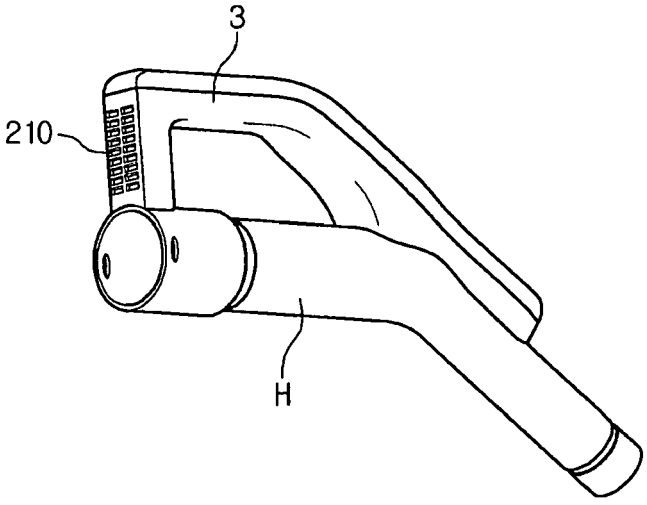

FIG. 3A

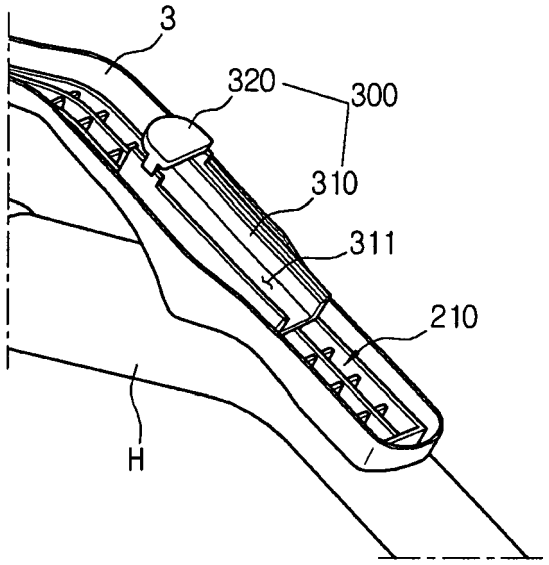

FIG. 3B

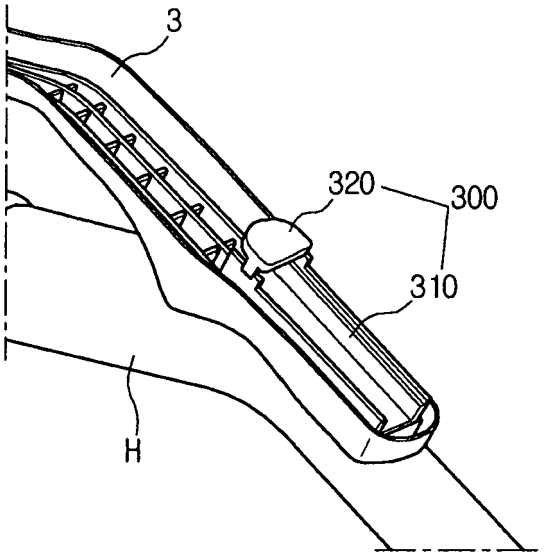

FIG. 4

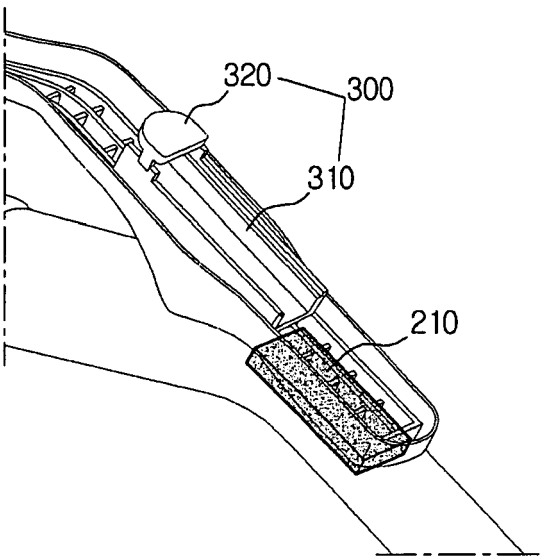

FIG. 5

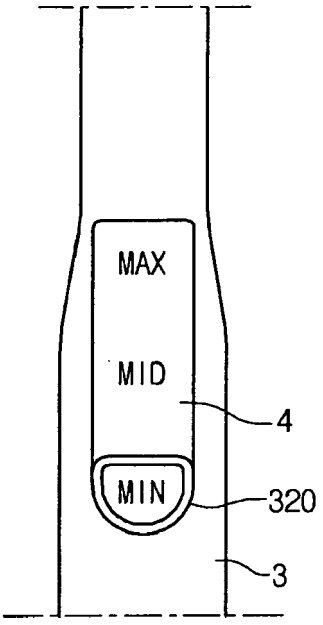

FIG. 6

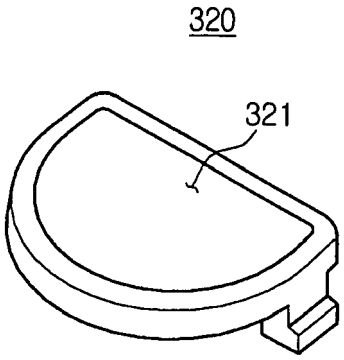

FIG. 7

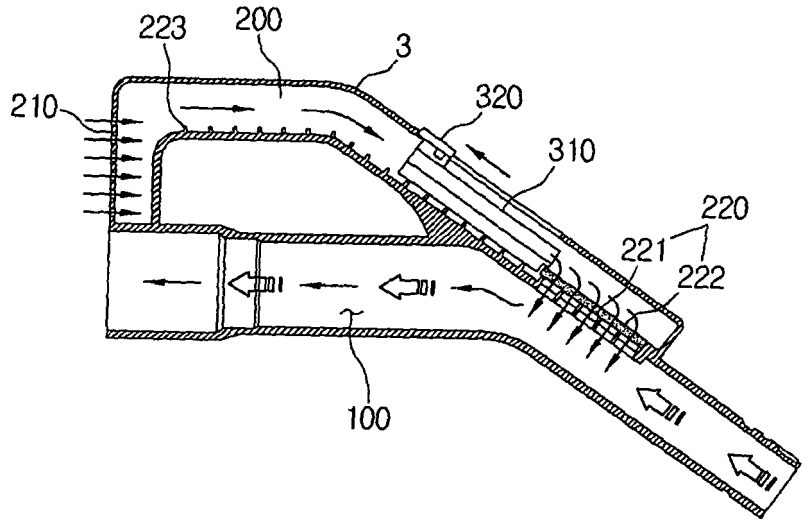

FIG. 8