(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
22 October 2009 (22.10.2009)

PCT

(10) International Publication Number
WO 2009/128763 A1

(51) International Patent Classification:
A47L 9/06 (2006.01) *A47L 9/02* (2006.01)

(21) International Application Number:
PCT/SE2009/000189

(22) International Filing Date:
15 April 2009 (15.04.2009)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
0800885-6 17 April 2008 (17.04.2008) SE
61/108,729 27 October 2008 (27.10.2008) US

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(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR),

[Continued on next page]

(54) Title: VACUUM CLEANER NOZZLE

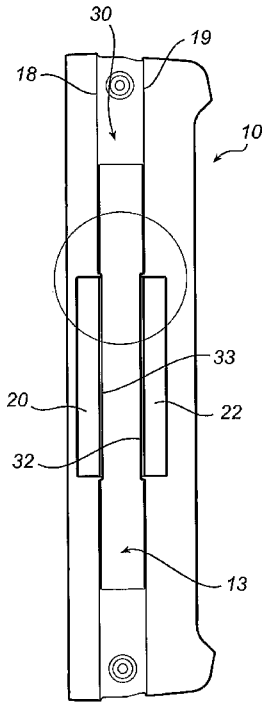

Fig. 4a

(57) Abstract: This invention relates to a vacuum cleaner nozzle comprising a suction plate (10) having an inlet side (11) and an outlet side (12). The suction plate comprises an air duct (30) having a duct wall (31). The air duct extends through the suction plate from a suction opening (13) on the inlet side to the outlet side. A first primary sealing edge (19) for engaging with a surface bein cleaned and for at least partly sealing the suction opening 13 against the surface being cleaned extends along at least a portion of a side (15) of the suction opening. The invention is characterized by that at least one inlet end portion of the duct wall forms an elongated first protrusion (32), which provides a first secondary sealing edge. The first secondary sealing edge extends along at least a portion of the first primary sealing edge and is horizontally displaced from the first primary sealing edge. The secondary sealing edge is provided in order to yield better dust removal ability from carpets as well as providing a more comfortable cleaning experience

WO 2009/128763 A1

OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report (Art. 21(3))*

VACUUM CLEANER NOZZLE

FIELD OF THE INVENTION

The present invention relates to a vacuum cleaner nozzle comprising a suction plate having an inlet side and an outlet side, and which comprises an air duct having a duct wall extending through the suction plate from a suction opening on the inlet side to the outlet side. The vacuum cleaner nozzle further comprises a first primary sealing edge for engaging with a surface being cleaned and for at least partly sealing the suction opening against the surface being cleaned. The first primary sealing edge extends along at least a portion of a side of the suction opening.

BACKGROUND OF THE INVENTION

A vacuum cleaner is a device that uses a suction force generated by a fan unit to create a partial vacuum to suck up objects like dust, particles, fibres, hair etc. usually from floors and carpets. Typically this is done with a vacuum cleaner nozzle, which is connected via a nozzle outlet to an extension tube and/or a suction hose to a dust compartment within the body of the vacuum cleaner. The suction hose is normally engaged with a removable dust bag arranged inside the dust compartment for collecting dust and foreign materials that are sucked in through the vacuum cleaner nozzle when the vacuum cleaner is in an operative mode. Thus, the dust laden air stream forwards the removed objects, via the hose, to the body of the vacuum cleaner in which the removed objects are separated from the air stream in the dust bag. Alternatively, dust can be separated from the dust laden air stream using a cyclone or other suitable dust separating unit.

Vacuum cleaner nozzles comprising multiple joints in the connection between the nozzle outlet and the extension tube and/or suction hose for increased performance on uneven and soft surfaces are known. The multiple joints allow the vacuum cleaner nozzle to adapt to the surface and thereby pick-up more dust as the hose and the vacuum cleaner nozzle is operated over a floor or a carpet. WO 02/26097 A1 discloses a vacuum cleaner nozzle which is pivotally mounted with respect to a nozzle outlet, such that movement of the vacuum cleaner nozzle in a forward and backward direction alternately brings one of two working edges (or sealing edges which are arranged to restrict the air flow from areas surrounding the active suction area

of the vacuum cleaner nozzle on soft surfaces) of the vacuum cleaner nozzle in closer contact with the surface being vacuumed. This is advantageous when vacuuming carpeted floors where hair, fluff and other fibrous material become trapped on the carpet.

When utilizing vacuum cleaner nozzles according to the prior art solution as cited above, the movement forwards and backwards during vacuuming brings the vacuum cleaner nozzle to tilt. In the case of uneven surfaces and because of the movement, sudden drops of underpressure created by the suction under the vacuum cleaner nozzle can cause discomfortable jumps. Furthermore, on some carpets continued sudden drop and increase of underpressure causes the vacuum cleaner nozzle to vibrate in an annoying way.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a vacuum cleaner nozzle for a vacuum cleaner, which vacuum cleaner nozzle alleviates the above-mentioned drawbacks of the prior art, while maintaining and/or increasing dust removal ability.

This object is achieved by a vacuum cleaner nozzle according to the present invention as defined in claim 1.

