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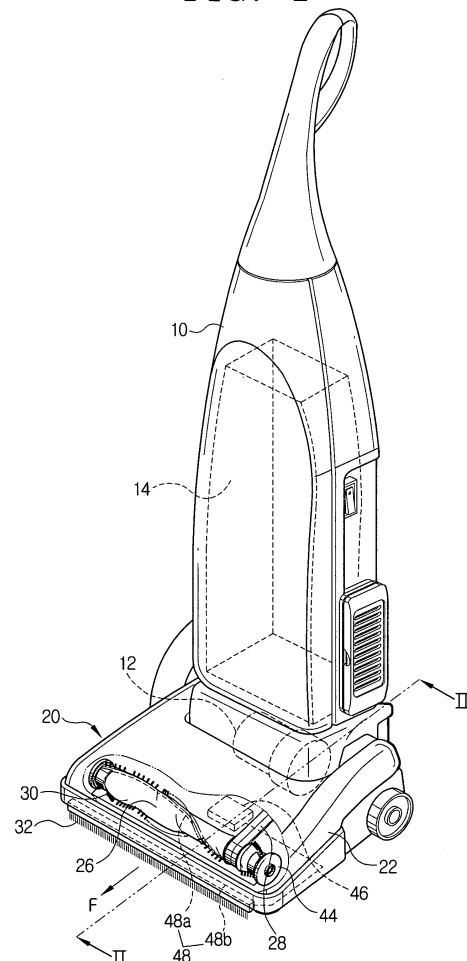
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(54) **Suction brush assembly having ultrasonic oscillator and a vacuum cleaner having the same**

(57) A suction port assembly (20) for a vacuum cleaner, that includes a housing (22) that has a suction port, and a rotary drum (26) rotatably mounted on the housing. The rotary drum has a first bristle member (30) on its outer circumference, which is adapted to contact a surface to be cleaned. An ultrasonic generation unit vibrates the first bristle member.

FIG. 1



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Description

FIELD OF THE INVENTION

[0001] The present invention relates to a vacuum cleaner. More particularly, the present invention relates to a vacuum cleaner including a suction brush assembly having an ultrasonic oscillator.

BACKGROUND OF THE INVENTION

[0002] Vacuum cleaners generally comprise a cleaner body including a suction motor which generates a suction force, and a suction port assembly pivotably mounted to a lower part of the cleaner body by a predetermined angle. Dust is drawn in from the surface being cleaned by the suction force of the suction motor.

[0003] The suction port assembly comprises a housing having a suction port, and a rotary drum pivotably coupled to the housing. The rotary drum has a bristle member which contacts the surface being cleaned. The rotary drum is rotated by the suction force generated by the dedicated driving motor or the suction motor. As the rotary drum rotates, the bristle member on an outer circumference of the rotary drum separates and moves dust from the surface being cleaned. The dust separated by the bristle member is drawn in through the suction port.

[0004] However, the bristle member can not easily separate the dust when the dust is firmly attached on the surface being cleaned. Accordingly, a vacuum cleaner including an ultrasonic oscillator for vibrating the bristle member has been introduced, as disclosed in Korean Patent Laid-open No. 2000-8667. According to the cited invention, an ultrasonic oscillator vibrates a bristle member to thereby easily separate and remove dust on a surface being cleaned. However, the bristle member is capable of merely shaking the dust on the surface being cleaned and this is not really effective in separating the dust from the surface being cleaned.

SUMMARY OF THE INVENTION

[0005] Accordingly, an aspect of the present invention is to provide a vacuum cleaner including a suction port assembly capable of significantly enhancing cleaning efficiency by scraping and vibrating dust on a surface being cleaned.

[0006] Another aspect of the present invention is to provide a vacuum cleaner including a suction port assembly with a bristle member capable of effectively separating the dust from the surface being cleaned and the dust from the bristle member itself by vibration.

[0007] In order to achieve the above-described aspects of the present invention, there is provided a suction port assembly for a vacuum cleaner, comprising a housing including a suction port which draws in dust by a suction force generated from a driving source, a rotary drum rotatably mounted on the housing and having a first bristle

member which is contacted with a surface being cleaned through the suction port, and an ultrasonic generation unit vibrating the first bristle member.

[0008] The suction port assembly further comprises a second bristle member supported by the housing in front of the suction port and vibrated by the ultrasonic generation unit.

