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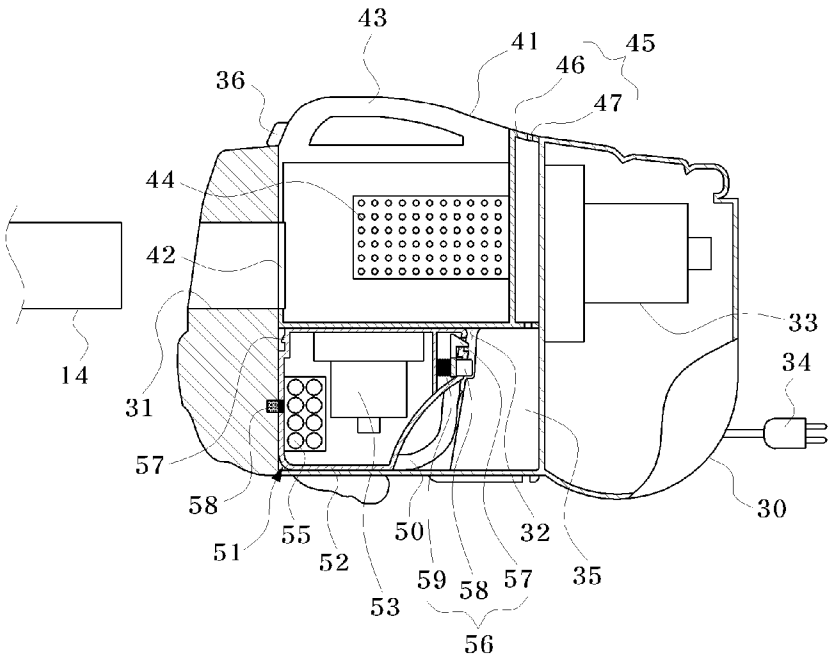
(54) **Title:** VACUUM CLEANER



(57) **Abstract:** A vacuum cleaner includes a dust container detachably mounted in a body of the vacuum cleaner and configured to perform vacuum cleaning via air suction even in a detached state. The vacuum cleaner includes the body having a hose attaching part and an accommodation recess, the dust container separably inserted into the accommodation recess, and including a hose mounting port, a filter, a knob, and a coupling part formed near the filter on an outer surface of the dust container, a main motor received near the filter of the dust container in the body and driven to suck air, a power supply device to supply power to drive the main motor, and an assistant driving unit separably inserted into the accommodation recess, and including a fastening part releasably coupled to the coupling part and an assistant motor received in the assistant driving unit to suck air.

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Description

VACUUM CLEANER

Technical Field

[1] The present disclosure relates to a vacuum cleaner, and more particularly to a vacuum cleaner that includes a detachable hand-held configuration.

[2]

Background Art

[3] According to shapes and usage postures, vacuum cleaners can be generally classified into a canister type vacuum cleaner, which provides convenience in corner cleaning and movement while allowing easy replacement of a brush or a nozzle, and an upright type vacuum cleaner, which provides convenience in storage and allows easy cleaning of a large space.

[4] Fig. 1 is a perspective view illustrating an exemplary vacuum cleaner. Referring to Fig. 1, the exemplary vacuum cleaner generally includes a suction unit 11 which will be brought into close contact with a floor, a pipe 12 connected to the suction unit 11 and having a predetermined length, a handle 13 connected to the pipe 12, a hose 14 connected to the handle 13, and a body 20 connected to the handle 14. The suction unit 11 is provided at a lower surface with wheels to suck up foreign matter such as dust and dirt while moving on the floor, and the pipe 12 and the handle 13 are used to move the suction unit 11 to desired locations. The pipe 12 and the hose 14 serve to guide air containing the foreign matter into the body 20, which in turn sucks the air containing the foreign matter and collects the foreign matter while discharging filtered air to an outside of the body 20.

[5] Fig. 2 is a schematic cross-sectional view of the body shown in Fig. 1. Referring to Fig. 2, the body 20 is provided at a front side with a hose attaching part 21 to which the hose 14 is coupled. The body 20 has a dust collection unit 22 positioned in a central region and connected to the hose attaching part 21. Specifically, the dust collection unit 22 includes a dust container 24 that is inserted into an accommodation recess 23 defined in the central region of the body 20 and has a filter 25 to filter foreign matter. The dust container 24 is provided at an upper side with a knob 26 and is separated from the accommodation recess 23 by a separation button 27 formed on the knob 26. A motor 28 is disposed adjacent the insertion groove 23 inside the body 20 and driven by power supplied via a power supply device 29.

[6] When the motor 28 is driven by power, air containing foreign matter is drawn into the dust container 24 and passes through the filter 25 in the dust container 24, so that the foreign matter is filtered by the filter 25 and collected in the container 24 while

filtered air is discharged outside the vacuum cleaner. Then, when filled with the foreign matter, the dust container 24 is separated from the insertion groove 24 by pushing the separation button 27, and opened to remove the foreign matter by means of a separate button.