Thus, in accordance with an aspect of the present invention, there is provided a vacuum cleaner nozzle comprising a suction plate, which has an inlet side and an outlet side. The suction plate comprises an air duct having a duct wall. The air duct extends through the suction plate from a suction opening on the inlet side to the outlet side. The suction plate further comprises a first primary sealing edge for engaging with a surface being cleaned and for at least partly sealing the suction opening against the surface being cleaned. The first primary edge extends along at least a portion of a side of the suction opening. The invention is characterized by that at least one inlet end portion of the duct wall forms an elongated first protrusion. The first protrusion provides a first secondary sealing edge extending along at least a portion of the first primary sealing edge and is further horizontally displaced from the first primary sealing edge.

Thus, there is provided a vacuum cleaner nozzle in which the duct wall of the air duct that extends through the suction plate is provided with an elongated protrusion in connection with the suction opening of the inlet side. The inlet side is provided with a first primary sealing edge which during

operation of the vacuum cleaner nozzle, i.e. when cleaning a surface, is pressed against the surface, sealing off the areas surrounding the suction area of the vacuum cleaner nozzle, which helps create underpressure in the suction opening. In the present invention, the mentioned first protrusion is positioned close to the inlet side and the first primary sealing edge, but is horizontally displaced such that a first secondary sealing edge is provided. The secondary sealing edge will decrease the size of underpressure drops that are created at the inlet side if the vacuum cleaner nozzle for some reason suddenly loses its close contact with the surface being cleaned (i.e. if the first primary sealing edge of the suction plate is suddenly tilted too far up from the surface). By arranging the air duct wall with the protrusion the underpressure drop of the vacuum cleaner nozzle can be kept more controlled as the vacuum cleaner nozzle is moved across carpets or any textile or soft surface, and when the nozzle is tilted too much so that underpressure would otherwise have dropped. If the underpressure is lost under the vacuum cleaner nozzle, the dust removal ability is temporary decreased, as the underpressure has to be built up again. In the present inventive concept a more controlled underpressure of the vacuum cleaner nozzle is obtained by allowing the underpressure to decrease in smaller steps as the first secondary sealing edge supports a less abrupt change in surface contact to the surface being cleaned. The annoying jumping effect and vibration effect in the vacuum cleaner nozzle due to sudden underpressure drops are then decreased. Thus, the secondary sealing edge provides better dust removal ability from carpets as well as a more comfortable cleaning experience.

In accordance with an embodiment of the vacuum cleaner nozzle, the first protrusion is vertically displaced a predetermined distance inwards the air duct from the suction opening, which further helps smoothening sudden underpressure drops.

In accordance with an embodiment of the vacuum cleaner nozzle, the protrusion is arranged in a centre portion of the suction plate. The underpressure created between the vacuum cleaner nozzle and the surface being vacuumed is larger at the centre portion of the suction plate. Thus, the positioning of the protrusion in the centre portion of the suction plate is more beneficial as it allows for keeping as high underpressure as possible for the area covered by the suction plate overall.

In accordance with an embodiment of the vacuum cleaner nozzle,

the suction opening has a substantially rectangular shape. The first protrusion is arranged at the centre of a long side of the suction opening. An advantage of this vacuum cleaner nozzle is that that the rectangular shape of the suction opening is well adapted for the normal operation of the vacuum cleaner nozzle during vacuuming, i.e. the forward and backward stroke of the vacuum cleaner nozzle in a direction being perpendicular to the longitudinal direction of the rectangular suction opening. The positioning of the first protrusion in the centre of one of the long sides of the suction opening then provides for, especially when the protrusion is arranged to extend a predetermined distance along the long side, encountering a plurality of irregularities in the surface being vacuumed simultaneously, while still having the most advantageous positioning with respect to the distribution of the strength of the underpressure created beneath the suction plate.

In accordance with an embodiment of the vacuum cleaner nozzle, the vacuum cleaner nozzle further comprises a second primary sealing edge arranged on an opposite long side of the suction opening. An elongated second protrusion is arranged on the opposite long side of the suction opening providing a second secondary sealing edge. The second secondary sealing edge extends along at least a portion of the second primary sealing edge and is horizontally displaced from the second primary sealing edge.

This has the advantage of providing smoothness of the operation of the vacuum clenaer nozzle in both the forward and the backward direction.

In accordance with an embodiment of the vacuum cleaner nozzle, the predetermined distance is within a range between 0 and 1 mm.

In accordance with an embodiment of the vacuum cleaner nozzle, the first protrusion is arranged to be one of step shaped, wedge shaped, and bevelled.

In accordance with an embodiment of the vacuum cleaner nozzle, the first protrusion horizontally extends between 0.5 to 40% of the width of the suction opening.

In accordance with an embodiment of the vacuum cleaner nozzle, the vacuum cleaner nozzle further comprises at least one lint picker, and the first protrusion laterally extends along the lint picker.