[0009] The ultrasonic generation unit comprises an ultrasonic signal generator outputting an ultrasonic signal of predetermined frequency, and first and second ultrasonic oscillators vibrated in accordance with the signal output from the ultrasonic signal generator, thereby vibrating the first and the second bristle members, respectively. The first bristle member spirals an outer circumference of the rotary drum and the first ultrasonic oscillator is formed along the first bristle member inside the rotary drum.

[0010] According to another aspect of the present invention, there is provided a vacuum cleaner comprising a cleaner body having a driving source for generating a suction force, and a housing fluidly communicated with the cleaner body and having a suction port for drawing in dust by the suction force of the driving source. The vacuum cleaner also includes a rotary drum rotatably mounted on the housing and having a first bristle member on an outer circumference thereof, which contacts the surface being cleaned through the suction port, a second bristle member provided by the housing and disposed in front of the suction port, and an ultrasonic generation unit vibrating the first and the second bristle members.

BRIEF DESCRIPTION OF THE DRAWING FIGURES

[0011] The above aspect and other features of the present invention will become more apparent by describing in detail exemplary embodiments thereof with reference to the attached drawing figures, wherein;

[0012] FIG. 1 is a perspective view of an upright-type vacuum cleaner according to an embodiment of the present invention;

[0013] FIG. 2 is a side elevational of a suction port assembly of the upright-type vacuum cleaner taken in section along line II-II of FIG. 1;

[0014] FIG. 3 is a block diagram illustrating the structure of an ultrasonic oscillator of the upright-type vacuum cleaner according to an embodiment of the present invention; and

[0015] FIG. 4 is a perspective view of a rotary drum of the upright-type vacuum cleaner shown in FIG. 1.

DETAILED DESCRIPTION OF THE EXEMPLARY EMBODIMENTS

[0016] Hereinafter, certain embodiments of the present invention will be described in detail with reference to the accompanying drawing figures. The matters defined in the description, such as a detailed construction and elements, are provided only to assist in a compre-

hensive 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.

[0017] Referring to FIGS. 1 to 4, a vacuum cleaner according to an embodiment of the present invention comprises a cleaner body 10 and a suction port assembly 20 in fluid communication with a lower part of the cleaner body 10. The cleaner body 10 comprises a driving source 12 for generating a suction force at a lower part therein and a dust collecting chamber 14 for storing dust drawn in by the suction force generated by the driving source 12.

[0018] The suction port assembly 20 comprises a housing 22, a rotary drum 26, first and second bristle members 30 and 32, and an ultrasonic generation unit 40. At a bottom part of the housing 22, which contacts the surface being cleaned, a suction port 24 (FIG. 2) is formed to draw in the dust from the surface being cleaned by the suction force generated by the driving source 12. The housing 22 further comprises a dust path (not shown) through which the drawn-in dust can be delivered from the suction port 24 to the dust collecting chamber 14.

[0019] The rotary drum 26 is rotatably mounted to the housing 22 and exposed to the outside through the suction port 24. A driving belt 28 is connected to one side of the rotary drum 26 to rotate the rotary drum 26. The driving belt 28 may be driven by a dedicated driving motor (not shown) or through connection with a turbine assembly which is rotated by drawn-in air.

[0020] The first bristle member 30 is spirally formed on the rotary drum 26. The first bristle member 30 protrudes from an outer circumference of the rotary drum 26 and contacts the surface being cleaned. When the rotary drum 26 rotates, the first bristle member 30 separates and moves the dust from the surface being cleaned. The dust separated from the surface being cleaned is drawn in through the suction port 24 by the suction force.

[0021] The second bristle member 32 is mounted to the housing 22 and disposed ahead of the suction port 24, as shown by an arrow F in FIG. 1. Therefore, the second bristle member 32 is able to separate and move the dust from the surface being cleaned before the dust reaches the suction port 24 of the suction port assembly 20.

[0022] As seen in FIG. 3, the ultrasonic generation unit 40 comprises a power supply 42, an ultrasonic signal generator 46 and an ultrasonic oscillator 48. The power supply 42 may be implemented by a power source of the vacuum cleaner; however, a dedicated power supply may be provided for the ultrasonic generation unit 40. The ultrasonic signal generator 46 is electrically connected with the power supply 42. Therefore, the ultrasonic signal generator 46 receives electric power from the power supply 42 and, thereby generates a signal of predetermined frequency. The predetermined frequency is preferably about 500 Hz or more (e.g. tens of thousands Hz) capable of dust separation and sterilization. However, the frequency and amplitude of the signal output from

the ultrasonic signal generator 46 is variable according to the type of surface being cleaned and the dust. The ultrasonic signal generator 46 may be implemented by a crystal oscillator which resonates a crystal plate by high-frequency voltage or a magnetostriction oscillator under the principle that metal is deformed when being magnetized.

