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(54) **MULTI-FUNCTIONAL VACUUM CLEANER NOZZLE**

(57) The invention relates to a vacuum cleaner nozzle with a nozzle head (103) having at least one suction opening through which suction opening air can enter the vacuum cleaner nozzle. The vacuum cleaner nozzle also comprises at least one movable glide plate (108) configured to in at least one mode of operation glide on a surface to be cleaned and at least one retractable brush (109). The vacuum cleaner nozzle is configured to be selectable operated in at least three modes of operation. Each of the at least three modes of operation are enabled by moving the at least one of the retractable brush and

the at least one glide plate in relation the nozzle head. The movement will typically be vertical when the nozzle head is used on a horizontal surface. Hereby multiple modes of operations are enabled in an efficient manner that can provide different modes of operation suitable for different surfaces. The different modes of operations can be enabled by only moving a retractable brush and a glide plate. Hence there is no need for any additional arrangement such as configurable wheels for providing multiple (at least three) modes of operation.

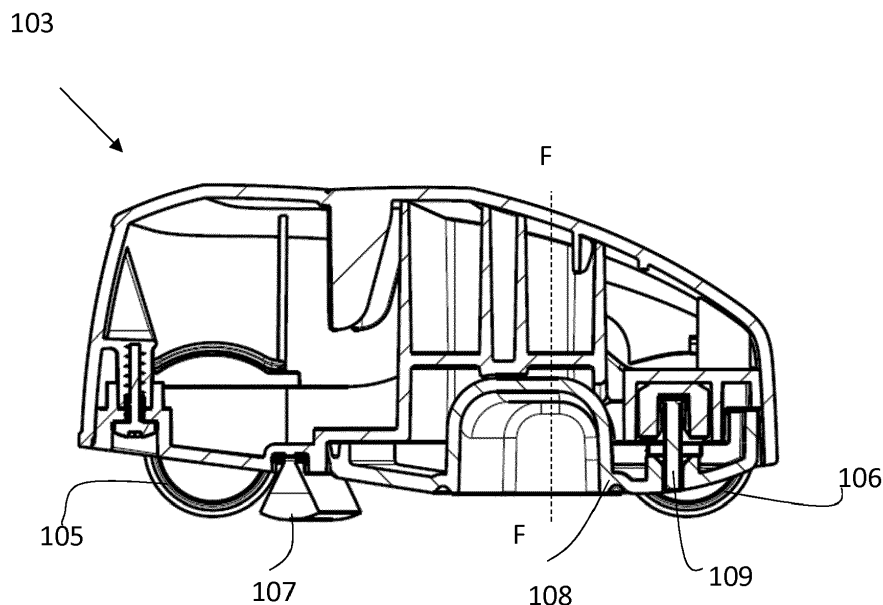


Fig. 6

Description

TECHNICAL FIELD

[0001] The invention relates to a nozzle for a vacuum cleaner. In particular the present invention relates to nozzle for a vacuum cleaner that can operate in multiple modes of operation.

BACKGROUND

[0002] Conventional nozzles for vacuum cleaners typically comprise a brush, which is retractable into a nozzle head of the nozzle so as to adapt the nozzle to different surfaces to be cleaned. When the brush is retracted, the nozzle is adapted to carpets and when the brush is projected, the nozzle is adapted to hard floors.

[0003] There also exist vacuum cleaner nozzle having three modes of operation. For example EP 3 151 711, describes a mechanism arranged to set the brush and the support means in three different settings: a first setting, in which the brush and the support means are fully retracted in the nozzle head, a second setting, in which at least a portion of the brush is partly retracted in the nozzle head and the support means is projected further out from the nozzle head than said portion of the brush so as to form a gap between said portion of the brush and the surface to be cleaned, and a third setting, in which the brush is fully projected.

[0004] There is a constant desire to improve various aspects of a nozzle for a vacuum cleaner. Hence, there exists a need for an improved vacuum cleaner nozzle.

SUMMARY

[0005] It is an object of the present invention to provide an improved vacuum cleaner nozzle.

This object and/or others are obtained by a device as set out in the appended claims.

In accordance with a first aspect of the invention a vacuum cleaner nozzle is provided. The vacuum cleaner nozzle can comprise a nozzle head having at least one suction opening through which suction opening air can enter the vacuum cleaner nozzle. The vacuum cleaner nozzle also comprises at least one movable glide plate configured to in at least one mode of operation glide on a surface to be cleaned and at least one retractable brush. The vacuum cleaner nozzle is configured to be selectable operated in at least three modes of operation. Each of the at least three modes of operation are enabled by moving the at least one of the retractable brush and the at least one glide plate in relation the nozzle head. The movement will typically be vertical when the nozzle head is used on a horizontal surface. Hereby multiple modes of operations are enabled in an efficient manner that can provide different modes of operation suitable for different surfaces. The different modes of operations can be enabled by only moving a retractable brush and a

glide plate. Hence there is no need for any additional arrangement such as configurable wheels for providing multiple (at least three) modes of operation.

[0006] In accordance with one embodiment, the vacuum cleaner nozzle is in a first mode of operation configured with the at least one retractable brush in an engaged position to contact the surface to be cleaned. Hereby a mode of operation that is advantageous to be used on a hard floor is enabled.

[0007] In accordance with one embodiment, the vacuum cleaner nozzle is in a second mode of operation configured with the at least one glide plate in an engaged position to contact the surface to be cleaned. Hereby a mode of operation that is advantageous to be used on carpets and the like is enabled.

[0008] In accordance with one embodiment, the vacuum cleaner nozzle is in a third mode of operation configured with the at least one glide plate in a floating position. Hereby a multi-functional mode of operation can be obtained that is efficient on a surface having varying properties or as a multi-use mode for both hard floor and/or carpets.

[0009] In accordance with one embodiment, the glide plate is spring loaded by a spring. Hereby an efficient mechanism whereby the movement of the glide plate can be achieved is obtained. The force of the spring can be set in response to the vacuum force of the vacuum cleaner nozzle.

[0010] In accordance with one embodiment, the glide plate is provided with at least one brush opening. Hereby a brush, in particular a forward brush can extend through the glide plate.