These and other aspects, features, and advantages of the invention will be apparent from and elucidated with reference to the embodiments described hereinafter.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be described in more detail and with reference to the appended drawings in which:

Fig. 1 is a three-dimensional view illustrating an embodiment of a vacuum cleaner nozzle according to the present invention,

Fig. 2 is a three-dimensional view illustrating a suction plate of an embodiment of a vacuum cleaner nozzle according to the present invention,

Fig. 3 a) is a bottom view, b) is a cross-sectional side view c) and d) are enlarged detail views, respectively, of an embodiment of a vacuum cleaner nozzle according to the present invention, and

Fig. 4 a) is a bottom view, and b) is a detail view of a suction plate in an embodiment of a vacuum cleaner nozzle according to the present invention.

DESCRIPTION OF PREFERRED EMBODIMENTS

Fig. 1 is a three-dimensional view of an embodiment of a vacuum cleaner nozzle according to the present invention. The vacuum cleaner nozzle 1 comprises a nozzle body 2, which is connected to a nozzle outlet 3 via a support structure 6. The nozzle outlet 3 is adapted for being connected to the suction hose of a vacuum cleaner (not shown), such that when the vacuum cleaner is in an operative mode, underpressure is created as air is sucked through the vacuum cleaner nozzle via the hose to the vacuum cleaner. The operation of a typical vacuum cleaner is well known by the skilled man and will not be described in further detail here.

The nozzle body 2 is pivotally connected with the support structure 6. This connection between the nozzle body 2 and the support member 6 allows a limited degree of movement such that the nozzle body 2 is allowed to tilt as the vacuum cleaner nozzle 1 is moved forwards and backwards against the surface being cleaned during vacuuming.

The nozzle body 2 supports two brushes 4, 5 which are preferably manually or automatically retractable, such that the brushes can be retracted into the nozzle body 2 when the vacuum cleaner nozzle 1 is used for vacuuming carpets or other soft surfaces. The nozzle body 2 further comprises a suction plate 10, which is located between the two brushes 4, 5.

Fig. 2 illustrates the suction plate 10 in more detail. The suction plate 10 is preferably a plastic part, which has been formed by means of, e.g. injection moulding it in one piece, a metal part, or a combination of plastic and

metal. The suction plate 10, has an inlet side 11 and an outlet side 12, and there is an air duct 30 extending from the inlet side 11 to the outlet side 12. On the inlet side, the air duct 30 forms a suction opening 13. The suction opening 13 has, in this exemplifying embodiment, a substantially rectangular shape and has a first long side 14 and a second long side 15. The first long side 14 and the second long side 15 are separated a distance which is herein after referred to as the suction opening width.

During normal operation of the vacuum cleaner nozzle 1, the suction plate 10 is arranged such that the inlet side 11 is facing the surface being cleaned. Throughout the description, horizontally is referring to a plane which is parallel to the inlet side 11 and vertically is referring to a plane which is perpendicular to the inlet side.

The long sides 14, 15 are perpendicular to the normal direction of movement of the vacuum cleaner nozzle 1 when it is being operated during vacuuming of a surface. From the suction opening 13 the air duct 30 extends through the suction plate 10 to the outlet side 12. An outlet tube 16 is arranged on the outlet side 12, by means of which a suction can be applied to the suction opening 13, i.e. the nozzle outlet 3 is connected to the outlet tube 16 and further connected to the suction hose of a vacuum cleaner (not shown).

Furthermore, the suction plate 10 comprises two lint pickers 20, 22 located opposite to each other, with respect to the suction opening 13. The lint pickers 20, 22 are arranged in parallel with the first primary sealing edge 19 and the second primary sealing edge 18. Lint pickers are typically comprising a strip of a material in which tufts of fine fibre are secured. The lint pickers attract dust from the surface being cleaned, and the dust is further sucked in through the suction opening 13. When moving the vacuum cleaner nozzle 1 forwards (away from the user) the lint picker 22 picks up fibres and dust from the surface being cleaned, and when moving the vacuum cleaner nozzle 1 backwards, the collected dust and fibres are peeled off the lint picker 22 and is sucked in through the suction opening. (Similarly fibres are picked up and peeled off from the pint licker 20 when the vacuum cleaner nozzle is moved backwards/forwards.)

A first primary sealing edge 19 and a second primary sealing edge 18 are operative to at least partly seal the suction opening 13 against a carpet, such that a large suction, i.e. underpressure, can be generated by means of the suction plate 10. The first primary sealing edge 19 and the second

primary sealing edge 18 extend across substantially the full width of the suction plate 10 and are in this exemplifying embodiment straight.When the suction plate 10 is in a straight position on a carpet the first primary sealing edge 19 and the second primary sealing edge 19 engages with the carpet. The purpose of the primary sealing edges 18, 19 is to restrict the air flow from areas surrounding the active suction area of the vacuum cleaner nozzle on soft surfaces, the active suction area typically being the area covered by the suction opening 13. Furthermore, the primary sealing edges 18, 19 are active so as to agitate the fibres of a soft surface, e.g. carpet fibres, during the forward and backward movement of the vacuum cleaner nozzle 1 against the surface being cleaned.

In an alternative embodiment the first primary sealing edge 19 and the second primary sealing edge 18 are arranged having an arrow shape, wherein the width of the suction opening is minimized in the centre portion of the suction plate (not shown). Other shapes of the first primary sealing edge 19 and the second primary sealing edge 18 are also possible.