[0023] The ultrasonic oscillator 48 vibrates in accordance with the signal output from the ultrasonic signal generator 46. A piezoelectric device may be adopted for the ultrasonic oscillator 48. The ultrasonic oscillator 48 comprises a first ultrasonic oscillator 48a for vibrating the first bristle member 30 and a second ultrasonic oscillator 48b for vibrating the second bristle member 32 as seen in FIGS. 2 and 3.

[0024] As shown in FIG. 2, the first ultrasonic oscillator 48a is installed along the first bristle member 30 inside the rotary drum 26 so as to efficiently transmit the vibration to the first bristle member 30. Because the first ultrasonic oscillator member 48a is rotated together with the rotary drum 26, it is 48a electrically connected to the ultrasonic signal generator 46 by a brush 44. Accordingly, as the first bristle member 30 formed on the outer circumference of the rotary drum 26 vibrates, the dust on the surface being cleaned is shaken. Also, rotation of the first bristle member 30 scrapes the dust on the surface being cleaned, thereby enhancing the cleaning efficiency.

[0025] The second ultrasonic oscillator 48b is formed on one side of the second bristle member 32 and is electrically connected with the ultrasonic signal generator 46. The first and the second ultrasonic oscillators 48a and 48b not only vibrate the first and the second bristle members 30 and 32 but also form a sound wave of a predetermined frequency. The sound wave enables sterilization of each of the surface being cleaned, the dust drawn in from the surface being cleaned, and the bristle members 30 and 32.

[0026] Hereinafter, the operation of the suction port assembly 20 according to an embodiment of the present invention will be described. First, when a user turns on the vacuum cleaner, the power supply 42 supplies electric power to the ultrasonic signal generator 46. The ultrasonic signal generator 46 outputs a signal of predetermined frequency. The signal output from the ultrasonic signal generator 46 vibrates the first ultrasonic oscillator 48a through the brush 44 and accordingly, the first ultrasonic oscillator 48a vibrates the first bristle member 30. As the first ultrasonic oscillator 48a transmits the vibration throughout the first bristle member 30, the first bristle member 30 rotates with the rotary drum 26, thereby shaking and separating the dust on the surface being cleaned. Here, the vibration of at least 500 Hz frequency is generated, which enables sterilization of the surface being cleaned and the first bristle member 30, as well as easy separation of the dust from the surface being cleaned.

[0027] In addition, the ultrasonic signal generator 46 vibrates the second ultrasonic oscillator 48b to vibrate

the second bristle member 32. The second bristle member 32 shakes and separates the dust on the surface being cleaned. Because the second bristle member 32 is mounted in front of the suction port 24, the second bristle member 32 is able to draw in the dust shaken and separated by the second bristle member 32 prior to the suction port assembly 20.

[0028] After completion of cleaning, the user can immerse the first and the second bristle members 30 and 32 into a detergent solution and operate the first and the second ultrasonic oscillators 48a and 48b. By this, any dust remaining on the first and the second bristle members 30 and 32 can be easily removed from the first and the second bristle members 30 and 32 by the vibration. Therefore, the user avoids direct contact with the first and the second bristle members 30 and 32 to remove any dust thereby improving user convenience and hygiene.

[0029] Accordingly, the dust can be separated with ease from the surface being cleaned and from the bristle members 30 and 32 using vibration generated by the ultrasonic oscillator 48, thereby improving cleaning efficiency. Because, the first bristle member 30 on the rotary drum 26 scrapingly separates the dust from the surface being cleaned by vibration, cleaning efficiency is enhanced. Moreover, the second bristle member 32 shaking the dust on the surface being cleaned by vibration before the dust reaches the suction port 24, also improves the cleaning efficiency. In addition, user convenience is improved by separating any dust on the bristle members 30 and 32 using vibration. Furthermore, the sound wave generated from the ultrasonic oscillator 48 is capable of sterilizing the surface being cleaned, the drawn-in dust and the bristle members 30 and 32.