[7]

Disclosure of Invention

Technical Problem

[8] Since such a vacuum container has the motor installed inside the body, it is necessary to move the body when performing the vacuum operation at several locations on the floor. Therefore, the exemplary vacuum cleaner has problems in that the overall body must be moved even for corner vacuuming or partial vacuuming, and in that, in the case where a power cable has a short length, it must be plugged again in a wall socket near a vacuuming location.

[9]

Technical Solution

[10] An aspect of the invention provides a vacuum cleaner comprising: a main body; a first motor housed in the main body; a dust container releasably engaged with the main body, wherein when engaged, the dust container and the main body form a first vacuum cleaner using the first motor and the dust container; a hand-held module releasably engaged with the main body; a second motor housed in the hand-held module; wherein the hand-held module and the dust container are configured to be coupled with each other to form a second vacuum cleaner using the dust container and the second motor, wherein when the dust container is engaged with the main body, the dust container is not operably coupled with the hand-held module.

[11] In the foregoing vacuum cleaner, the dust container may comprise an air inlet port and an air outlet port, wherein the air outlet port may be configured to be connected to both the main body and the hand-held module, wherein the air outlet port may be in fluid communication with the main body when the dust container is engaged with the main body. The air outlet port may not be in fluid communication with the hand-held module when the dust container is engaged with the main body. The hand-held module may comprise an air inlet port configured to be coupled with the air outlet port of the dust container, wherein the air inlet port of the hand-held module and the outlet port of the dust container may face different directions when the dust container is engaged with the main body.

[12] Another aspect of the invention provides a method of using a vacuum cleaner, comprising: providing the foregoing vacuum cleaner, wherein the hand-held module and the dust container are engaged with the main body; disengaging the dust container

from the main body; disengaging the hand-held module from the main body; and coupling the hand-held module and the dust container to form the second vacuum cleaner. The hand-held module may be disengaged from the main body after coupling the hand-held module and the dust container.

[13] Yet another aspect of the invention provides a vacuum cleaner, comprising: a body comprising a hose attaching part and an accommodation recess; a dust container separably inserted into the accommodation recess, the dust container comprising a hose mounting port for coupling with a hose, a filter to filter foreign matter, a handle, and a coupling part formed near the filter on an outer surface of the dust container; a main motor housed in the body; a power supply to supply power to drive the main motor; and an assistant driving unit separably inserted into the accommodation recess, the assistant driving unit comprising a fastening part configured to be releasably coupled to the coupling part and an assistant motor housed in the assistant driving unit.

[14] In the foregoing vacuum cleaner, the assistant driving unit may comprise an assistant case comprising the fastening part, the assistant motor housed in the assistant case near the dust container, and an assistant power source connected to the assistant motor to supply power thereto. When the assistant case is inserted in the accommodation recess, the fastening part may be located such that, as the coupling part of the dust container is inserted downward into the accommodation recess, the coupling part is coupled to the fastening part. The coupling part may comprise a coupling hole formed in an extension part extending from upper and lower sides of a rear surface of the dust container, and the fastening part may comprise at least one latch protrusion formed on an outer peripheral surface of the assistant case configured to be inserted into the coupling hole. The at least one latch protrusion may comprise a plurality of latch protrusions, one of which is integrally formed with a button protruding from the outer peripheral surface of the assistant case, the button being supported by an elastic member received in the assistant case. The assistant case may comprise an assistant handle. The main body may comprise a guide rib in the accommodating recess to guide the assistant case as the assistant case is inserted in the accommodation recess. The assistant power source may comprise a power cable and a plug. The assistant power source may comprise a rechargeable battery. The battery may be housed in the assistant case and configured to be charged via the power supply.

[15] A further aspect of the present invention provides a vacuum cleaner that includes a dust container detachably mounted in a body of the vacuum cleaner and configured to perform vacuum cleaning via air suction even in a detached state, so that a user can perform vacuum cleaning even in a place that a power source is not provided, while carrying the detached dust container.

[16] In accordance with one aspect of the present invention, a vacuum cleaner is provided,

which comprises: a body having a hose attaching part and an accommodation recess; a dust container separably inserted into the accommodation recess, and including a hose mounting port for coupling with the hose, a filter to filter foreign matter, a knob, and a coupling part formed near the filter on an outer surface of the dust container; a main motor received near the filter of the dust container in the body and driven to suck air; a power supply device to supply power to drive the main motor; and an assistant driving unit separably inserted into the accommodation recess, and including a fastening part releasably coupled to the coupling part and an assistant motor received in the assistant driving unit to suck air.