The primary sealing edges 18, 19 are typically arranged as integrated parts of the suction plate 10, however in an alternative embodiment the suction plate is provided with sealing edges, which are separate parts being mounted along the suction opening 13.

The airduct 30 having a duct wall 31 is now described in more detail and with reference to Fig. 3 a) to d), which show a bottom view, a cross-sectional side view, and two enlarged detail views, respectively, of the vacuum cleaner nozzle 1. The air duct wall 31 formed along the long sides 14, 15 of the suction opening 13 are typically, in prior art solutions, arranged to track the shape of the suction opening 13. A prior art solution having sealing edges arranged as in the exemplifying embodiment described a above thus have the air duct wall 31 along the long sided formed as vertical sidewalls that projects the first primary sealing edge 19 and the second primary sealing edge 18. In the present inventive concept, at least one inlet end portion of the duct wall 31, i.e. one portion of the duct wall 31, which is located in connection with the suction opening 13, forms an elongated first protrusion 32. In this exemplifying embodiment the first protrusion 32 is arranged along the second long side 15 of the suction opening 13, and extends along the lint picker 22.

The first protrusion 32 extends lenghtwise along the lint picker 22. This is preferable. However, in alternative embodiments the first protrusion 32 may

extend along any portion or the whole lenght of the first primary sealing edge 19. Furthermore, the first protrusion 32 extends horizontally into the suction channel 13. The first protrusion 32 may extend between 0.5 to 40% of the width of the suction opening 13. However, preferably the first protrusion is chosen to extend between 0.5 to 10% of the width of the opening such that the suction opening 13 is not made too narrow.

In an embodiment of the vacuum cleaner nozzle, the first protrusion 32 is displaced from the inlet side 11, inwards in the air duct 30 (and towards the outlet side 12) a predetermined distance. The predetermined distance may be set within a range of 0 to 1 mm. Here the predetermined distance is set to 0.3 mm. As the vacuum cleaner nozzle 1 is operated over a surface being cleaned, the first primary sealing edge 19 is normally the active sealing edge, restricting the air flow from areas surrounding the active suction area. However, if the vacuum cleaner nozzle 1 is tilted such that the first primary sealing edge 19 loses contact (or contact pressure) with the surface being cleaned, a first secondary sealing edge which is formed by the first protrusion 32, and which in this situation is tilted into a closer position to the soft surface, promotes a retention of underpressure such that no sudden underpressure drop occurs. Thus, the first secondary sealing edge becomes active as the vacuum cleaner nozzle 1 is tilted, and further if the surface being cleaned has irregularities protruding into the suction opening 13.

The first protrusion 32 is here displaced from the inlet side 11, inwards in the air duct 30. This way the first protrusion 32 does not obstruct the removal of the peeled off dust and fibres from the lint picker 22 when moving the vacuum cleaner nozzle 1 backwards.

The shape of the first protrusion 32, is in the exemplifying embodiment bevelled. This is advantageous since the bevelled shape provides little resistance during movement of the vacuum cleaner nozzle on the soft surface. Furthermore, the first protrusion is typically arranged to have the same curvature, or radius, as the first primary sealing edge 19. The exact behaviour of the reduction of sudden underpressure drops depends on the softness and curvature of the surface being cleaned, and the tilting angle of the vacuum cleaner nozzle 1.

In alternative embodiments other shapes of the side projection of the first protrusion 32 may be utilized, e.g. step shape or wedge shape.

In an embodiment of the vacuum cleaner nozzle according to the present inventive concept, which embodiment is illustrated in Fig. 4 a) and b),

the suction plate 10 has an elongated suction opening 13, which has two primary sealing edges 18 and 19. The suction plate 10 is further provided with an elongated first protrusion 32 which is arranged on the air duct wall 31 of an air duct 30. The suction plate 10 is further arranged having an enlogated second protrusion 33, which is arranged on the opposite side air duct wall, with respect to the suction opening 13, of the first protrusion 32. Thus, the suction plate 10 is arranged having a first secondary sealing edge formed by the first protrusion 32 and a second secondary sealing edge formed by the second protrusion 33. When the vacuum cleaner nozzle 1 according to this embodiment is moved back and forth on a surface being cleaned, and the vacuum cleaner nozzle 1 is tilted in any of the directions of movement, the secondary sealing edges provide a less abrupt change in the underpressure and a smooth vacuuming is obtained for the benefit of the user. The more constantly retained underpressure of the vacuum cleaner nozzle 1 also provides better dust removal ability as compared to a prior art vacuum cleaner nozzle. It should be emphasized that the second protrusion 33 and the corresponding second secondary sealing edge has the same functionallity and possible embodiments as described above for the first protrusion 32 and the corresponding first secondary sealing edge.

In an alternative embodiment the vacuum cleaner nozzle 1 is provided with the second protrusion 33 only.

Above, embodiments of the vacuum cleaner nozzle according to the present invention as defined in the appended claims have been described. These should be seen as merely non-limiting examples. As understood by a skilled person, many modifications and alternative embodiments are possible within the scope of the invention.

It is to be noted, that for the purposes of this application, and in particular with regard to the appended claims, the word “comprising” does not exclude other elements or steps, that the word “a” or “an”, does not exclude a plurality, which per se will be apparent to a person skilled in the art.