[0011] In accordance with one embodiment, the at least one retractable brush is configured to move through said at least one brush opening. Hereby an efficient setting of the mode selection of the mode of operation of the vacuum cleaner nozzle can be achieved by positioning a brush in different positions relative to the glide plate in different modes of operation.

[0012] In accordance with one embodiment, the at least one retractable brush is configured to seal said at least one brush opening when vacuum cleaner nozzle is in said second mode of operation. Hereby the second mode of operation can be less noisy and the efficiency can also be improved.

[0013] In accordance with one embodiment, the brush ends of the at least one retractable brush is level with the glide plate when vacuum cleaner nozzle is in said second mode of operation. Hereby an efficient sealing can be obtained.

[0014] In accordance with one embodiment, the at least three modes of operation are configured to be selectable using a selector located on a top surface of the nozzle head. Hereby a user can easily select between the different modes of operation.

[0015] In accordance with one embodiment, the glide plate is provided with a rounded frontal section. Hereby, the glide plate can run easier on carpet and it is easier

to get in big particles under the glide plate.

[0016] In accordance with a second aspect of the invention a vacuum cleaner nozzle comprising at least one suction opening through which suction opening air can enter the vacuum cleaner nozzle is provided. The vacuum cleaner nozzle has at least one glide plate, and at least one brush. The at least one brush extend through at least one brush opening in the glide plate. Hereby an efficient vacuum cleaner nozzle can be obtained. For example, implementation of multiple modes of operation can be facilitated.

[0017] In accordance with one embodiment, the at least one brush is retractable. Hereby a mode of operation with the brush retracted is achieved so that the glide plate can contact the surface.

[0018] In accordance with one embodiment, the at least one retractable brush in one mode of operation is configured to seal said at least one brush opening. Hereby a silent mode of operation can be obtained.

[0019] In accordance with one embodiment, the at least one retractable brush is level with the glide plate when in a mode of operation where said at least one opening is sealed. Hereby an efficient silent mode of operation can be obtained.

[0020] The invention also extends to a vacuum cleaner comprising a vacuum cleaner nozzle according to the above.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] The invention will now be described in more detail, by way of example, and with reference to the accompanying drawings, in which:

Fig. 1 shows a general view of a vacuum cleaner,

Fig. 2 is a view illustrating a view of a vacuum cleaner nozzle with multiple settings.

Figs. 3 and 4 are views illustrating a vacuum cleaner nozzle in a first setting for a first mode of operation.

Figs. 5 and 6 are views illustrating a vacuum cleaner nozzle in a second setting for a second mode of operation.

Figs. 7 and 8 are views illustrating a vacuum cleaner nozzle in a third setting for a third mode of operation.

Fig. 9 is a sectional view illustrating a spring-loaded glide plate.

Fig. 10 is a bottom view of a vacuum cleaning nozzle

DETAILED DESCRIPTION

[0022] The invention will now be described more fully hereinafter with reference to the accompanying draw-

ings, in which certain embodiments of the invention are shown. The invention may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided by way of example so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art. For example, like or similar components of different embodiments can be exchanged between different embodiments. For example, while three modes of operation are given, additional modes of operation are envisaged. Also, while the nozzle is illustrated having four wheels, other number of wheels are possible. Some components can be omitted from different embodiments. Like numbers refer to like elements throughout the description.

[0023] In Fig. 1, a general view of a vacuum cleaner 100 is shown. The vacuum cleaner 100 is provided with a vacuum cleaner nozzle 101.

[0024] In Fig. 2, the vacuum cleaner nozzle 101 is depicted in more detail. The vacuum cleaner nozzle 101 comprises a nozzle head 103 and a connector outlet 102 for connecting the vacuum cleaner nozzle 101 to a wand or a hose of the vacuum cleaner 100. The connector outlet 102 can be provided with a lock mechanism for keeping the vacuum cleaner nozzle in a locked connection to the wand or hose. The vacuum cleaner nozzle 101 further comprises a selector 104 arranged to selectively set the vacuum cleaner nozzle 101 in, at least, three different modes of operation. The selector 104 can advantageously be provided on a top side of the vacuum cleaner nozzle 101 for easy access by a user. By operating the selector 104, a user can select for the vacuum cleaner nozzle 101 to be selectable operated in at least three modes of operation. In accordance with embodiments described herein each of at least three modes of operation is enabled by moving at least one of a retractable brush and at least one glide plate vertically in relation the nozzle head 103 when the vacuum cleaner is in use on a horizontal surface to be cleaned. The movement of the retractable brush and/or the at least one glide plate is enabled by operating the selector 104. Different modes of operation of the vacuum cleaner nozzle 101 that can be selected will now be described in more detail in conjunction with Figs. 3 - 8.

[0025] In Fig. 3 a sectional view of the vacuum cleaner nozzle 101 along the section A - A in Fig. 2 is shown. In Fig. 3 the selector 104 is in a first position. When the selector is in the first position, the vacuum cleaner nozzle 101 is configured to operate in a first mode of operation. This first mode of operation can be referred to a hard floor mode. The vacuum cleaner nozzle 101 is provided with a glide plate 108 that forms a bottom side of the nozzle head 103. The glide plate 108 faces the surface to be cleaned when the vacuum cleaner 100 is used. In the hard floor mode, the nozzle head 103 is supported by a number of wheels 105, 106 and the nozzle head 103 can roll on the floor on the wheels 105, 106. Also,

the nozzle head is supported by brushes, see below. In the exemplary embodiment of Fig. 3 the nozzle head has 4 wheels, two rear wheels 105 and two forward wheels 106. Other wheel configurations and number of wheels are possible. Further, a rear brush 107 can be fixedly attached to the nozzle head 103 and contact the floor when the vacuum cleaner nozzle is operated in the hard floor mode.

