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(54) **Title**: Water Filtration Widget

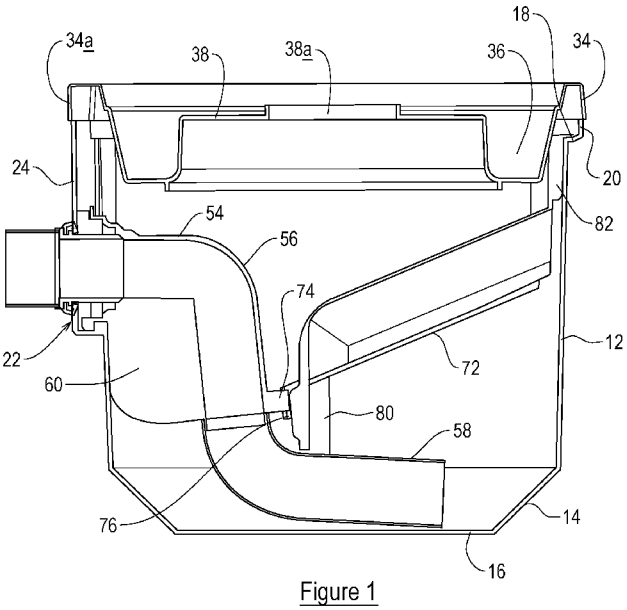

Figure 1

(57) **Abstract**: A method of converting a suction cleaner for water filtration, the cleaner comprising: a container (10) for separated dust, able to retain liquid in a lowermost part thereof, a source of suction communicating with the container (10) for drawing air from the interior thereof at an upper part of the container (10), and an inlet (22) for suction airflow into the container (10) at a position spaced above the lowermost part of the container (10), the method comprising: providing, within the container (10), an airflow-directing member (50), affording a passage extending downwardly from the inlet (22) to the lowermost part of the container (10) to discharge incoming air in the lowermost part, the airflow directing member (50) comprising a first (54), a second (56) and a third (58) portion, arranging the first portion (54) so that it extends generally horizontally from the inlet (22) and the second portion (56) so that it extends downwardly from the first portion (54), and the third portion (58) so that it extends generally horizontally from the second portion (56) and configured so that the third portion (58) ends at a position which, in plan view, is remote from the inlet (22), and arranging, within the container (10), a baffle member (70) adapted to extend over the outlet of the directing member (50) at a position spaced above the lowermost part of the container, the baffle member (70) being inclined downwardly in the direction of the inlet (22).

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Title: Water Filtration Widget

Description of Invention

This invention relates generally to suction cleaners (vacuum cleaners). More particularly, the invention relates to a means by which dust, entrained in the suction airflow drawn by the suction cleaner from whatever is being cleaned, is separated from the suction airflow and retained by the vacuum cleaner for disposal.

It is to be appreciated that when we refer herein to "dust" it is used as a general term to cover all the matter that a suction cleaner might be used to collect, rather than as a literal term referring solely to household or other dust. In the domestic environment, the matter sucked up by a suction cleaner may include hairs, textile fibres, food particles, and items, particles or debris of organic or inorganic material which might range in size from microns to millimetres or even tens of millimetres.

For many years the most common method by which entrained dust has been separated from the suction airflow of a cleaner has been by a filtration process, i.e. passing the airflow through a filter element which will not pass, and therefore traps, particles greater than a certain size. The filtration may be effected by a dust-collection bag, having porous walls which trap the dust but allow air to flow therethrough. The interior of the bag is in fluid communication with an inlet and the bag is disposed in a chamber or compartment from which an electric motor-driven fan causes a stream of dust-laden air to be delivered to the inlet and, after passing through the bag, to be discharged to the ambient atmosphere (in most cases after further filtration. The inlet communicates with a cleaning head part of the cleaner, in the case of an "upright" cleaner, or a suction hose, in the case of a "cylinder" cleaner, which can be directed to an area requiring cleaning.

The filtration principle for dust removal has also been utilised in cleaners of the tank or canister type, wherein an inlet hose communicates with a chamber from which air is drawn through a filter element provided at an exit from the chamber. Usually such an exit is provided at an upper part of the chamber. Separated dust simply falls from the filter element into the chamber to await disposal.

More recently suction cleaners have utilised the so-called "cyclonic" principle of separating dust from the airflow. In this, dust separation is effected by the rapid swirling motion of airflow in one or more cyclone devices. A number of cyclone devices may be arranged to have the suction airflow passed successively through a first cyclone device or devices of relatively large size to remove large dust particles from the airflow, followed by a number of cyclone devices of smaller size to remove smaller dust particles from the airflow.

Yet a further technique for removing dust from the suction airflow is water filtration, wherein the suction airflow is caused to pass through a bath of water which may contain additives. Such water filtration is effective, but not commonly utilised; water contaminated with separated dust particles has to be emptied at intervals and replaced by clean water.