CLAIMS

1. A vacuum cleaner nozzle comprising

a suction plate (10) having an inlet side (11) and an outlet side (12), said suction plate comprising:

an air duct (30) having a duct wall (31), wherein said air duct extends through the suction plate from a suction opening (13) on the inlet side to the outlet side, and

a first primary sealing edge (19) for engaging with a surface being cleaned and for at least partly sealing said suction opening 13 against said surface being cleaned, wherein said first primary sealing edge extends along at least a portion of a side (15) of said suction opening,

characterized by:

at least one inlet end portion of said duct wall forming an elongated first protrusion (32) providing a first secondary sealing edge extending along at least a portion of said first primary sealing edge and which is horizontally displaced from said first primary sealing edge.

2. A vacuum cleaner nozzle according to claim 1, wherein said first protrusion (32) is vertically displaced a predetermined distance inwards said air duct from said suction opening (13).

3. A vacuum cleaner nozzle according to claim 1 or 2, wherein said first protrusion (32) is arranged in a centre portion of said suction plate (10).

4. A vacuum cleaner nozzle according to any one of the preceding claims, wherein said suction opening (13) has a substantially rectangular shape, wherein said first protrusion (32) is arranged at the centre of a long side (15) of said suction opening (13).

5. A vacuum cleaner nozzle according to any one of claims 2 - 4, wherein said predetermined distance is within a range between 0 and 1 mm.

6. A vacuum cleaner nozzle according to any one of the preceeding claims, wherein said first protrusion (32) is arranged to be one of step shaped, wedge shaped, and bevelled.

7. A vacuum cleaner nozzle according to any one of the preceding claims, wherein said first protrusion (32) horizontally extends between 0.5 to 40% of the width of the suction opening (13).

8. A vacuum cleaner nozzle according to any one of the preceding claims, further comprising at least one lint picker (20, 22), wherein said protrusion (32) laterally extends along said lint picker.

9. A vacuum cleaner nozzle according to any one of claims 4 to 8, further comprising a second primary sealing edge (18) arranged on an opposite long side (14) of said suction opening (13), wherein an elongated second protrusion (33) is arranged on said opposite long side (14) of said suction opening providing a second secondary sealing edge extending along at least a portion of said second primary sealing edge and which is horizontally displaced from said second primary sealing edge.