[0026] In Fig. 4, a sectional view of the vacuum cleaner nozzle 101 along the section C - C in Fig. 3 is shown. In the hard floor mode, a forward, retractable brush 109 is in a projected position where the forward brush 109 projects through at least one opening in the glide plate 108. The forward brush 109 is then configured to be in contact with the floor to be cleaned and the nozzle head 103 rolls on the wheels 105, 106. When in the hard floor mode, the glide plate 108 can be in a fixed, retracted position. Thus, the selector can, in the hard floor mode be adapted to project the forward brush 109 through opening(s) in the glide plate and at the same time place the glide plate 108 in a fixed position relative to the nozzle head 103. The glide plate 108 has a smooth front edge. The smooth front edge is formed by a rounded frontal section 118 of the glide plate 108. The rounded frontal section 118 makes the glide plate 108 run easier on carpet and easier to get in big particles under the glide plate 108. For example, the rounded frontal section 118 can have a front tip bottom side that is elevated 1 - 5 mm, in particular 2 - 3 mm, from the rest of the bottom side of the glide plate. The entire bottom side of the glide plate is continuous and smooth from the front tip and backwards, in particular back to the forward brush 109.

[0027] In Fig. 5, a sectional view of the vacuum cleaner nozzle 101 along the section A - A in Fig. 2 is shown. In Fig. 5, the selector 104 is in a second position. When the selector is in the second position, the vacuum cleaner nozzle 101 is configured to operate in a second mode of operation. This second mode of operation can be referred to as a smart/floating mode. In the smart/floating mode, the nozzle head 103 is supported by a number of wheels 105, 106 and the nozzle head 103 can roll on the floor on the wheels 105, 106 as in the floor mode. Further, optionally, the rear brush 107 can be fixedly attached to the nozzle head 103 and contact the floor when the vacuum cleaner nozzle 101 is operated in the smart mode.

[0028] In Fig. 6 a sectional view of the vacuum cleaner nozzle 101 along the section D - D in Fig. 5 is shown. In the smart mode, a forward, retractable brush 109 is in a retracted position where the forward brush 109 is retracted above the glide plate 108. The nozzle head 103 rolls on the wheels 105, 106. The glide plate 108 is in a suspended, spring loaded mode. This will be described in more detail below in conjunction with Fig. 9. In such a suspended mode, the glide plate 108 is configured to move, typically vertically, between different positions by influence of the vacuum force formed by air blown through the nozzle head 103 and counter acted by a spring. Hereby a floating position can be formed where

the glide plate is able to move between different positions. For example, when the nozzle head 103 rolls on a floor the glide plate 108 can be suspended above the floor a few mm such as 2 - 5 mm or about 3 - 4 mm. On the other hand, when the nozzle head 103 moves over a carpet, the vacuum force becomes greater than the force of the spring, and the spring-loaded glide plate 108 contacts the carpet for efficient cleaning of the carpet. The smart mode will therefore act to provide efficient cleaning on different types of surfaces. This is due to the ability of the glide plate to move between different positions and also due to the forward brush being enabled to project through the glide plate. The force of the spring will therefore be dimensioned in response to the vacuum force. Thus, the spring force of the spring can be adapted to enable the glide plate to have different positions on different surfaces because the vacuum force will vary for different surfaces.

[0029] In Fig. 7, a sectional view of the vacuum cleaner nozzle 101 along the section A - A in Fig. 2 is shown. In Fig. 7 the selector 104 is in a third position. When the selector is in the third position, the vacuum cleaner nozzle 101 is configured to operate in a third mode of operation. This third mode of operation can be referred to a carpet mode. In the carpet mode the glide plate 108 is placed in a locked projected position by the selector 104. Further, optionally, the rear brush 107 can be fixedly attached to the nozzle head 103 and contact the floor when the vacuum cleaner nozzle 101 is operated in the carpet mode.

[0030] In Fig. 8 a sectional view of the vacuum cleaner nozzle 101 along the section B - B in Fig. 5 is shown. In the carpet mode, a forward, retractable brush 109 is placed in position where the brush ends of the forward brush 109 is level with the openings of the glide plate 108. By placing the brush ends of the forward brush level with the openings in the glide plate, the forward brush will act as a seal in the openings. Hereby it is achieved that the noise level can be reduced. Also, the suction power can be increased due to reduced losses via the openings.

[0031] In Fig. 9 a sectional view along the section F-F in Fig. 6 is shown. The spring 110 that suspends the glide plate can in accordance with the exemplary embodiment of Fig. 9 be attached to a hook 111 holding the glide plate. The spring 110 can be dimensioned to provide a spring bias force that suspends the glide plate. The spring force can be such that the glide plate is in a retracted position when the nozzle head 103 is moved over a floor surface. When the vacuum downward force increases on the glide plate when the nozzle head is moved over a carpet or the like, the vacuum force is greater than the spring force and the glide plate moves to a more projected position.

[0032] In Fig. 10 a bottom view of a nozzle head 103 of the vacuum cleaner nozzle 101 is shown. The nozzle head 103 has a suction opening 113 through which suction opening air can enter the vacuum cleaner nozzle. Fig. 10 illustrates brush openings 112 in the glide plate 108. The brush openings 112 provide a space for the

forward brush to project through (and be retracted through) the glide plate 108. Any suitable number of brush openings 112 can be provided in the glide plate 108 for example 1 - 10 brush openings can be provided. In particular 3 - 6 brush openings 112 can be provided. In the example shown in Fig. 10, 5 brush openings 112 are provided. The brush openings are preferably elongated in shape and can be provided as slit(s) in the glide plate 108. The size of the brush openings 112 is preferably matched to the dimensions of the forward brush. Hereby the forward brush can be made to seal the brush openings 112 in the glide plate 108 when the brush ends of the forward brush is set level with the glide plate as described above.

Claims

1. A vacuum cleaner nozzle (101) comprising:

- a nozzle head (103) having at least one suction opening (113) through which suction opening air can enter the vacuum cleaner nozzle,
- at least one movable glide plate (108) configured to in at least one mode of operation glide on a surface to be cleaned,
- at least one retractable brush (109),

wherein the vacuum cleaner nozzle is configured to be selectable operated in at least three modes of operation and wherein each of the at least three modes of operation is enabled by moving the at least one of:

- the retractable brush (109), and
- the at least one glide plate (108)

in relation to the nozzle head.

2. The vacuum cleaner nozzle according to claim 1, wherein the vacuum cleaner nozzle in a first mode of operation is configured with the at least one retractable brush in an engaged position to contact the surface to be cleaned.