[0030] While the invention has been shown and described with reference to certain embodiments thereof, it will be understood by those skilled in the art that various changes in form and details may be made therein without departing from the spirit and scope of the invention as defined by the appended claims. For example, although the present embodiment illustrates the upright-type vacuum cleaner, the present invention can also be applied to diverse types of vacuum cleaners, such as a canister-type vacuum cleaner or a portable vacuum cleaner.

Claims

1. A suction port assembly (20) for a vacuum cleaner, comprising:
 - a housing (22) including a suction port (24) which draws in dust by a suction force generated from a driving source (12);
 - a rotary drum (26) rotatably mounted on the housing and having a first bristle member (30) adapted to contact a surface to be cleaned; and
 - an ultrasonic generation unit (40) vibrating the

first bristle member.

2. The suction port assembly of claim 1, further comprising a second bristle member (32) supported by the housing (22) in front of the suction port (24), and the second bristle member being vibrated by the ultrasonic generation unit (40).
3. The suction port assembly of claim 2, wherein the ultrasonic generation unit (40) comprises:
 - an ultrasonic signal generator (46) outputting an ultrasonic signal of predetermined frequency; and
 - first (48a) and second (48b) ultrasonic oscillators vibrated in accordance with the signal output from the ultrasonic signal generator, thereby respectively vibrating the first (30) and the second (32) bristle members.
4. The suction port assembly of claim 3, wherein the first bristle member (30) is spirally formed on an outer circumference of the rotary drum (26), and the first ultrasonic oscillator (48a) is formed along the first bristle member inside the rotary drum.
5. A vacuum cleaner comprising:
 - a cleaner body (10) having a driving source (12) for generating a suction force;
 - a housing (22) in fluid communication with the cleaner body and having a suction port (24) for drawing in dust by the suction force of the driving source;
 - a rotary drum (26) rotatably mounted on the housing and having a first bristle member (30) on an outer circumference thereof adapted to contact a surface to be cleaned through the suction port;
 - a second bristle member (32) provided to the housing and disposed in front of the suction port; and
 - an ultrasonic generation unit (40) vibrating the first and the second bristle members.
6. The vacuum cleaner of claim 5, wherein the ultrasonic generation unit (40) comprises:
 - an ultrasonic signal generator (46) outputting an ultrasonic signal of predetermined frequency; and
 - first (48a) and second (48b) ultrasonic oscillators vibrated in accordance with the signal output from the ultrasonic signal generator, thereby respectively vibrating the first (30) and the second (32) bristle members.
7. The vacuum cleaner of claim 6, wherein the first bris-

tle member (30) is spirally formed on an outer circumference of the rotary drum (26) and the first ultrasonic oscillator (48a) is formed along the first bristle member inside the rotary drum.