[17] The assistant driving unit may comprise an assistant case having the fastening part; the assistant motor received in the assistant case near the dust container to suck air; and an assistant power source connected to the assistant motor to supply power thereto. The fastening part may be formed on the top of the assistant case inserted into the accommodation recess such that, as the coupling part of the dust container is inserted downward into the accommodation recess, the coupling part is coupled to the fastening part. The coupling part may comprise a coupling hole formed in an extension part extending from upper and lower sides of a rear surface of the dust container, and the fastening part may comprise at least one latch protrusion formed on an outer peripheral surface of the assistant case to be inserted into the coupling hole. The at least one latch protrusion may comprise a plurality of latch protrusions, one of which is integrally formed with a button protruding from the outer peripheral surface of the assistant case, and the button is supported by an elastic member received in the assistant case. The assistant case may be provided with an assistant knob. The accommodation recess may be provided with a guide rib to guide the assistant case. The assistant power source may be a rechargeable battery or a power cable to be plugged into a wall socket. The battery may be received in the assistant case and charged by the power supply device connected to the battery.

[18]

Advantageous Effects

[19] The dust container of the vacuum cleaner according to the present invention enables vacuum cleaning not only in a state of being mounted in the body, but also in a state of being detached therefrom. In addition, the dust container of the vacuum cleaner enables vacuum cleaning by using a battery where a wall socket is not provided, thereby overcoming restriction by location. Accordingly, the vacuum cleaner according to the present invention can eliminate needs of separately buying a larger vacuum cleaner and a smaller vacuum cleaner, thereby being more economical for consumers.

[20]

Brief Description of the Drawings

[21] These and other aspects and features of the present invention will be more clearly understood from the following detailed description taken in conjunction with the accompanying drawings, in which:

[22] Fig. 1 is a perspective view of an exemplary vacuum cleaner;

[23] Fig. 2 is a schematic cross-sectional view of a body of the exemplary vacuum cleaner shown in Fig. 1;

[24] Fig. 3 is a schematic cross-sectional view illustrating the inner construction of a vacuum cleaner according to one embodiment of the present invention;

[25] Fig. 4 is a view illustrating a dust container and an assistant driving unit of Fig. 3 in a state of being coupled to each other;

[26] Fig. 5 is a cross-sectional view illustrating the dust container and the assistant driving unit of Fig. 3 in a coupled state, wherein the dust container can be self-operated; and

[27] Fig. 6 is a side view illustrating the dust container and the assistant driving unit having a power cable used as an assistant power source of the vacuum cleaner according to one embodiment of the present invention.

[28]

Best Mode for Carrying Out the Invention

[29] Exemplary embodiments of the present invention will be described in detail with reference to the accompanying drawings.

[30] For convenience of description, the drawings are not to precise scale and may be exaggerated in thickness of lines or size of components for descriptive convenience and clarity only. Furthermore, terms used herein and defined by taking functions of the apparatus according to embodiments of the present invention into account and can be changed according to the custom or intention of users or operators. Therefore, definition of such terms should be made according to overall disclosures herein.

[31] Fig. 3 is a schematic cross-sectional view illustrating the inner construction of a vacuum cleaner according to one embodiment of the present invention, Fig. 4 is a view illustrating a dust container and an assistant driving unit of Fig. 3 in a state of being coupled to each other, Fig. 5 is a cross-sectional view illustrating the dust container and the assistant driving unit of Fig. 3 in a coupled state, wherein the dust container can be self-operated, and Fig. 6 is a side view illustrating the dust container and the assistant driving unit having a power cable used as an assistant power source of the vacuum cleaner according to one embodiment of the present invention.

[32] Although not shown in the drawings, the vacuum cleaner according to an embodiment of the invention comprises a suction unit, a pipe, and a handle, which are

assembled in sequence and connected to a hose 14. The vacuum cleaner comprises a body 30 that is formed at a front side with a hose attaching part 31 for coupling with the hose 14 and has an accommodation recess 32 opened at a portion.

[33] A dust container 41 is separably coupled to the body 30 by inserting the dust container 41 into the accommodation recess 32. The dust container 41 is formed at the front side with a hose mounting port 42 that corresponds to the hose attaching part 31 and is coupled to the hose 14. Here, as in the exemplary vacuum cleaner shown in the drawings, the hose 14 may be a nozzle, which is connected to any one of the suction unit, the pipe and the handle, or used for a general handy cleaner. The dust container 41 is provided at an upper side with a knob 43, with which a user can carry the dust container 41. When the dust container 41 is coupled to the body 30, the user can lift the body 30 with the knob 43. The dust container 41 has a filter 44 received inside the rear surface thereof to filter foreign matter, and a coupling part 45 formed near the filter 44 on an outer surface of the dust container 41.

[34] A main motor 33 is installed near the filter 44 of the dust container 41 in the body 30 and operated for air suction. The body 30 is provided with a power supply device unit 34. The power supply device unit 34 is electrically connected to the main motor 33 and plugged into a wall socket to supply power to the main motor 33 when driving the main motor 33.

[35] Here, the vacuum cleaner according to an embodiment of the present invention comprises an assistant driving unit 51 that is separably inserted into the accommodation recess 32 of the body 30. The assistant driving unit 51 is positioned at a lower portion in the accommodation recess 32 and the dust container 41 is laid on the top of the assistant driving unit 51. In this way, since the dust container 41 and the assistant driving unit 51 are separated from the body 30 and coupled to each other, it is possible to perform vacuum cleaning using an assembly of the dust container 41 and the assistant driving unit 51 via air suction. The assistant driving unit 51 comprises an assistant case 52, an assistant motor 53, and an assistant power source 54 or 55. The assistant case 52 comprises a fastening part 56 coupled to one side of the dust container 41 near the filter 44.