3. The vacuum cleaner nozzle according to claim 1 or 2, wherein the vacuum cleaner nozzle in a second mode of operation is configured with the at least one glide plate in an engaged position to contact the surface to be cleaned.

4. The vacuum cleaner nozzle according to any one of claims 1 - 3, wherein the vacuum cleaner nozzle in a third mode of operation is configured with the at least one glide plate in a floating position.

5. The vacuum cleaner nozzle according to claim 4, comprising a spring (110) adapted to spring load the

glide plate in the floating position.

6. The vacuum cleaner nozzle according to claim 5, wherein the spring has a spring force dimensioned in response to a vacuum force in the vacuum cleaner nozzle.

7. The vacuum cleaner nozzle according to any one of claims 4 - 6, wherein the glide plate is provided with at least one brush opening (112).

8. The vacuum cleaner nozzle according to claim 7, wherein the at least one retractable brush is configured to move through said at least one brush opening.

9. The vacuum cleaner nozzle according to any one of claims 3 - 8, wherein, when the vacuum cleaner nozzle is in said second mode of operation, the at least one retractable brush is configured to seal said at least one brush opening.

10. The vacuum cleaner nozzle according to claim 9, wherein, when the vacuum cleaner nozzle is in said second mode of operation, the brush ends of the at least one retractable brush is level with the glide plate.

10. The vacuum cleaner nozzle according to any one of claims 1 - 10, wherein the at least three modes of operation are configured to be selectable using a selector (104) located on a top surface of the nozzle head.

12. The vacuum cleaner nozzle according to any one of claims 1 - 11, wherein the glide plate (108) has a rounded frontal section (118).

13. A vacuum cleaner nozzle (101) comprising:

- at least one suction opening (113) through which suction opening air can enter the vacuum cleaner nozzle,
- at least one glide plate (108),
- at least one brush (109),

wherein the at least one brush extend through at least one brush opening in the glide plate.

14. The vacuum cleaner nozzle according to claim 13, wherein the at least one brush is retractable.

15. The vacuum cleaner nozzle according to claim 14, wherein the at least one retractable brush in one mode of operation is configured to seal said at least one brush opening.

16. The vacuum cleaner nozzle according to claim

13, wherein the brush end of the at least one retractable brush is level with the glide plate when in a mode of operation where said at least one brush opening is sealed.

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17. A vacuum cleaner (100) comprising a vacuum cleaner nozzle (101) according to any one of claims 1-16.

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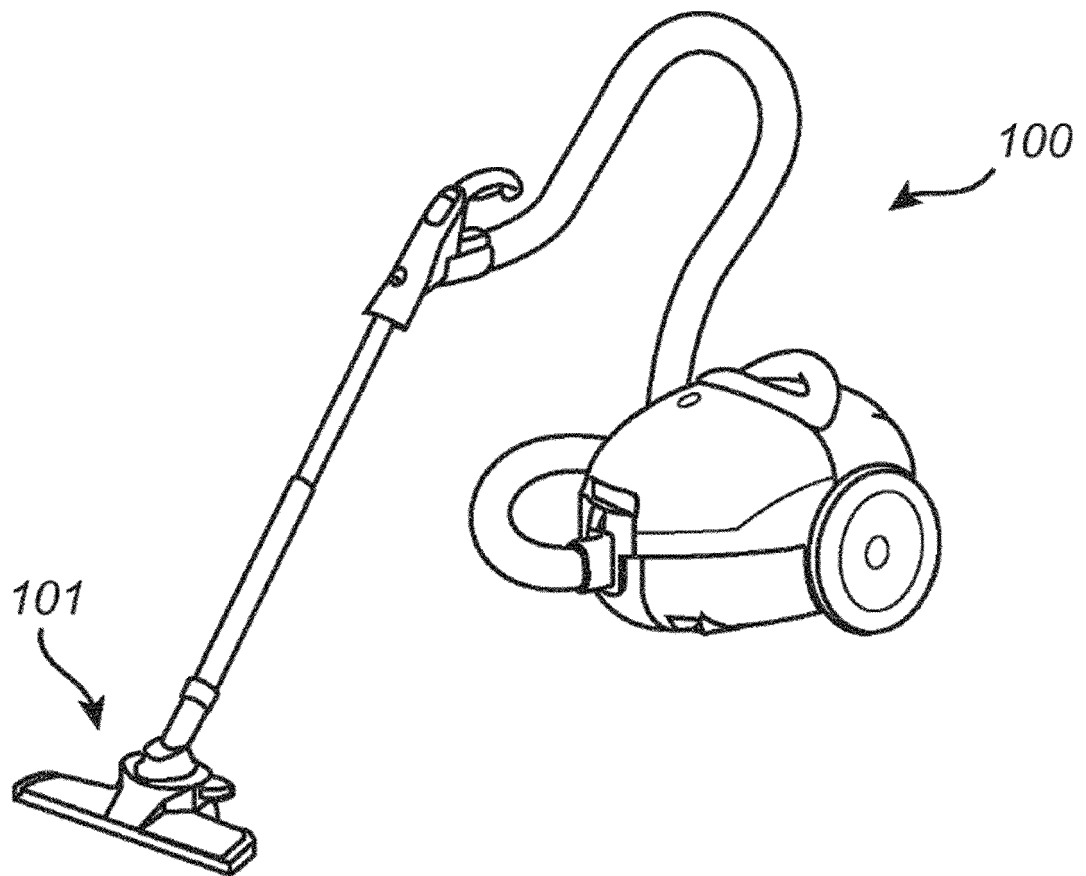


