(11) Application No. AU 2007274885 C1

(19) AUSTRALIAN PATENT OFFICE

(54) Title

A cleaning appliance

(51)[6] International Patent Classification(s)

A47L 5/24 (2006.01) 20060101ALI2008012 4BHEP **A47L** 9/22 (2006.01) 20060101ALI2008012 4BHEP **A47L** 9/28 (2006.01) 20060101ALI2008012 4BHEP **A47L** 9/32 (2006.01) 20060101ALI2008012 4BHEP

A47L 5/24 20060101AFI2008012 4BHEP **A47L** 9/22

PCT/GB2007/002524

(21) Application No: 2007274885 (22) Application Date: 2007.07.05

(87) WIPO No: WO08/009883

(30) Priority Data

(31) Number	(32) Date	(33) Country
0614235.0	2006.07.18	GB

(43) Publication Date : 2008.01.24

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(56) Related Art

JP 63296718 A

JP 2004041760 A

JP 62290431 A

JP 05192270 A

GB 795118 A

GB 2276311 A

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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
24 January 2008 (24.01.2008)

PCT

(10) International Publication Number
WO 2008/009883 A1

(51) International Patent Classification:
A47L 5/24 (2006.01) *A47L 9/28* (2006.01)
A47L 9/22 (2006.01) *A47L 9/32* (2006.01)

(21) International Application Number:
PCT/GB2007/002524

(22) International Filing Date: 5 July 2007 (05.07.2007)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
0614235.0 18 July 2006 (18.07.2006) GB

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(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, 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, 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, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

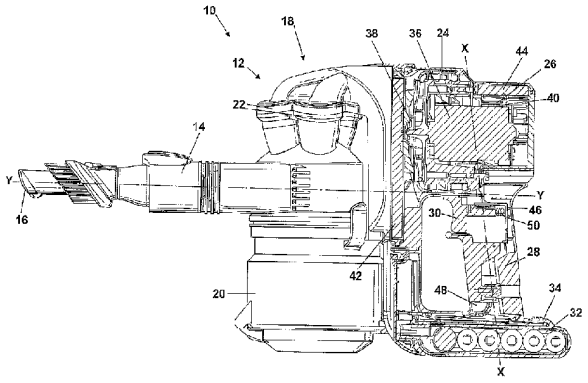
(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

WO 2008/009883 A1

(54) Title: A CLEANING APPLIANCE



(57) Abstract: The invention provides a hand-held cleaning appliance (10) comprising a suction conduit (14), an airflow generator (36) for generating an airflow along the suction conduit (14), separating apparatus (18) in communication with the suction conduit (14) for separating dirt and dust from the airflow, a power source (32) for supplying power to the airflow generator (36) and a handgrip (28) for enabling a user to manoeuvre the hand-held cleaning appliance. The handgrip (28) has a first end (46) and a second end (48). The airflow generator (36) is arranged directly adjacent the first end (46) of the handgrip (28) and the power source (32) is arranged adjacent the second end (48) of the handgrip (28). By providing a hand-held vacuum cleaner (10) with such an arrangement, the hand-held vacuum cleaner (10) is easier and more comfortable to manipulate in use.

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AUP0408A

A Cleaning Appliance

The invention relates to a hand-held cleaning appliance. More particularly, the invention relates to a hand-held vacuum cleaner.

Any discussion of the prior art throughout the specification should in no way be considered as an admission that such prior art is widely known or forms part of common general knowledge in the field.

Hand-held vacuum cleaners are known from, for example, GB 1 207 278. This document discloses a hand-held vacuum cleaner having an elongate main body with an air inlet, a suction conduit and a dust bag for separating dirt and dust from an airflow. A motor and fan assembly is provided in the main body together with a power source. A handgrip is located on the upper part of the hand-held vacuum cleaner. The handgrip extends parallel to the elongate main body at a shallow angle to the suction conduit, and both the airflow generator and the power source are located in the main body underneath the handgrip. JP 2004-041760 discloses a hand-held vacuum cleaner having a similar handgrip arrangement. However, in this case, the motor and fan assembly and the power source of the hand-held vacuum cleaner are arranged so that the centre of gravity of the machine is located at the centre of the handgrip.