[36] The assistant motor 53 is received in the assistant case 52 to be positioned near the dust container 41 and is operated for air suction. The assistant power source 54 or 55 is electrically connected to the assistant motor 53 and supplies power thereto when driving the assistant motor 53.

[37] Here, the fastening part 56 is positioned on the top of the assistant case 52 inserted into the accommodation recess 32 such that, as the coupling part 45 of the dust container 41 is inserted downward into the accommodation recess 32, the coupling part 45 is coupled to the fastening part 56. More specifically, the fastening part 56 can be

coupled to or released from the coupling part 45, and is provided on the top of the assistant driving unit 51 inserted into the accommodation recess 32 such that, when the assistant driving unit 51 is inserted into the accommodation recess 32, the coupling part 45 of the dust container 41 is coupled to the fastening part 56 of the assistant driving unit 51.

[38] Here, when the coupling part 45 is coupled to the fastening part 56, it is desirable that the filter 44 be located near the assistant motor 53. For this purpose, the fastening part 56 is preferably located on the assistant case 51, which is positioned near the assistant motor 53. As one example of such coupling configurations of the dust container 41 and the assistant driving unit 51, the coupling part 45 comprises an extension part 46 extending from upper and lower sides of the rear surface of the dust container 41 and a coupling hole 47 formed in the extension part 46.

[39] Additionally, the assistant case 52 has such a height to allow the assistant case 52 to be inserted into the coupling part 45, and the fastening part 56 has latch protrusions 57, which are formed on an outer peripheral surface of the assistant case 52 and inserted into the coupling hole 47. Here, one of the protrusions 57 is integrally formed with a button 58 protruding from the outer peripheral surface of the assistant case 52, and the button 58 is supported by an elastic member 59 received in the assistant case 52. The assistant case 52 is provided with an assistant knob 50, so that the center of mass of the assembly of the dust container 41 and assistant driving unit 51 is directed forward. In addition, the accommodation recess 32 may be provided with a guide rib 35 to guide the assistant case 52.

[40] The assistant power source 54, 55 may be a rechargeable battery 55 or a power cable 54 having a predetermined length and configured to be plugged into a wall socket. The battery 55 may be received in the assistant case 52. Here, if the assistant power source is the battery 55, the accommodation recess 32 and the assistant case 52 are provided with ground terminals 55a to contact each other, and such ground terminals 55a are connected to the power supply device 34 to charge the battery 55.

[41] Operation of the vacuum cleaner according to the embodiment of the present invention having such a configuration as described above will be described. First, by pushing an operation button with the power supply device 34 plugged into a wall socket, the main motor 33 is driven to force air containing foreign matter to be drawn into the dust container 41 through the hose 14, and air filtered through the filter 44 is discharged to the outside.

[42] Further, to use the dust container 41 as a handy cleaner by detaching the dust container 41 from the body 30, the dust container 41 is separated from the accommodation recess 32 of the body 30 by means of the separation button 36.

[43] After detaching the dust container 41 from the body 30, by bringing the coupling part

45 of the dust container 41 into contact with the fastening part 56 in a state of the coupling part facing downward, as shown in Fig. 4, the latch protrusion 57 is inserted into the coupling hole 47 of the extension part 46, so that the dust container 41 is coupled to the assistant driving unit 51. In this state, when pulling the dust container 41 out of the accommodation recess 32, the dust container 41 and assistant driving unit 51 remain in an integrated state, and the hose 14 or the assistant nozzle 15 is mounted to the hose mounting port 42 of the dust container 41.

[44] Then, when a user pushes a switch 51a of the assistant driving unit 51, power is supplied to the assistant motor 53 via the assistant power source 54 or 55, and the assistant motor 53 is then driven to perform air suction. Therefore, the user can perform vacuum cleaning while moving the dust container 41 by gripping the knob 43 of the dust container 41. At this time, if the power cable 54 is used as the assistant power source, it is plugged into the wall socket to supply power to the assistant motor. If the battery 55 is used as the assistant power source, the battery 55 is charged through the ground terminals 55a via the power supply device 34 and supplies power to the assistant motor 53 in response to a signal from the switch 51a.

[45] The aforementioned assembly of the dust container 41 and assistant driving unit 51 can have the center of mass leaning towards the rear of the assembly due to the weight of the assistant motor 53 or the battery 55 received inside the assistant driving unit 51. If the center of mass is located at the rear of the assembly, it is difficult for the user to hold the knob 43 such that the assistant hose 14 or the assistant nozzle 15 can be brought into close contact with a floor during vacuum cleaning. According to the embodiment, however, an assistant knob 50 is formed at a rear upper side of the assistant case 52 and allows the center of mass of the assembly to be located at the front when the user holds the assistant knob 50, enabling easy vacuum cleaning.