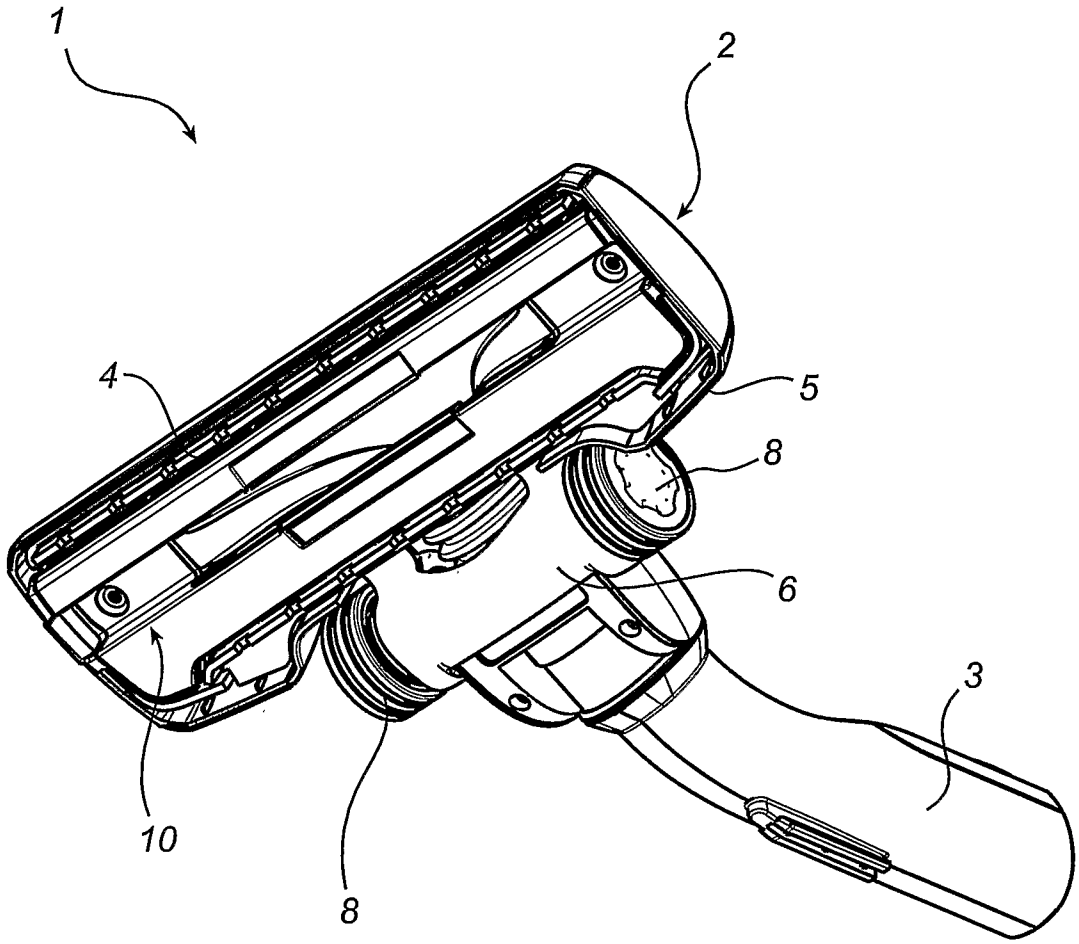

Fig. 1

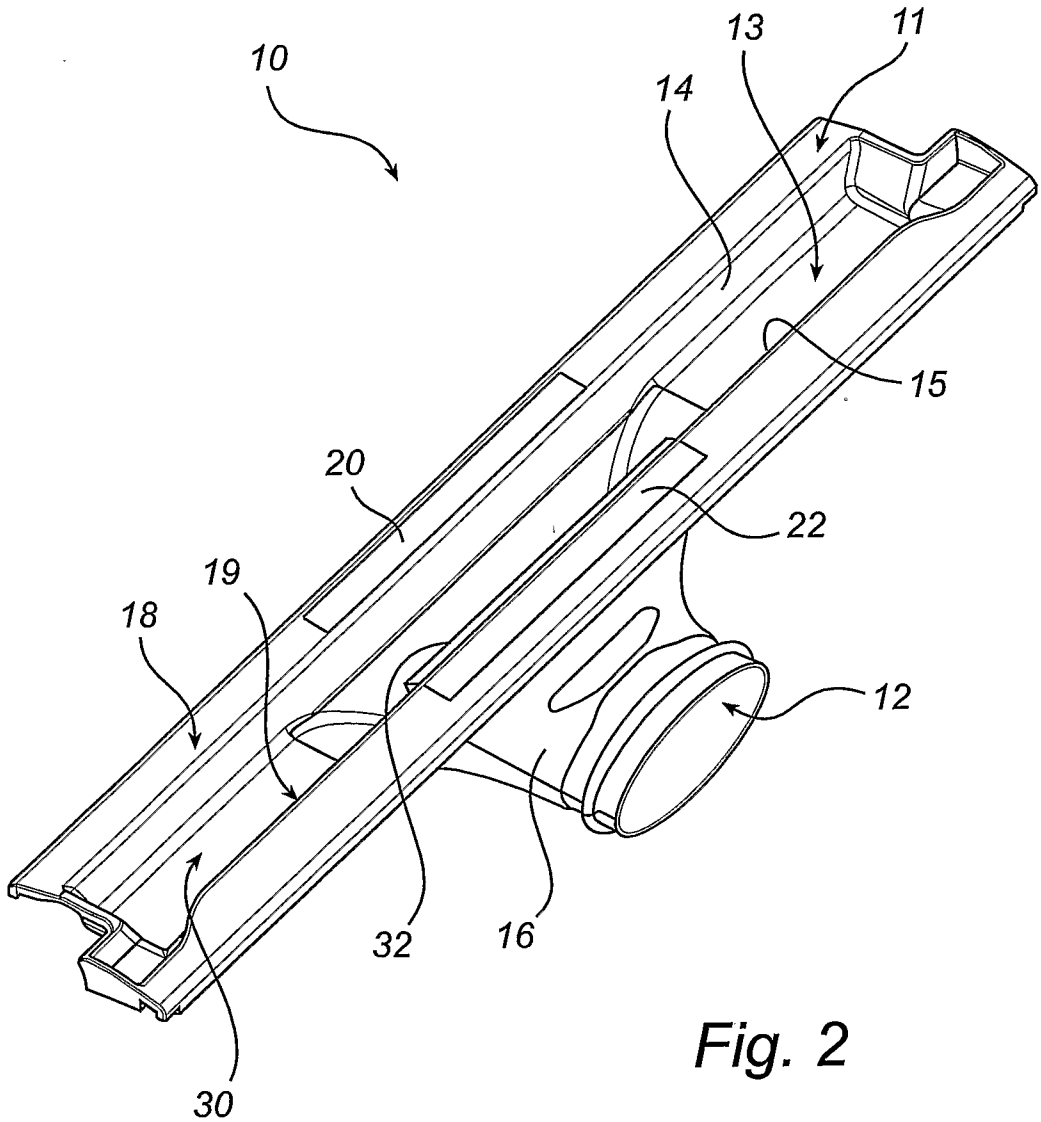

Fig. 2

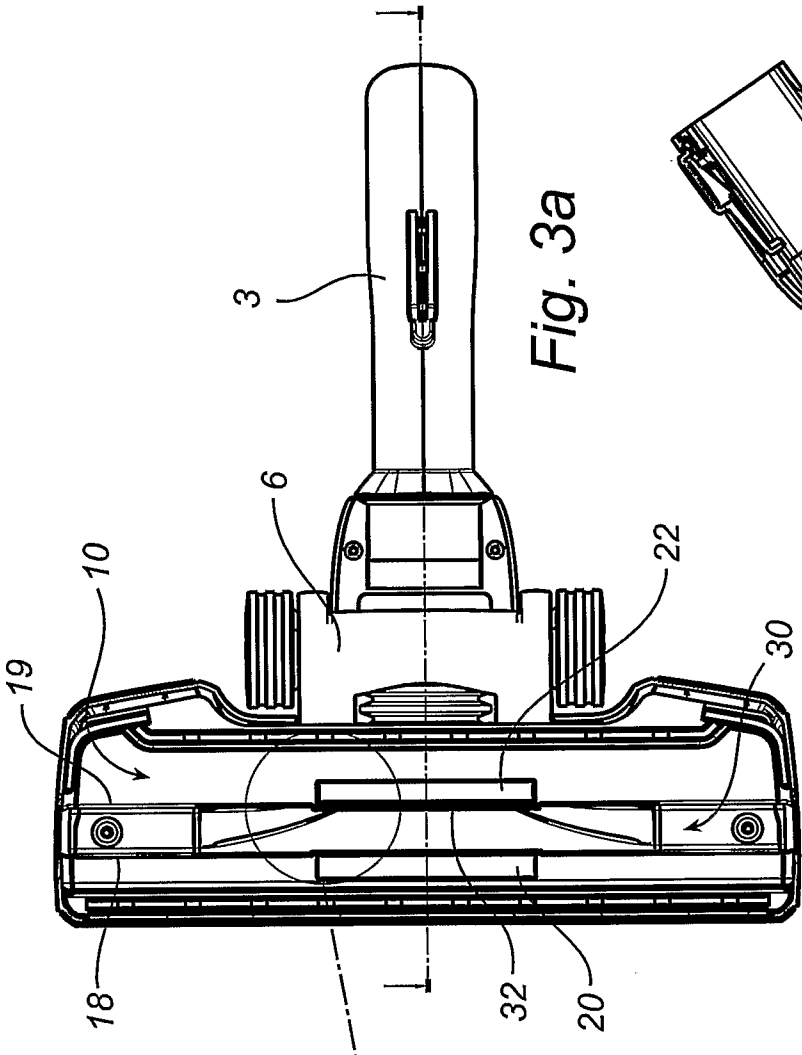

Fig. 3a

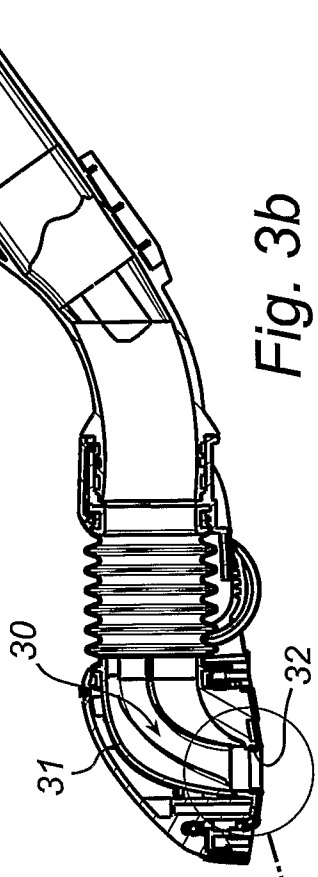

Fig. 3b

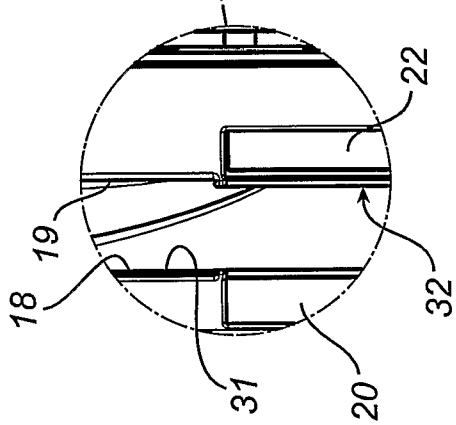

Fig. 3c

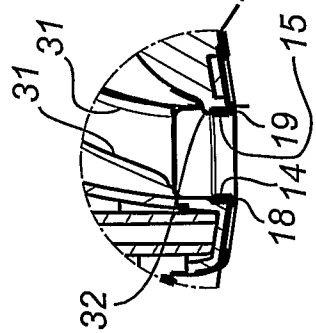

Fig. 3d

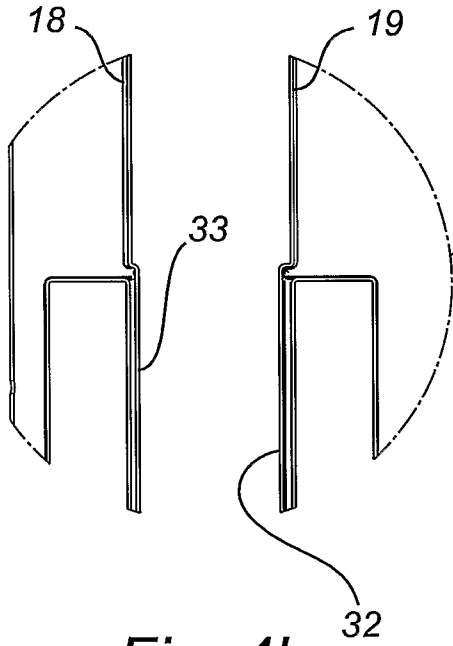

Fig. 4b

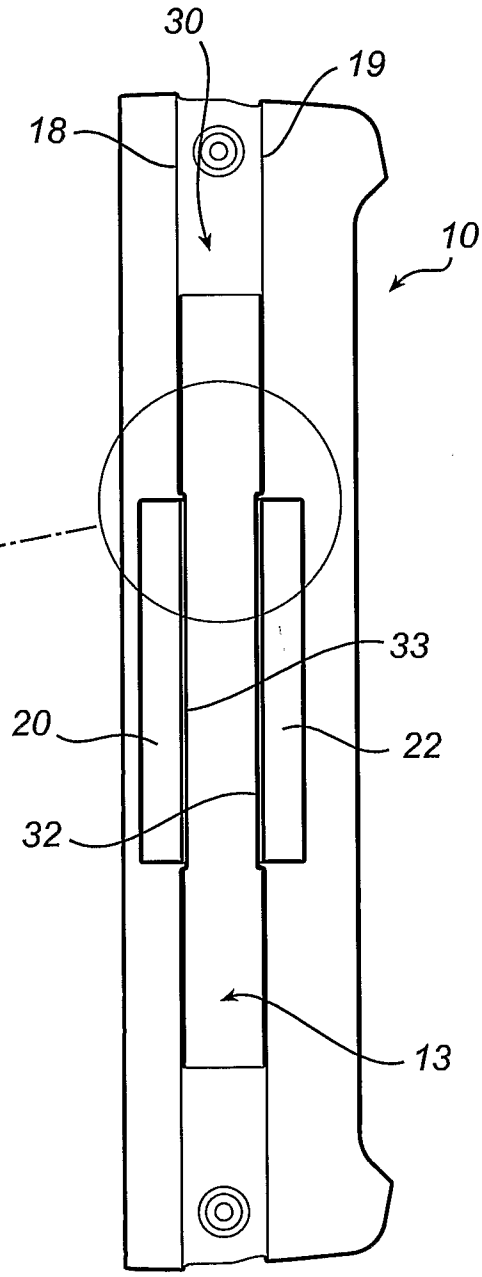

Fig. 4a

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE2009/000189

A. CLASSIFICATION OF SUBJECT MATTER

IPC: see extra sheet
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: A47L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI DATA, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 0226097 A1 (DYSON LIMITED), 4 April 2002 (04.04.2002), figures 1-10, abstract --	1-9
A	WO 03039316 A1 (DYSON LIMITED), 15 May 2003 (15.05.2003), figures 3,4,11,12, abstract --	1-9
A	EP 1875846 A2 (WESSEL-WERK GMBH), 9 January 2008 (09.01.2008), figures 1-6, abstract --	1-9