An alternative arrangement of handgrip is shown in US 1,871,624. This document discloses a hand-held vacuum cleaner having a cylindrical main body and a handgrip arranged at one end. A curved suction conduit is located at an end opposite to the handgrip. The handgrip is arranged transversely to the longitudinal axis of the cylindrical main body and approximately parallel to the suction conduit. This arrangement may give the user a stronger wrist position in use than the handgrip arrangements disclosed in GB 1 207 278 and JP 2004-041760. However, the heavy components of the vacuum cleaner (for example, the motor and fan assembly) are located forwardly of the handgrip relative to a user's hand when the vacuum cleaner is

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in use. Therefore, the centre of mass of the respective hand-held vacuum cleaner will be located forwardly of the handgrip. This may result in the hand-held vacuum cleaner described above being tiring and uncomfortable to use because the user will have to exert additional effort in order to maintain the hand-held vacuum cleaner in a fixed orientation.

It is an object of the present invention to overcome or ameliorate at least one of the disadvantages of the prior art, or to provide a useful alternative.

It is an object of a preferred form of the present invention to provide a hand-held vacuum cleaner which is easier to manipulate in use than known arrangements. It is a further object of a preferred form of the present invention to provide a hand-held vacuum cleaner in which the arrangement of the handgrip, the motor and fan assembly and the power source allow the hand-held vacuum cleaner to be manipulated easily and comfortably.

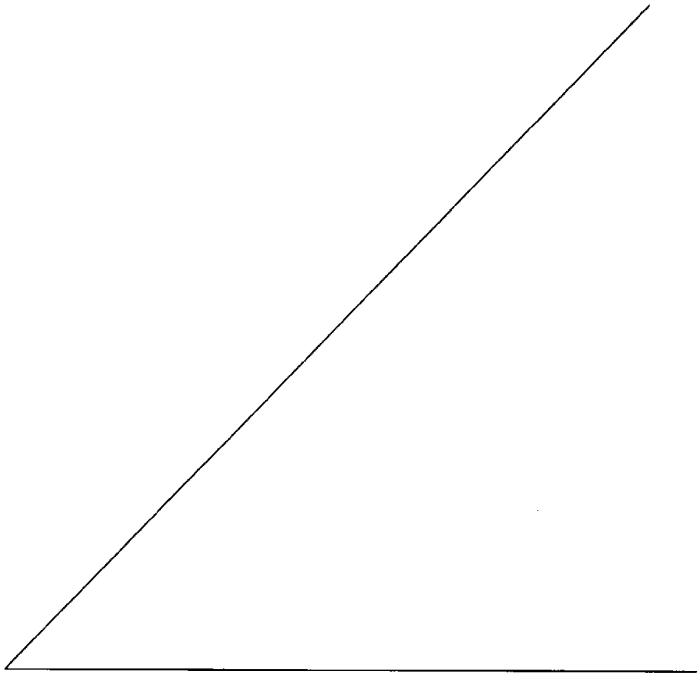
The invention provides a hand-held cleaning appliance comprising a suction conduit, an airflow generator for generating an airflow along the suction conduit, separating apparatus in communication with the suction conduit for separating dirt and dust from the airflow, a handgrip for enabling a user to manoeuvre the hand-held cleaning appliance, the handgrip having a first end, a second end and a longitudinal axis, and a power source arranged adjacent the second end of the handgrip for supplying power to the airflow generator, wherein the airflow generator is arranged directly adjacent the first end of the handgrip, the longitudinal axis passes through at least a part of the airflow generator and the handgrip lies between the airflow generator and the power source.

Unless the context clearly requires otherwise, throughout the description and the claims, the words "comprise", "comprising", and the like are to be construed in an inclusive sense as opposed to an exclusive or exhaustive sense; that is to say, in the sense of "including, but not limited to".

Preferably, the power source is arranged directly adjacent the second end of the handgrip. This arrangement allows the hand-held vacuum cleaner to be used easily and comfortably by a user.

Preferably, the handgrip has a longitudinal axis which passes through at least a part of the power source.

Preferably, the suction conduit has a suction opening which is located remote from the handgrip. More preferably, the separating apparatus is located between the suction opening and the handgrip. Such an arrangement is compact and convenient to use.



An embodiment of the invention will now be described with reference to the accompanying drawings, in which:

Figure 1 is an isometric view of a hand-held vacuum cleaner according to the invention;

Figure 2 is a partially cut-away side view of the hand-held vacuum cleaner of Figure 1; and

Figure 3 is a plan view of the hand-held vacuum cleaner of Figure 1.