[46] After completing the vacuum cleaning with the assembly of the dust container 41 and assistant driving unit 51, the button 58 of the assistant driving unit 51 is pushed to compress the elastic member 59, and, the latch protrusion 57 is then released from the coupling hole 47 of the extension part 46. In this way, the dust container 41 is separable from the assistant driving unit 51.

[47] Next, the assistant driving unit 51 is inserted into the accommodation recess 32 such that the fastening part 56 is located at an upper side, so the assistant driving unit 51 can be stably seated at the lower portion of the accommodation recess 32 along the guide rib 35. Then, the dust container 41 is inserted into the accommodation recess 32 and located on the assistant driving unit 51.

[48] In the vacuum cleaner of the embodiment, the filter 44 is disposed at one side of the dust container 41 in a close contact state, and the main motor 33 or the assistant motor 53 is installed to closely contact the filter 44. Here, in order to ensure air flow in the

vacuum cleaner, a plurality of perforations (not shown) are formed in portions of the dust container 41 and the assistant case 52 which closely contact the filter 44.

[49] Although embodiments of the present invention has been described with reference to the drawings, it should be understood that these embodiments are provided for illustrative purposes and that various equivalent modifications and other embodiments will be apparent to those skilled in the art without departing from the scope of this invention. Therefore, the scope and spirit of the invention is limited only by the claims set forth herein as follows.

Claims

[1] A vacuum cleaner comprising:
a main body;
a first motor housed in the main body;
a dust container releasably engaged with the main body, wherein when engaged, the dust container and the main body form a first vacuum cleaner using the first motor and the dust container;
a hand-held module releasably engaged with the main body;
a second motor housed in the hand-held module;
wherein the hand-held module and the dust container are configured to be coupled with each other to form a second vacuum cleaner using the dust container and the second motor, wherein when the dust container is engaged with the main body, the dust container is not operably coupled with the hand-held module.

[2] The vacuum cleaner of Claim 1, wherein the dust container comprising an air inlet port and an air outlet port, wherein the air outlet port is configured to be connected to both the main body and the hand-held module, wherein the air outlet port is in fluid communication with the main body when the dust container is engaged with the main body.

[3] The vacuum cleaner of Claim 2, wherein the air outlet port is not in fluid communication with the hand-held module when the dust container is engaged with the main body.

[4] The vacuum cleaner of Claim 2, wherein the hand-held module comprises an air inlet port configured to be coupled with the air outlet port of the dust container, wherein the air inlet port of the hand-held module and the outlet port of the dust container faces different directions when the dust container is engaged with the main body.

[5] A method of using a vacuum cleaner, comprising:
providing the vacuum cleaner of Claim 1, wherein the hand-held module and the dust container are engaged with the main body;
disengaging the dust container from the main body;
disengaging the hand-held module from the main body; and
coupling the hand-held module and the dust container to form the second vacuum cleaner.

[6] The method of Claim 5, wherein the hand-held module is disengaged from the main body after coupling the hand-held module and the dust container.

[7] A vacuum cleaner, comprising:

a body comprising a hose attaching part and an accommodation recess;
a dust container separably inserted into the accommodation recess, the dust container comprising a hose mounting port for coupling with a hose, a filter to filter foreign matter, a handle, and a coupling part formed near the filter on an outer surface of the dust container;
a main motor housed in the body;
a power supply to supply power to drive the main motor; and
an assistant driving unit separably inserted into the accommodation recess, the assistant driving unit comprising a fastening part configured to be releasably coupled to the coupling part and an assistant motor housed in the assistant driving unit.

[8] The vacuum cleaner according to Claim 7, wherein the assistant driving unit comprises:
an assistant case comprising the fastening part;
the assistant motor housed in the assistant case near the dust container; and
an assistant power source connected to the assistant motor to supply power thereto.

[9] The vacuum cleaner according to Claim 8, wherein when the assistant case is inserted in the accommodation recess, the fastening part is located such that, as the coupling part of the dust container is inserted downward into the accommodation recess, the coupling part is coupled to the fastening part.

[10] The vacuum cleaner according to Claim 8, wherein the coupling part comprises a coupling hole formed in an extension part extending from upper and lower sides of a rear surface of the dust container, and the fastening part comprises at least one latch protrusion formed on an outer peripheral surface of the assistant case configured to be inserted into the coupling hole.

[11] The vacuum cleaner according to Claim 10, wherein the at least one latch protrusion comprises a plurality of latch protrusions, one of which is integrally formed with a button protruding from the outer peripheral surface of the assistant case, the button being supported by an elastic member received in the assistant case.

[12] The vacuum cleaner according to Claim 8, wherein the assistant case comprises an assistant handle.