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FIG. 1

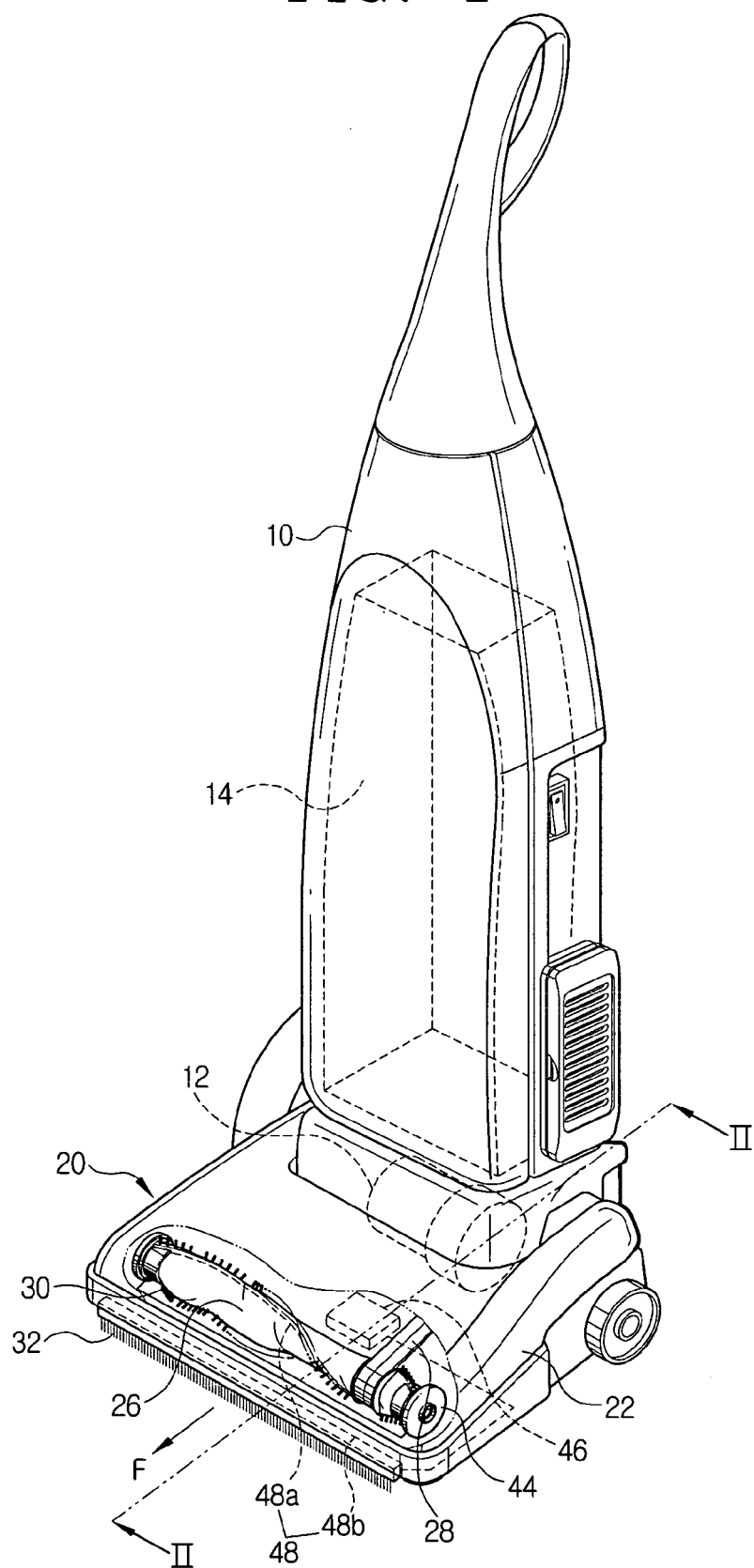


FIG. 2

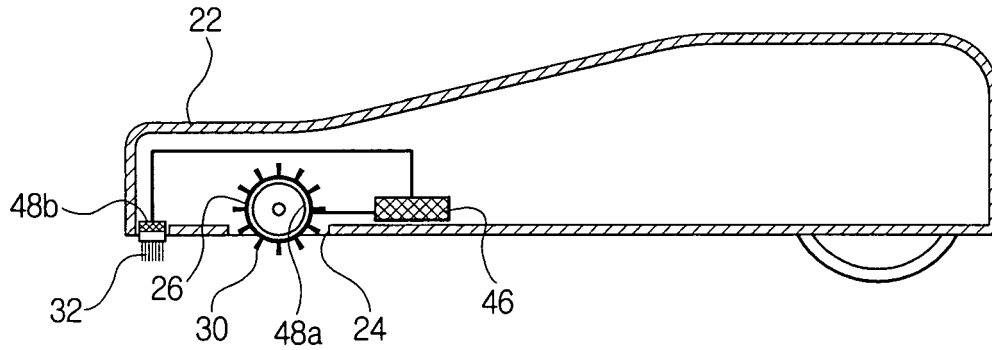


FIG. 3

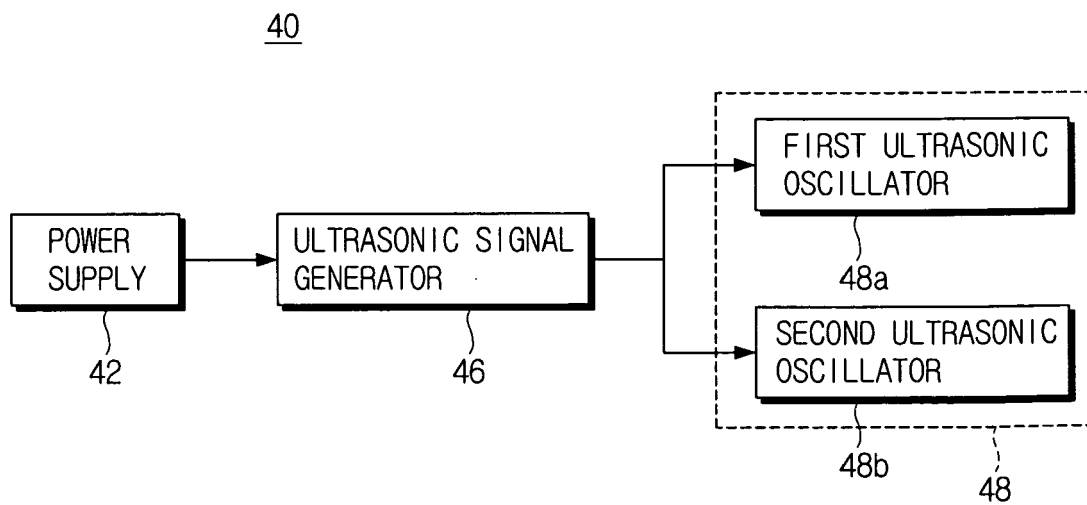
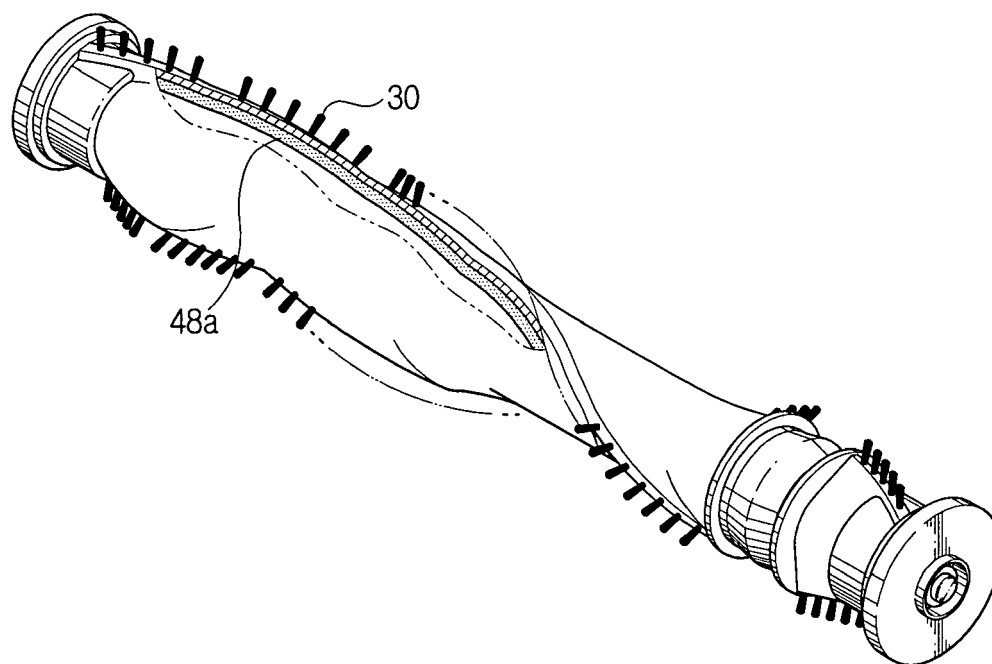


FIG. 4





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EUROPEAN SEARCH REPORT

Application Number
EP 05 35 6211

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
E	WO 2006/009637 A (BOSSES, M.D.) 26 January 2006 (2006-01-26) * abstract * * paragraphs [0094], [0095] * * figures 8,10 * * paragraph [0096] - paragraph [0099] * * figures 11-18 * -----	1-3,5,6	INV. A47L9/04
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A	WO 2005/032735 A (ELECTROLUX HOME CARE PRODUCTS, LTD ET AL) 14 April 2005 (2005-04-14) * page 90, line 27 - page 91, line 24 * * figure 39A * -----	1,5	
A,D	KR 2000 008 667 A (LG ELECTRONICS INC) 15 February 2000 (2000-02-15) * figures 5,6 * -----	1-7	TECHNICAL FIELDS SEARCHED (IPC) A47L
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 31 July 2006	Examiner Cabral Matos, A
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03.02 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 05 35 6211

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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31-07-2006

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WO 2006009637	A	26-01-2006	NONE	
WO 2006041690	A	20-04-2006	NONE	
WO 2005032735	A	14-04-2005	NONE	
KR 2000008667	A	15-02-2000	NONE	

REFERENCES CITED IN THE DESCRIPTION

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