Figure 1 shows a hand-held vacuum cleaner 10. The hand-held vacuum cleaner 10 comprises a main body 12. The main body 12 includes a suction conduit 14 having a suction opening 16. The main body 12 also includes cyclonic separating apparatus 18 for separating dirt and dust from an airflow drawn in through the suction opening 16. The cyclonic separating apparatus 18 is in communication with the suction conduit 14 and the suction opening 16. The cyclonic separating apparatus 18 comprises an upstream cyclone 20 and a plurality of downstream cyclones 22 but further detail is not material to the invention and therefore will not be described.

The main body 12 further includes a motor housing 24 having a plurality of exhaust vents 26 formed therein. A flowpath extends from the suction opening 16, through the suction conduit 14, the cyclonic separating apparatus 18 and the motor housing 24 to the exhaust vents 26. A handgrip 28 is located below the motor housing 24 for manipulating the hand-held vacuum cleaner 10 when in use. The handgrip 28 is arranged so that the cyclonic separating apparatus 18 is located between the handgrip 28 and the suction opening 16. The handgrip 28 includes a trigger switch 30 which is positioned on the side of the handgrip 28 closest to the suction opening 16 such that the trigger switch 30 can be manipulated by a user's index finger. A power source 32 is connected to the handgrip 28 through a mounting portion 34.

Figure 2 shows the hand-held vacuum cleaner 10 in more detail. An airflow generator 36 is located in the motor housing 24. In this embodiment, the airflow generator 36 takes the form of a motor and fan assembly. The airflow generator 36 has an inlet 38 and an outlet 40. A pre-motor filter 42 is located upstream of the inlet 38 for filtering fine particulates from the airflow. A post-motor filter 44 is located downstream of the outlet 40. The pre-motor filter 42 and the post-motor filter 44 are located in the flowpath.

The handgrip 28 takes the form of an elongate handle and has a first end 46, a second end 48 and an axis X-X. The first end 46 of the handgrip 28 is connected to the motor housing 24. The airflow generator 36 is located adjacent the first end 46 of the handgrip 28. In this embodiment, the handgrip 28 and the airflow generator 36 are arranged such that the axis X-X of the handgrip 28 passes through at least a part of the airflow generator 36.

The mounting portion 34 removably receives the power source 32. When fitted to the hand-held vacuum cleaner 10, the power source 32 is located directly adjacent the second end 48 of the handgrip 28. In this embodiment, the power source 32 and the handgrip 28 are arranged so that the axis X-X passes through at least a part of the power source 32.

In other words, the handgrip 28 is arranged to lie between the airflow generator 36 and the power source 32. In this embodiment, the axis X-X passes through at least a part of each of the airflow generator 36 and the power source 32. Further, the axis X-X of the handgrip 28 lies transverse to a longitudinal axis Y-Y of the suction conduit 12. The longitudinal axis Y-Y passes through the suction opening 16. In this embodiment, the axis X-X is arranged at an angle to the longitudinal axis Y-Y which is close to 90°. This arrangement feels comfortable for a user.

The trigger switch 30 is located towards the first end 46 of the handgrip 28. The trigger switch 30 is located between the power source 32 and the airflow generator 36 and is

capable of switching the airflow generator 36 on or off. The trigger switch has on and off positions. The trigger switch moves from left to right as seen in Figure 2. The off position is located to the left, and the on position to the right. In the off position the trigger switch 30 is in an open state and the airflow generator 36 will be switched off. In the on position the trigger switch 30 will be closed and the airflow generator 36 will be switched on. The trigger switch 30 includes a spring 50 which biases the trigger switch 30 towards a normally open state. This arrangement allows the trigger switch 30 to be operated easily by a user's index finger. This in turn allows the hand-held vacuum cleaner 10 to be operated with one hand.

In use, a user grips the handgrip 28 to manipulate the hand-held vacuum cleaner 10 in use. When the user squeezes the trigger switch 30, the airflow generator 36 operates. The user must maintain pressure on the trigger switch 30 in order to keep the airflow generator 36 operating. This means that the user is likely to release the trigger switch 30 when he or she does not require a cleaning action, e.g. when moving from one room to another. If the user releases the trigger switch 30, the spring 50 will bias the trigger switch 30 to the off position and operation of the airflow generator 36 will cease. This reduces unnecessary use of the airflow generator 36 and results in a saving of battery life and motor life.