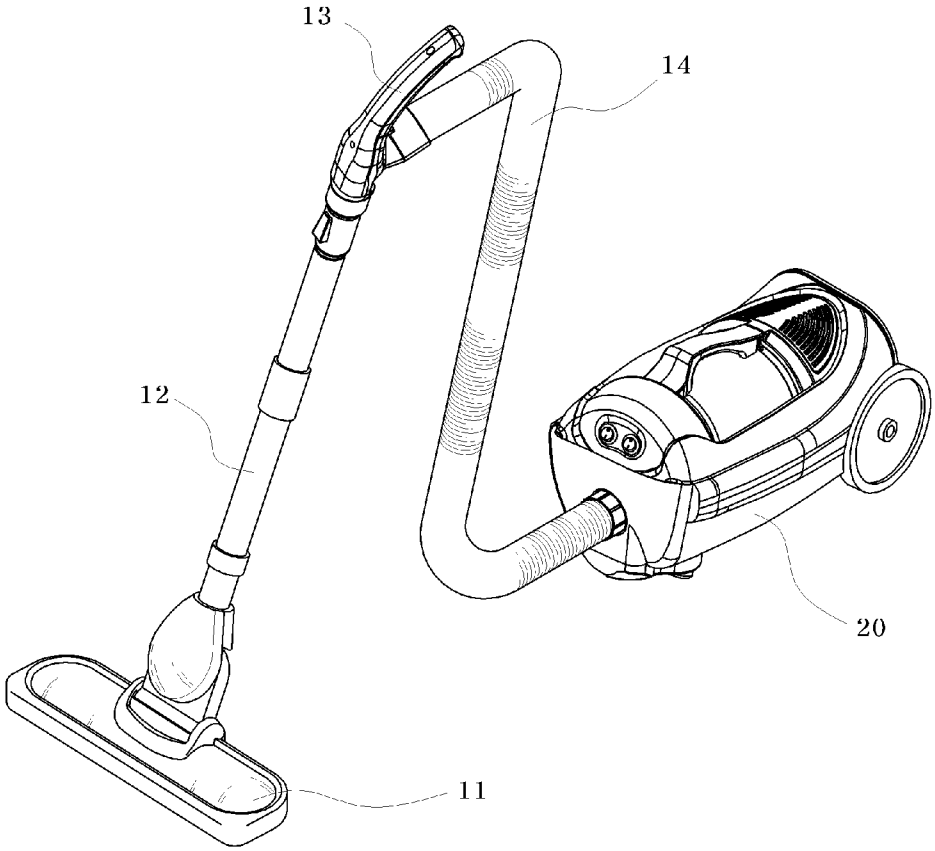
[13] The vacuum cleaner according to Claim 8, wherein the main body comprises a guide rib in the accommodating recess to guide the assistant case as the assistant case is inserted in the accommodation recess.

[14] The vacuum cleaner according to Claim 8, wherein the assistant power source comprises a power cable and a plug.

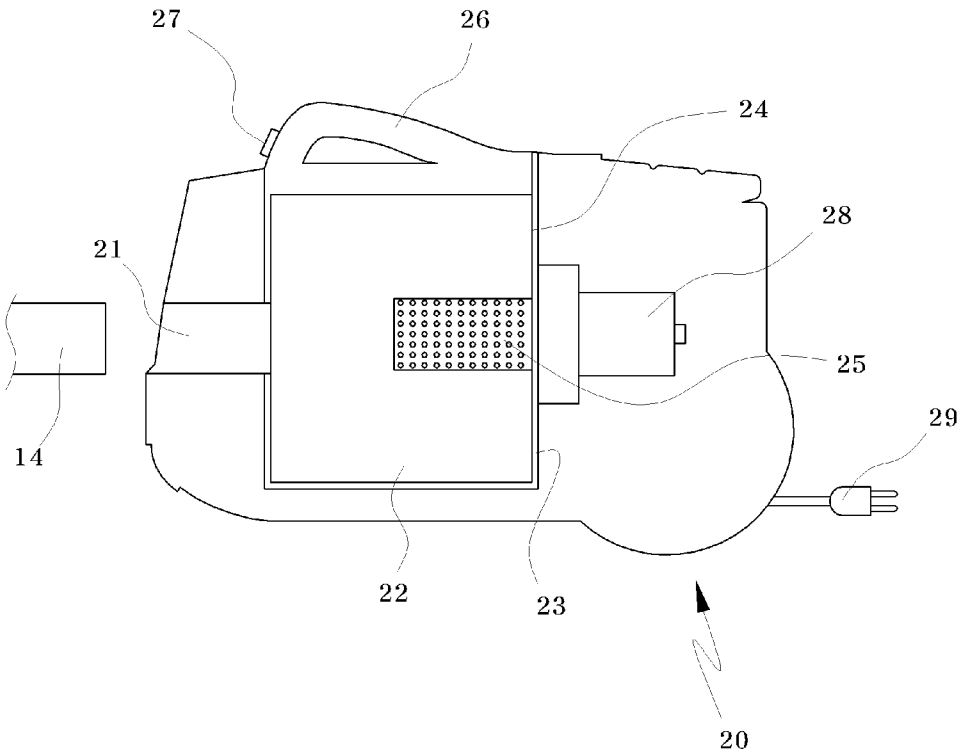
[15] The vacuum cleaner according to Claim 8, wherein the assistant power source comprises a rechargeable battery.