Nevertheless, water filtration is effective and is popular in some countries. The present invention is concerned with providing for water filtration in a cleaner which is of the tank or canister type, wherein the container in which separated dust is collected is suitable for containing a quantity of water for water filtration.

The object of providing a dry suction cleaner with equipment to enable water filtration poses difficulties to designers. Many suction cleaners cool their respective suction motors by passing air over the motor once dirt has been filtered from the dirt-laden air sucked into the cleaner. However, if the cleaner

is sucking in water and/or moisture-laden air, that air stream may be unsuitable to be passed over the motor. In particular, it is important to ensure that water does not pass from the chamber in which the water filtering takes place, through to the suction source. Furthermore, since the body of the cleaner will contain a volume of water, which may slosh around during use of the cleaner, the components held within that body must be structurally secure so that they are not easily dislodged during use.

Furthermore, if the cleaner is to be used in two different configurations – one in which the cleaner acts as a 'dry' suction cleaner, and one in which it acts as a 'wet' water filtration cleaner – the removable components must be simple to insert, assemble, and remove.

According to one aspect of the invention, we provide a method of converting a suction cleaner for water filtration, the cleaner comprising:

a container for separated dust, able to retain liquid in a lowermost part thereof,

a source of suction communicating with the container for drawing air from the interior thereof at an upper part of the container, and

an inlet for suction airflow into the container at a position spaced above the lowermost part of the container,

the method comprising:

providing, within the container, an airflow-directing member, affording a passage extending downwardly from the inlet to the lowermost part of the container to discharge incoming air in the lowermost part, the airflow directing member comprising a first, a second and a third portion,

arranging the first portion so that it extends generally horizontally from the inlet, the second portion so that it extends downwardly from the first portion, and the third portion so that it extends generally horizontally from the second portion and configured so that the third portion ends at a position which, in plan view, is remote from the inlet, and

arranging, within the container, a baffle member adapted to extend over the outlet of the directing member at a position spaced above the lowermost part of the container, the baffle member being inclined downwardly in the direction of the inlet.

According to another aspect of the invention, we provide a kit of parts for converting a suction cleaner for water filtration, the cleaner comprising:

a container for separated dust, able to retain liquid in a lowermost part thereof,

a source of suction communicating with the container for drawing air from the interior thereof at an upper part of the container, and

an inlet for suction airflow into the container at a position spaced above the lowermost part of the container,

the kit of parts comprising:

an airflow directing member affording a passage extending downwardly from the inlet to the lowermost part of the container, for discharging incoming air in the lowermost part of the container, the airflow directing member comprising:

a first portion extending generally horizontally from the inlet,

a second portion extending downwardly from the first portion, and

a third portion extending generally horizontally from the second portion and configured so that the third portion ends at a position which, in plan view, is remote from the inlet; and

a baffle member adapted to fit in the container and extend over the outlet of the directing member at a position spaced above the lowermost part of the container, the baffle member being inclined downwardly in the direction of the inlet.

As set out above, the passage afforded by the directing member may comprise at least one, and preferably each, of a first portion extending generally horizontally from the inlet; a second portion extending downwardly from the first portion, and a third portion extending generally horizontally from the second portion. The third portion may end at a position within the container remote from the inlet. In the case of a container which is generally cylindrical with its axis upright, the third passage portion may end generally diametrically opposite the inlet, in plan view.

The baffle member may, in the case of a cylindrical container as aforesaid extend across a generally semi-circular part of the container in which the end of the third passage portion lies. Of course, the general layout of the baffle member (extending across the end of the third portion of the passage) also applies when the container is not generally cylindrical.

Preferably, the baffle member may be inclined downwardly towards a diameter of the container transversely of the inlet thereto. Of course, in non-cylindrical containers, the same general configuration may apply, in which the baffle member is inclined downwardly towards the inlet.

Further features of the above aspects of the invention are set out in the appended claims.

The invention will now be described by way of example with reference to the accompanying drawings, of which:

Figure 1 is an exploded perspective view of the principal components of a suction cleaner adapted for water filtration in accordance with the invention;

Figure 2 is a cross-sectional elevation of part of the cleaner shown in figure 1.

Referring to the drawings, the suction cleaner there illustrated comprises a container indicated generally at 10, the container being generally cylindrical

with an upright central axis, and having a peripheral wall 12 of cylindrical or slightly frusto-conical form, extending upwardly from a frusto-conical lowermost portion 14 with a flat bottom wall 16. At the top of the wall 12, there is an outwardly extending flange and short upstanding wall 18, 20 respectively. At approximately two thirds of the height of the container above its bottom wall 16, there is an inlet fitting indicated generally at 22, this being disposed in a recess afforded by a wall portion 24 which lies radially outwardly of the general line of the circumferential wall 12 of the container 10. The inlet 22 is adapted to have an end fitting 26 of a suction hose connected thereto, e.g. by a bayonet-fitting type of retaining arrangement.