When operating, the airflow generator 36 draws a flow of dirt- and dust-laden air into the suction opening 16, through the suction conduit 14 and into the cyclonic separating apparatus 18. Dirt- and dust-laden air enters the upstream cyclone 20 and larger dirt and dust particles are separated by cyclonic motion. These particles are then collected in the upstream cyclone 20.

The partially-cleaned airflow then enters the plurality of downstream cyclones 22. The downstream cyclones 22 are able to separate smaller particles of dirt and dust from the partially-cleaned airflow than the upstream cyclone 20. The cleaned air exits the cyclonic separating apparatus 16 and passes sequentially through the pre-motor filter 42,

the airflow generator 36 and the post-motor filter 44 before being exhausted from the hand-held vacuum cleaner 10 through the exhaust vents 26.

In use, a user may wish to clean a variety of surfaces which may be orientated at different angles. Therefore, a user will need to lift and move the hand-held vacuum cleaner 10 into a variety of positions and orientations in order to clean effectively. The location of the handgrip 28 between the airflow generator 36 and the power source 32 allows the hand-held vacuum cleaner 10 to be manipulated easily in use. This is because the user's hand will be located between the two heaviest components of the hand-held vacuum cleaner 10. This results in a "dumbbell-like" configuration in which the weight of the hand-held vacuum cleaner 10 is distributed on both sides of the user's hand.

The transverse arrangement of the longitudinal axis Y-Y of the suction conduit 14 with respect to the axis X-X of the handgrip 28 results in the suction conduit 12 forming a substantially straight extension of the user's forearm when the user's wrist is essentially straight. This arrangement feels comfortable for the user, especially when the hand held vacuum cleaner 10 is used for a period of time. Further, the location of the longitudinal axis Y-Y of the suction conduit 14 close to the centre of the hand-held vacuum cleaner 10 means that the longitudinal axis Y-Y of the suction conduit 14 will be coincident, or close to, the longitudinal axis of rotation of the user's forearm. This results in little or no axial displacement of the suction opening 14 when the hand-held vacuum cleaner 10 is rotated.

The invention is not limited to the features of the specific embodiment described above. Variations will be apparent to the person skilled in the art. For example, the specific locations of the airflow generator or power source may be varied. The airflow generator may lie above or below the handgrip. Additionally, the power source may lie directly adjacent the second end of the handgrip. The power source may lie above or below the handgrip. What is important is that the airflow generator lies directly adjacent a first end of the handgrip and the power source lies adjacent a second end of the handgrip.

The angular relationship between the longitudinal axis of the suction conduit and the axis of the handgrip can be varied. It is preferred that the angle between the longitudinal axis of the suction conduit and the axis of the handgrip is in the range of 80 to 90°. However, what is important is that these axes are transverse to one another such that the manipulation of the hand-held vacuum cleaner by a user feels comfortable.

A cyclonic separating unit need not be used. Other separating apparatus such as a bag-type filter could be used. Further, the hand-held vacuum cleaner need not be fitted with a rechargeable power source. Standard batteries or a power lead could be used. Further, the invention is not limited to hand-held vacuum cleaners. Other types of hand-held cleaning appliances could be used, for example, carpet shampooers, wet and dry machines or blower vacuum devices.

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THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A hand-held cleaning appliance comprising a suction conduit, an airflow generator for generating an airflow along the suction conduit, separating apparatus in communication with the suction conduit for separating dirt and dust from the airflow, a handgrip for enabling a user to manoeuvre the hand-held cleaning appliance, the handgrip having a first end, a second end and a longitudinal axis, and a power source arranged adjacent the second end of the handgrip for supplying power to the airflow generator, wherein the airflow generator is arranged directly adjacent the first end of the handgrip, the longitudinal axis passes through at least a part of the airflow generator and the handgrip lies between the airflow generator and the power source.

2. A hand-held cleaning appliance according to claim 1, wherein the power source is arranged directly adjacent the second end of the handgrip.

3. A hand-held cleaning appliance according to claims 1 or 2, wherein the longitudinal axis passes through at least a part of the power source.

4. A hand-held cleaning appliance according to any one of the preceding claims, wherein the airflow generator is arranged above the handgrip and the power source is arranged below the handgrip.

5. A hand-held cleaning appliance according to any one of the preceding claims, wherein the suction conduit has a suction opening which is located remote from the handgrip.