[16] The vacuum cleaner according to Claim 15, wherein the battery is housed in the assistant case and configured to be charged via the power supply.

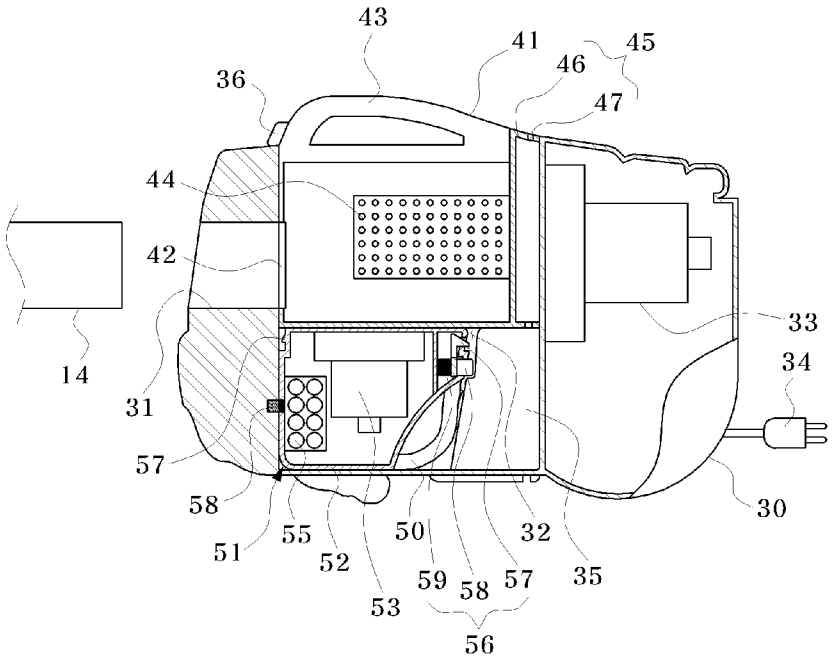
[Fig. 1]



[Fig. 2]