Fig. 1

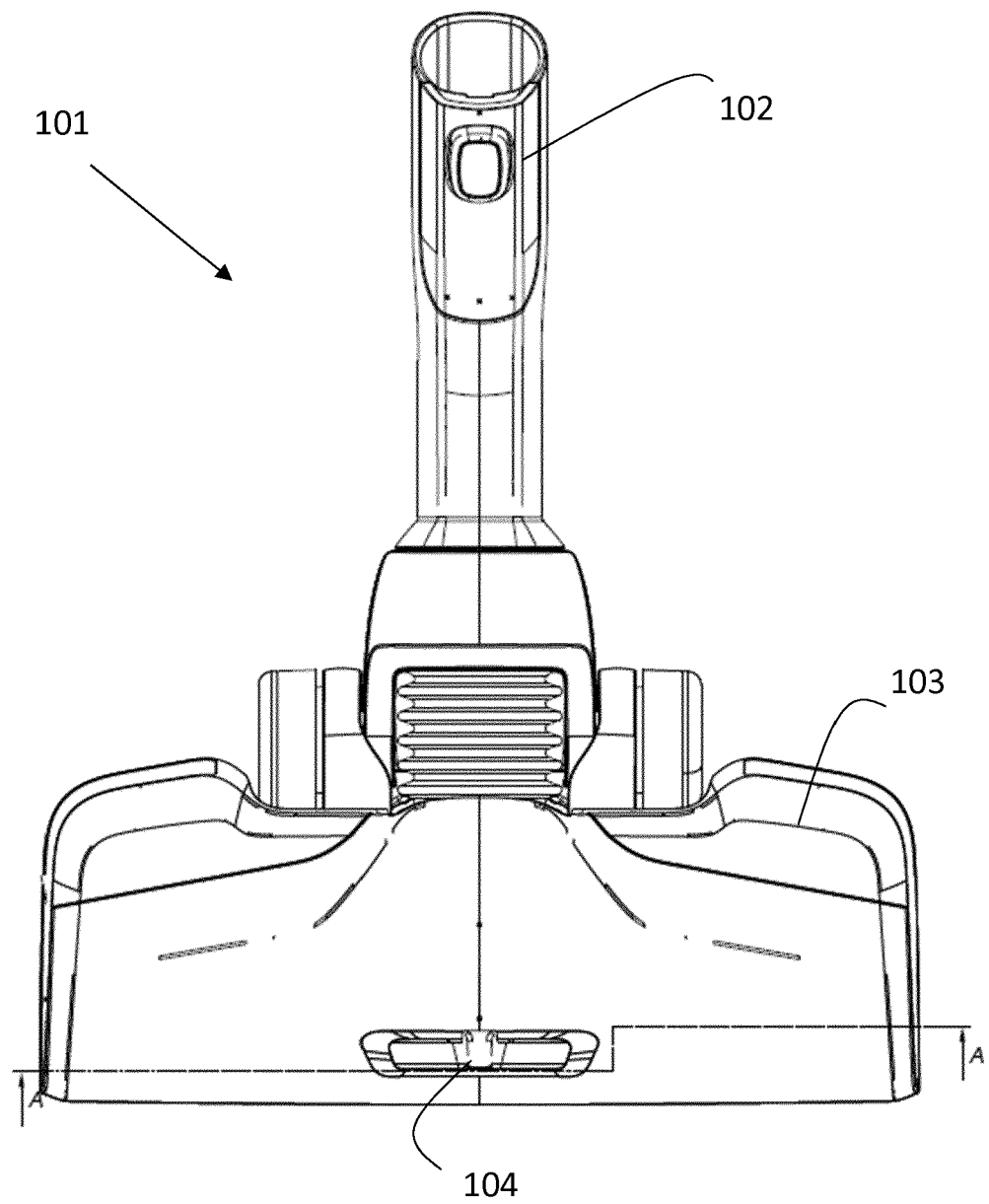
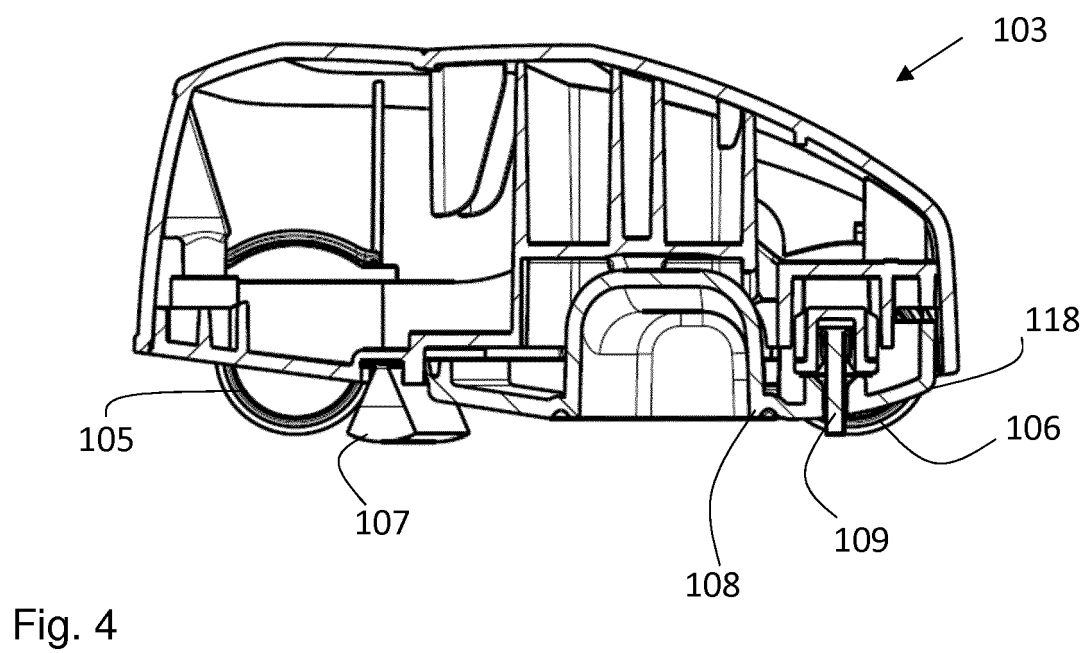
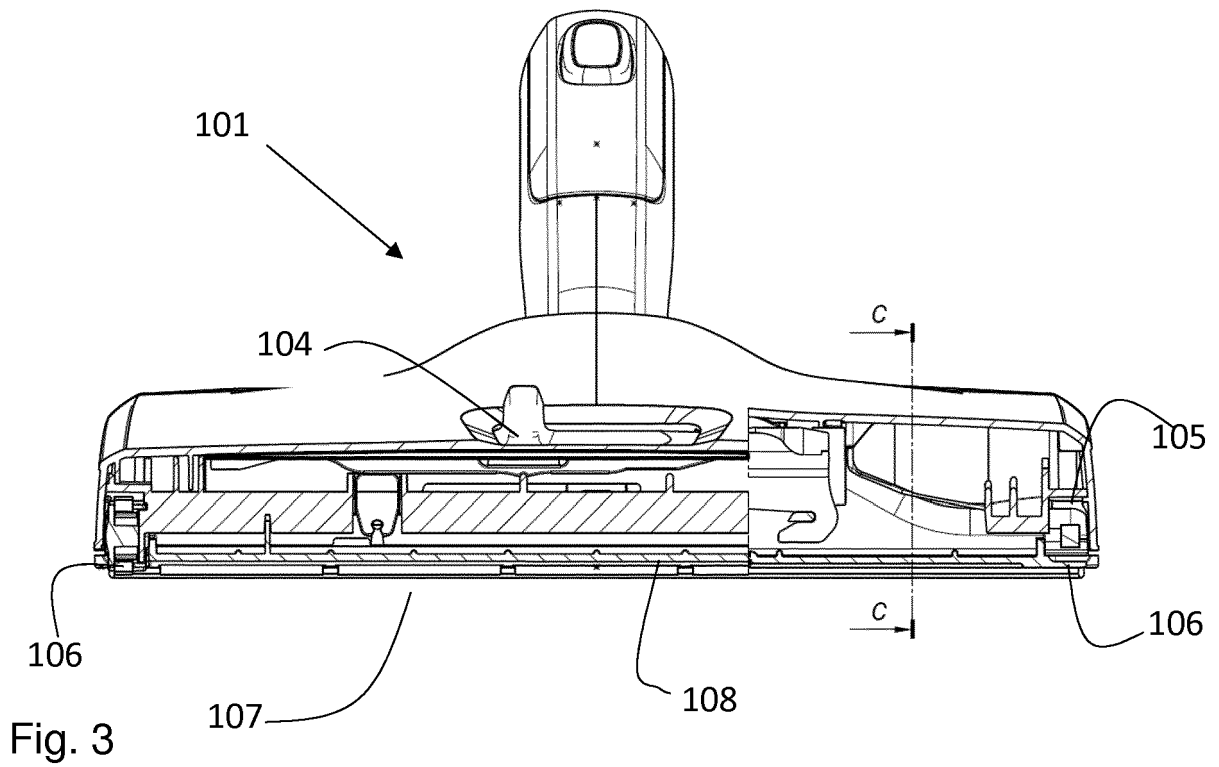