6. A hand-held cleaning appliance according to claim 5, wherein the separating apparatus is located between the suction opening and the handgrip.

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7. A hand-held cleaning appliance according to any one of the preceding claims, wherein a trigger switch is located on the handgrip for switching the airflow generator on or off.

8. A hand-held cleaning appliance according to claims 5 and 7, wherein the trigger switch is located on the side of the handgrip which is closest to the suction opening.

9. A hand-held cleaning appliance according to claim 7 or 8, wherein the trigger switch includes resilient means for biasing the trigger switch into an off position.

10. A hand-held cleaning appliance according to any one of the preceding claims, wherein the power source is removably attached to the second end of the handgrip.

11. A hand-held cleaning appliance according to any one of the preceding claims, wherein the separating apparatus comprises a cyclonic separator.

12. A hand-held cleaning appliance according to any one of the preceding claims, wherein the hand-held cleaning appliance is a hand-held vacuum cleaner.

13. A hand-held cleaning applicance substantially as herein described with reference to any one of the embodiments of the invention illustrated in the accompanying drawings and/or examples.

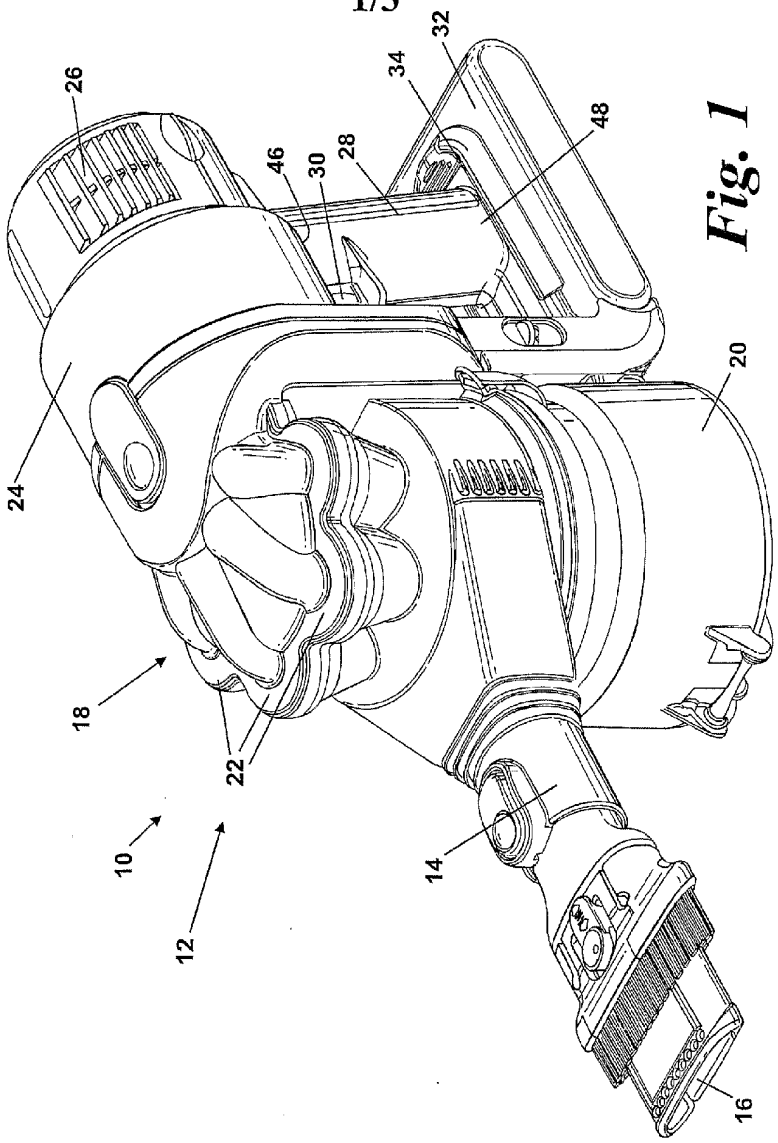

Fig. 1

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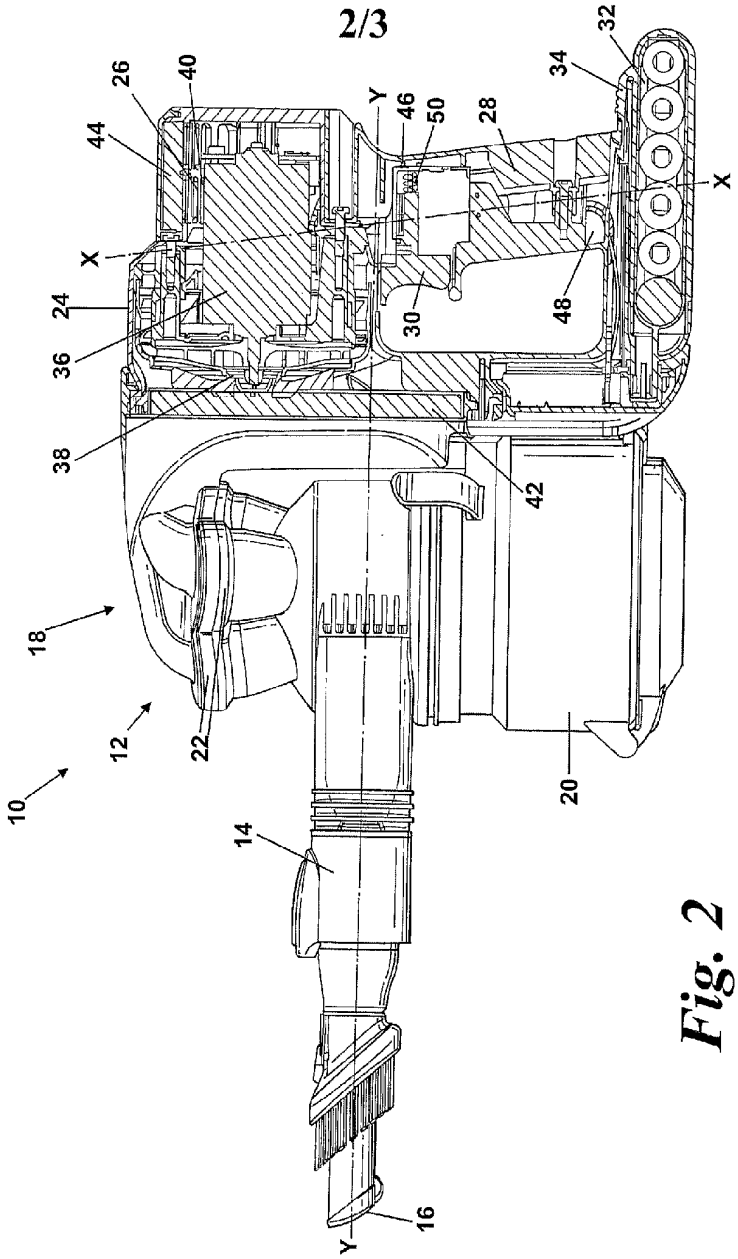

Fig. 2

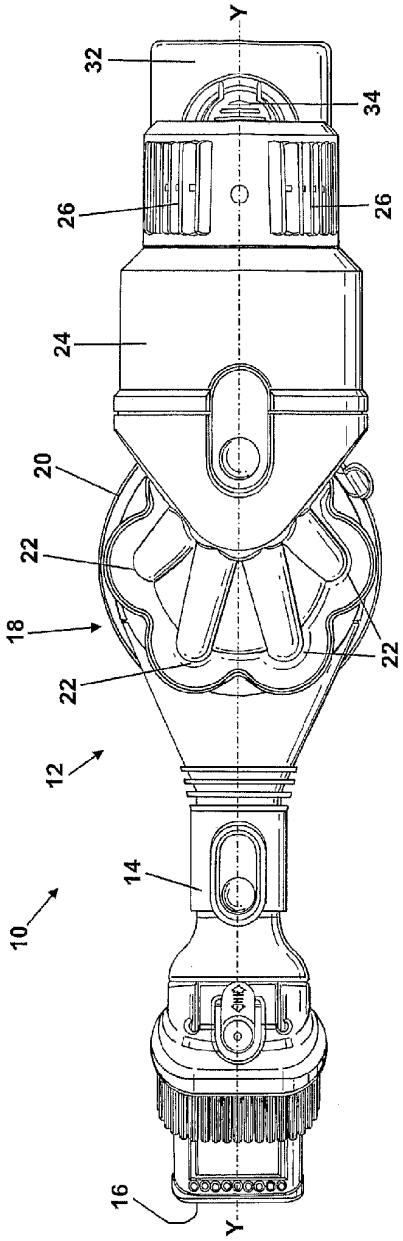

Fig. 3