[Fig. 3]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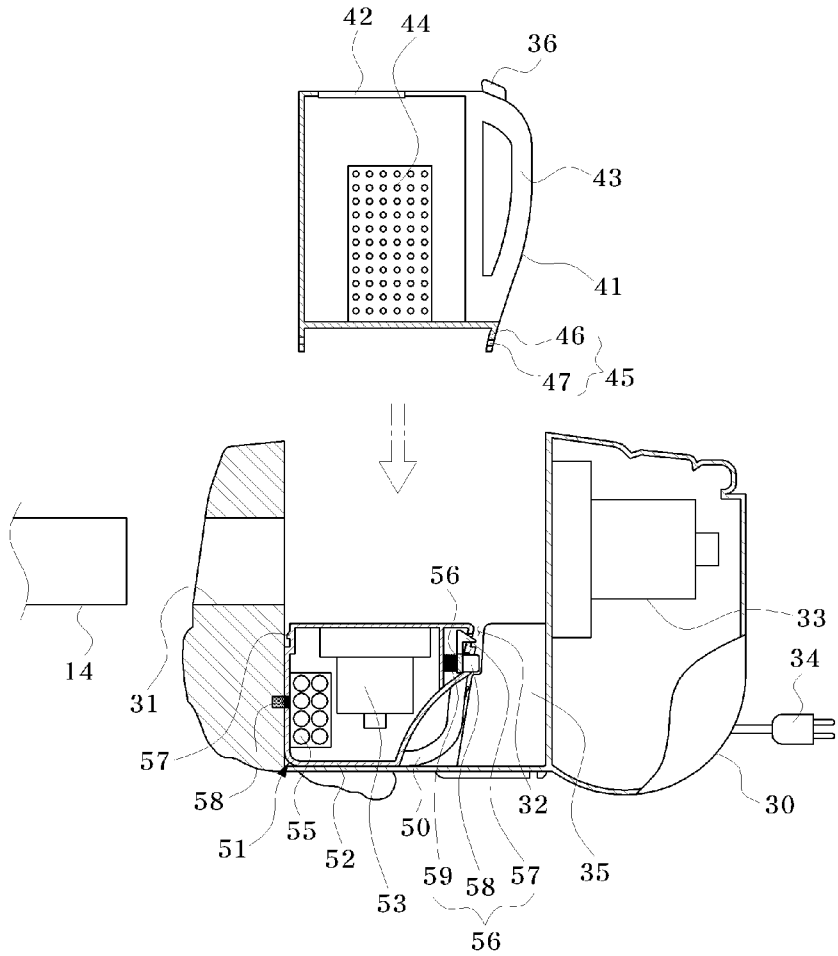
[Fig. 4]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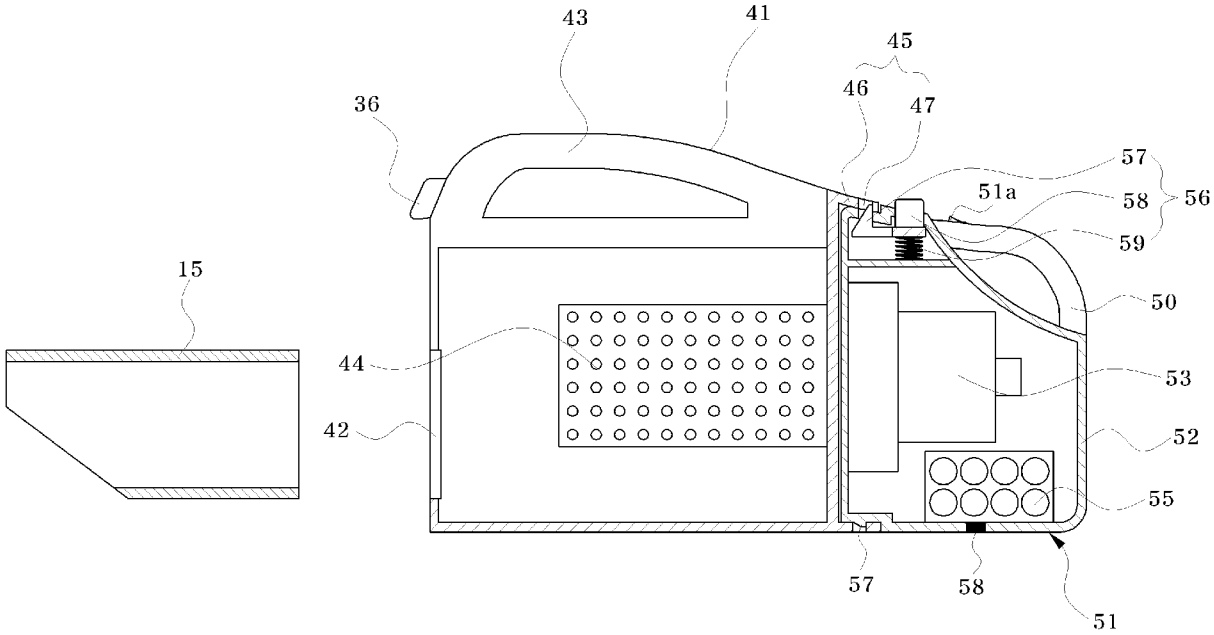
[Fig. 5]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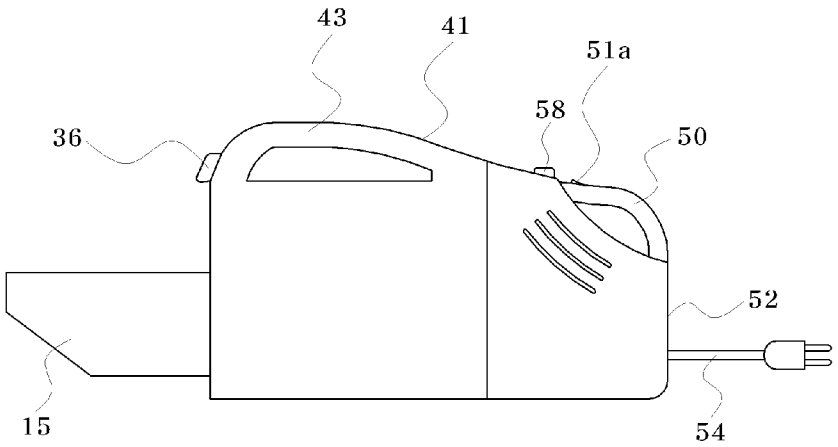
[Fig. 6]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INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2007/001986

A. CLASSIFICATION OF SUBJECT MATTER

A47L 9/10(2006.01)i

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)

IPC8 : A47L 05/28, 09/23, 09/24

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

Korean Utility models and applications for Utility models since 1975

Japanese Utility models and application for Utility models since 1975

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

eKIPASS (KIPO internal) & keyword: "cleaner", "hand", "handy"

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	KR 10-1998-0017824 A (DAEWOO ELECTRONICS CO., LTD.) 05 JUN 1998 See page 2 line 48 - page 3 line 37	1 - 16
A	JP 2005-160658 A (SANYO ELECTRIC CO., LTD.) 23 JUL 2005 SEE page 3 paragraphs 25 - page 8 paragraphs 71	1 - 16
A	JP 11009512 A (SANYO ELECTRIC CO., LTD.) 19 JAN 1999 SEE page 2 paragraphs 12 - page 4 paragraphs 34	1 - 16

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
25 JULY 2007 (25.07.2007)	**25 JULY 2007 (25.07.2007)**

Name and mailing address of the ISA/KR

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/KR2007/001986

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
KR 10-1998-0017824 A	05-06-1998	KR100199931B1	15.06.1999
JP 2005-160658 A	23-07-2005	None	-
JP 11009512 A	19-01-1999	JP3649863B2	18.05.2005