Fig. 2



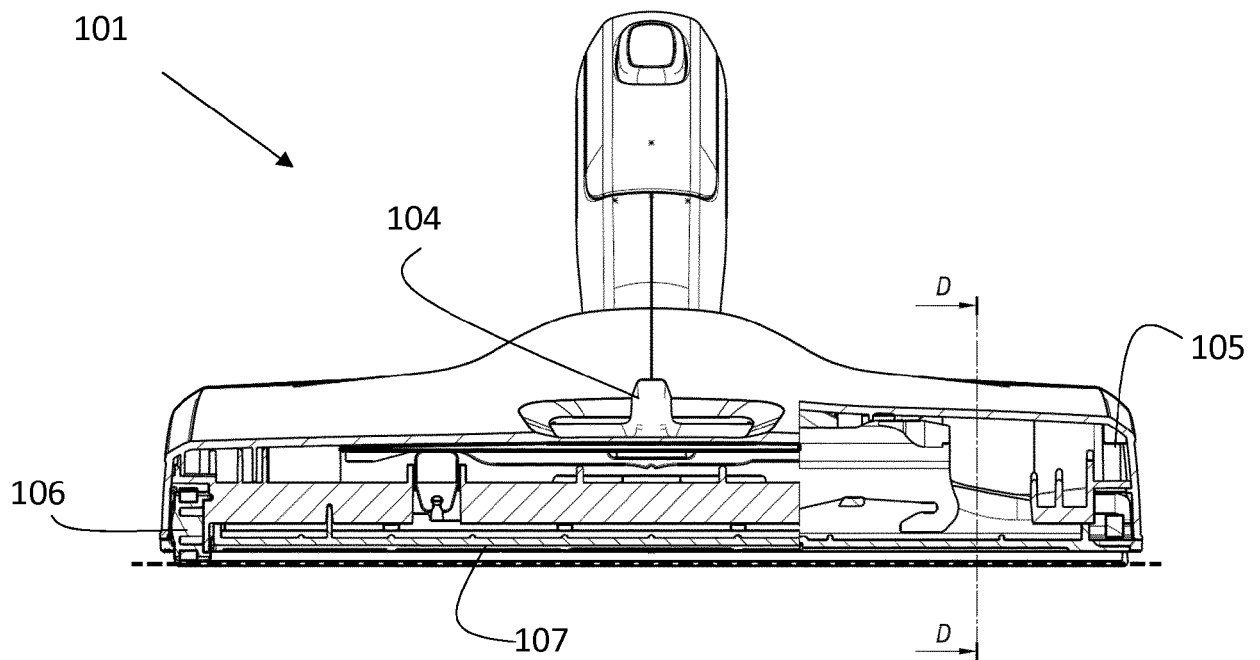


Fig. 5

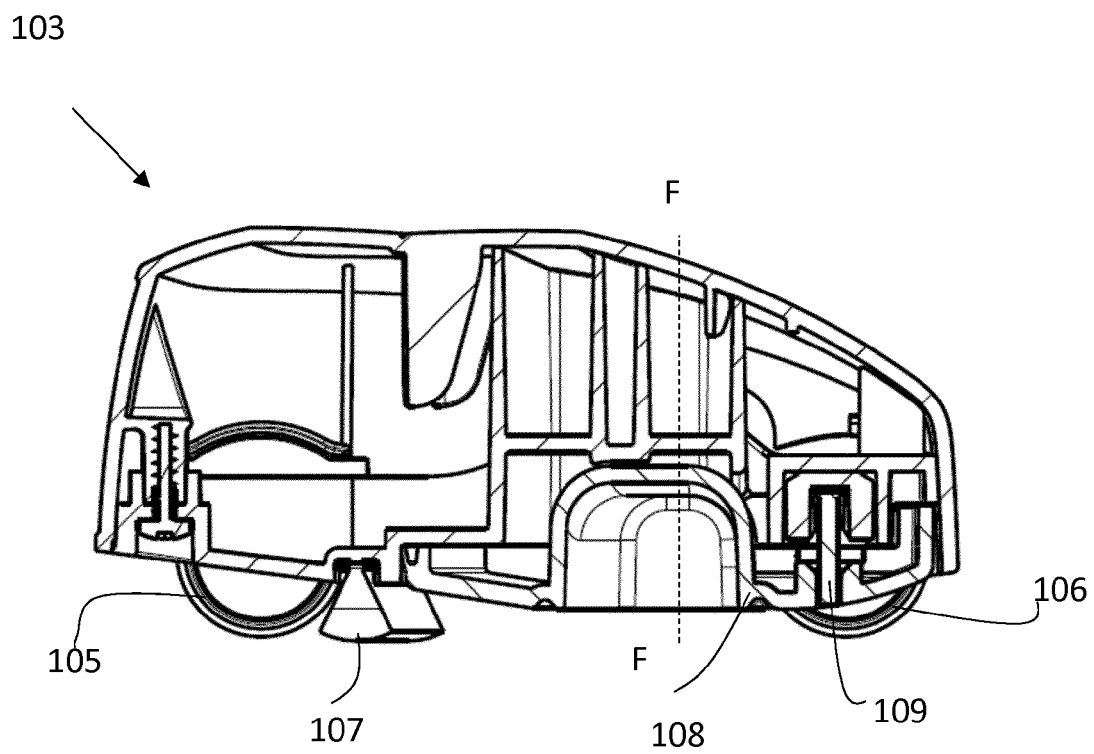


Fig. 6

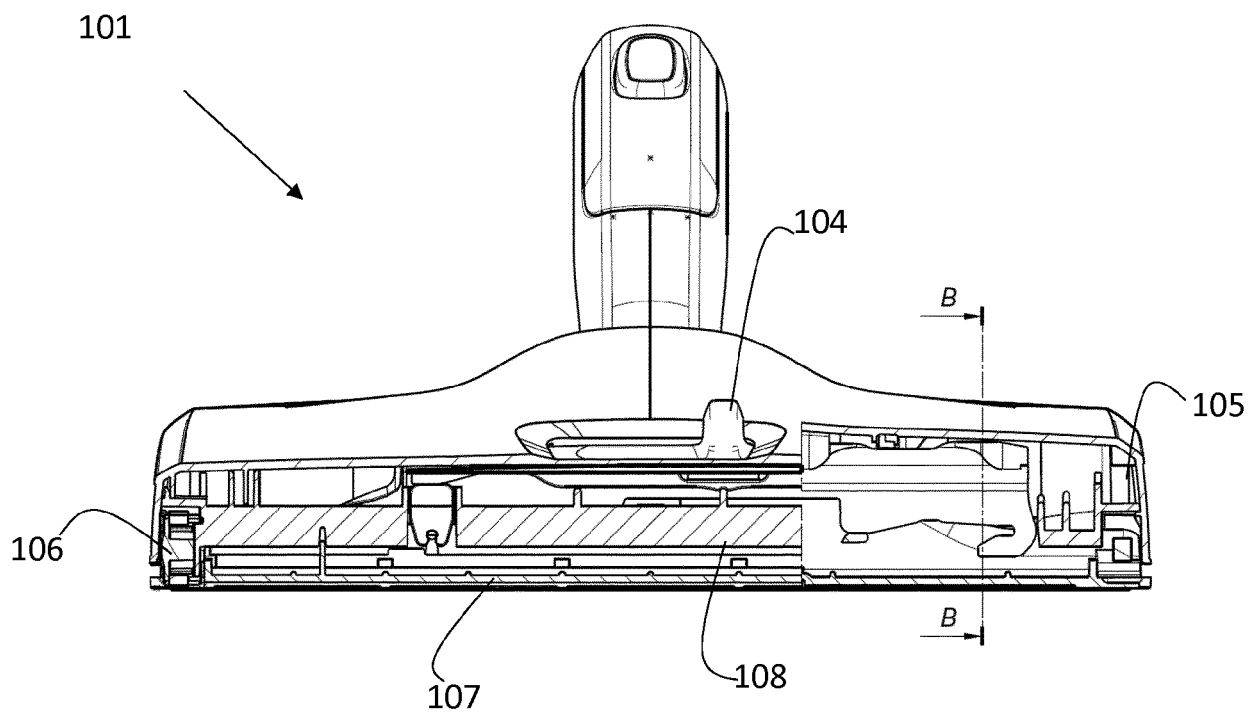


Fig. 7

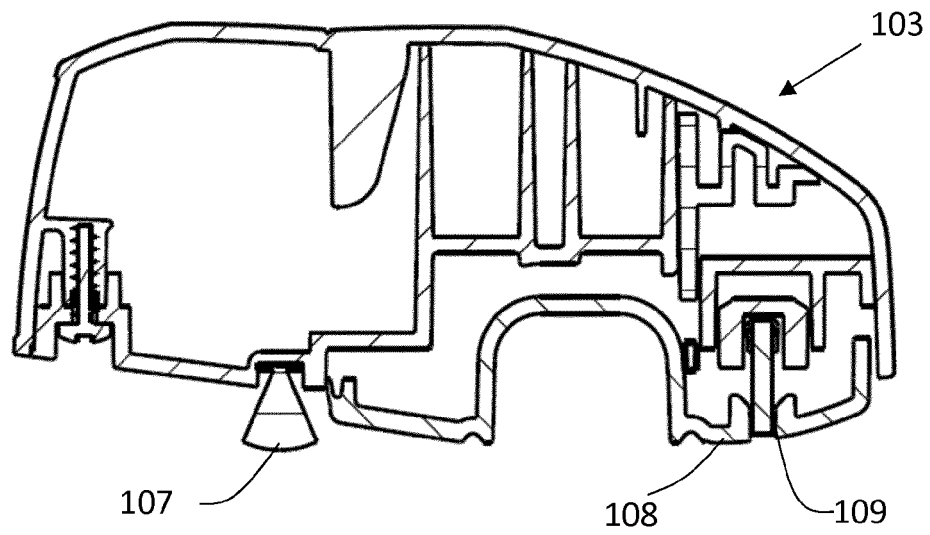


Fig. 8

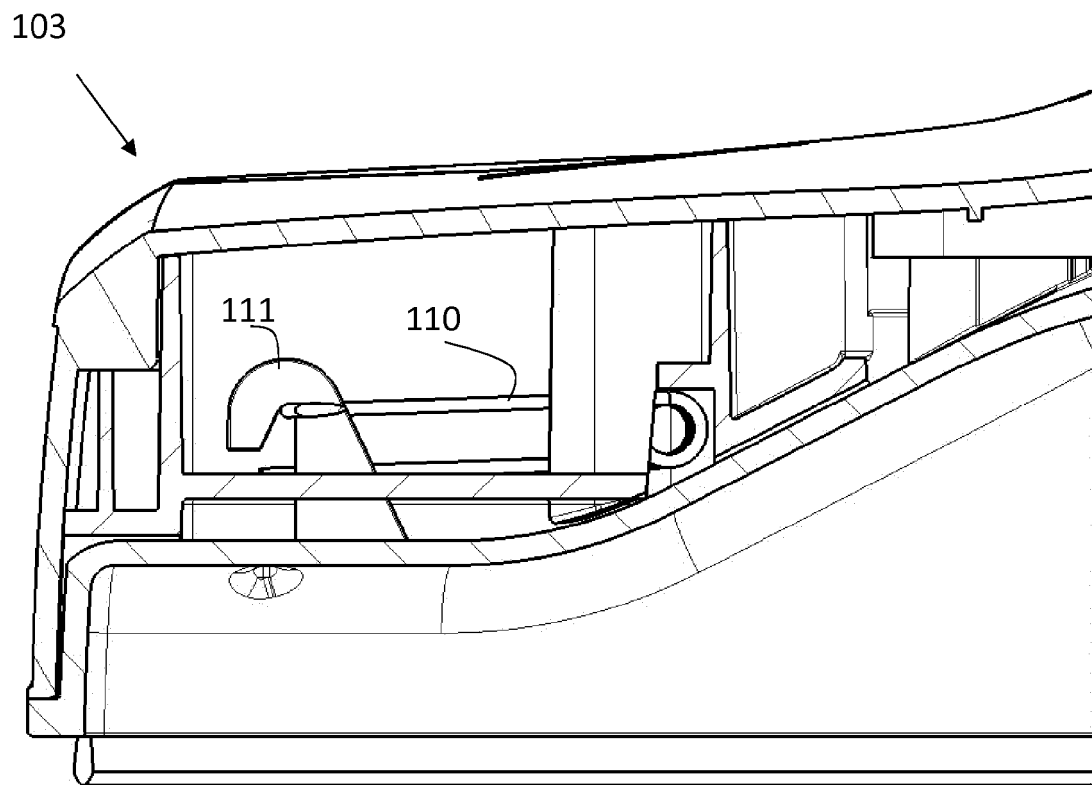


Fig. 9

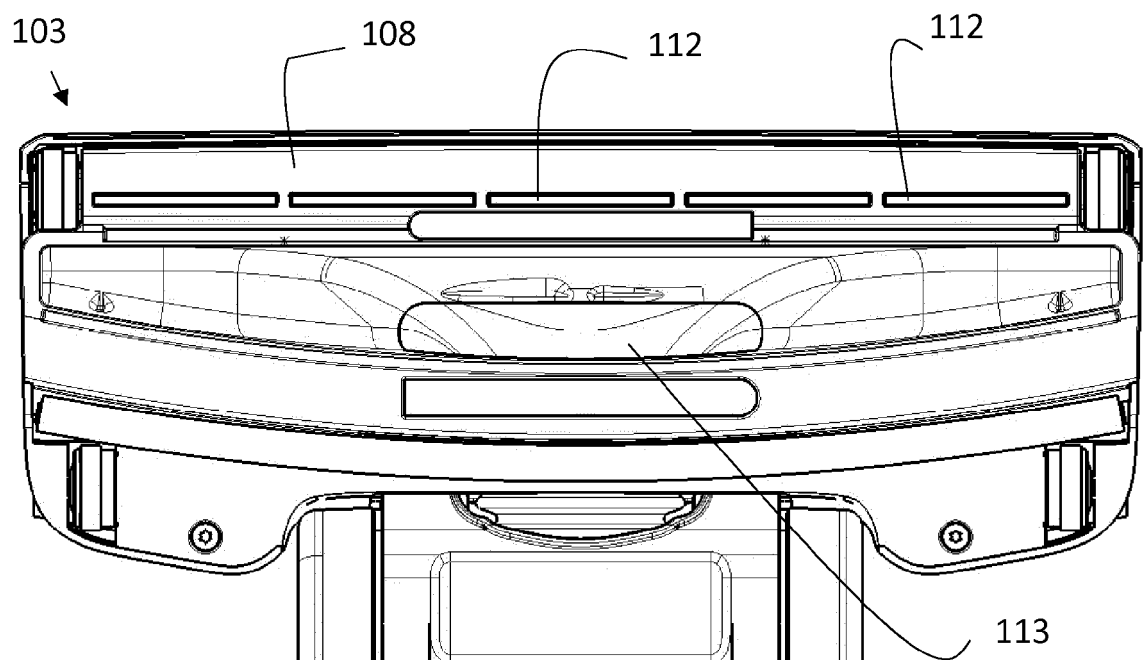


Fig. 10



EUROPEAN SEARCH REPORT

Application Number
EP 18 20 7617

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DOCUMENTS CONSIDERED TO BE RELEVANT			
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 16 September 2019	Examiner Masset, Markus
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			

EPO FORM 1503 03.82 (P04C01)



Application Number

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CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☒ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).



**LACK OF UNITY OF INVENTION
SHEET B**

Application Number

EP 18 20 7617

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-12

least three modes of operation

2. claims: 13-17

A vacuum cleaner nozzle having a glide plate with a brush opening

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

EP 18 20 7617

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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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