A	GB 2346545 A (WESSEL-WERK GMBH), 16 August 2000 (16.08.2000), figures 1,2, abstract --	1-9

[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
25 May 2009	28-05-2009
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INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE2009/000189

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 19900968 C1 (WESSEL-WERK GMBH), 13 January 2000 (13.01.2000), figures 1,2, abstract -- --------	1-9

International patent classification (IPC)

A47L 9/02 (2006.01)
A47L 9/06 (2006.01)

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Cited literature, if any, will be enclosed in paper form.

WO	0226097	A1	04/04/2002	AT	355006	T	15/03/2006
				AU	8787201	A	08/04/2002
				AU	2001287872	B,C	03/08/2006
				CN	1270665	C	23/08/2006
				CN	1466432	A	07/01/2004
				DE	60126965	D,T	31/10/2007
				EP	1320317	A,B	28/02/2007
				ES	2281442	T	01/10/2007
				JP	2004509684	T	02/04/2004
				US	7069620	B	04/07/2006
				US	20030163889	A	04/09/2003
WO	03039316	A1	15/05/2003	AT	388658	T	15/03/2008
				AU	2002337322	B	09/11/2006
				AU	2002341143	B	19/10/2006
				CA	2465636	A	15/05/2003
				CA	2465836	A	15/05/2003
				CN	1582127	A	16/02/2005
				CN	1582128	A	16/02/2005
				CN	100391396	C	04/06/2008
				CN	100391397	C	04/06/2008
				DE	60225582	D	24/04/2008
				EP	1443841	A	11/08/2004
				EP	1443842	A,B	12/03/2008
				JP	4087792	B	21/05/2008
				JP	4087793	B	21/05/2008
				JP	2005507296	T	17/03/2005
				JP	2005526536	T	08/09/2005
				US	7350268	B	01/04/2008
				US	7367085	B	06/05/2008
				US	20050050680	A	10/03/2005
				US	20050055798	A	17/03/2005
				WO	03039315	A	15/05/2003
EP	1875846	A2	09/01/2008	CN	101099648	A	09/01/2008
				DE	102006031486	A	10/01/2008
GB	2346545	A	16/08/2000	DE	19906137	C	20/07/2000
				SE	519822	C	15/04/2003
				SE	0000370	A,L	14/08/2000
DE	19900968	C1	13/01/2000	NONE			