Atop the container 10 there fits, firstly, a filter-holding assembly 30 and, secondly, a body 40 provided with a source of suction for the cleaner. The filter holding assembly 30 comprises a peripheral support part 32 which has a downwardly extending outer wall 34 which lies outside the upstanding wall part 20, and has an outwardly- displaced portion 34a which fits outside the wall portion 24 of the container 12. Radially within the peripheral support portion 32 there is an annular trough 36 and a central portion 38 having an aperture 38a through which air can pass to reach the body 40. A filter element lies in the trough 36 and covers the wall portion 38 with its aperture 38a.

The body 40 contains a source of suction, i.e. an electric motor and a fan, for drawing air from the interior of the container 10 by way of the aperture 38a and the filter. The body 40 has a base part 42 which overlies the peripheral part 32 of the filter holder 30, the body 40 being connected to the container 10 by suitable fastening means, e.g. peripherally-spaced clips. The body 40 includes a handle 44, and it is to be understood that there will be provided, as is commonly the case in vacuum cleaners of the general type described, an on-off switch, possibly an indicator light, a further airflow (exhaust) filter, and so forth.

The container 10 may be of plastics material, and its nature is such that the lower part of the container 10 is able to retain a quantity of liquid. Indeed, vacuum cleaners of the above described configuration are commonly used as wet/dry cleaners, able to used for sucking up spilled liquids and so forth.

To enable use of the cleaner as above described for water filtration of dust from the suction airflow, it is provided with two additional components, namely an airflow inlet directing member indicated generally at 50 and a baffle member indicated generally at 70. The member 50 comprises a generally U-shaped member 52. The U-shaped member 52 is configured for engaging a similarly-shaped recess in a portion of the wall of the container, so as to support a portion of a passage of the airflow directing member 50. As shown in Figure 2, the U-shaped member 52 fits in at the lower end of the recess defined by outwardly-displaced wall portion 24 of the container, and supports a tubular assembly of first, second and third passage portions 54, 56, 58 respectively.

The first passage portion 54 extends generally horizontally in line with the opening in the inlet 22 to which a suction hose is fitted as indicated at 26. The second passage portion 56 extends downwardly from the first passage portion 54, and a bracing web 60 between the passage portions 54, 56 extends so as to be able to contact the internal surface of the peripheral wall 12 beneath the inlet fitting 22 (and generally aligned with the inlet 22). In embodiments, the first and second passage portions 54, 56 are formed as a single component. In other embodiments, they may be formed separately and installed separately. The passage portion 58 is a separate component, and fits to the lowermost end of the downwardly extending second passage portion 56, having a curved region so that the remote end of the passage portion 58 extends to a region of the container 10 generally diametrically opposite the inlet 22, at a level within the frusto-conical wall portion 16.

The baffle member 70 includes a baffle plate part 72 which is adapted to conform with the a portion of the internal wall of the container so as to overlie the outlet of the directing member. In embodiments, and as shown, in plan view the baffle plate part 72 is generally semi-circular, with a curved peripheral wall part which fits relatively closely within the internal surface of the peripheral wall 12 of the container 10 and a straight edge part extending generally diametrically across the container.

The baffle plate 72 extends downwardly as it approaches the second passage portion 56. The baffle plate 72 provides a formation for engaging a portion of the passage of the airflow directing member 50. In embodiments, the second passage portion 56 provides a shelf for supporting a portion of the baffle plate 72. As shown, the baffle member may end at an undercut socket 76 within which engages a generally T-shaped lug 74 on the passage portion 56. The baffle member further has downwardly-extending legs 78, 80 where the curved edges of the baffle plate 72 meet the straight edge thereof which extends diametrally of the container 12, the legs 78, 80 extending downwardly to support the baffle member on the lower wall 16 of the container.

At the part of the baffle member remote from the inlet 22 an upwardly-extending wall 82 of the baffle member ends in a flange 84 which rests on the flange 18 of the container 10 opposite the inlet 22. The baffle member has a manually-graspable upwardly extending portion 86 to enable the baffle member to be handled when placing it in the container and removing it therefrom. Thus the directing member 50 and baffle member 70 are effectively held in their operative positions in the container, but are readily removed for cleaning if required and reinstalled.

When the illustrated vacuum cleaner is to be used for water filtration, the baffle member 70 and directing member 50 must be fitted within the container 10 of the cleaner. The user provides, within the container 10, an airflow-directing

member 50 as described above, affording a passage extending downwardly from the inlet 22 to the lowermost part of the container to discharge incoming air in the lowermost part, the airflow directing member 50 comprising a first 54, a second 56 and a third portion 58. The user arranges the first portion 54 so that it extends generally horizontally from the inlet 22, the second portion 56 so that it extends downwardly from the first portion 54, and the third portion 58 so that it extends generally horizontally from the second portion 56 and configured such that the third portion 58 ends at a position which, in plan view, is remote from the inlet 22. The baffle member 70 is arranged within the container 10, the baffle member 70 being adapted to extend over the outlet of the directing member 50 at a position spaced above the lowermost part of the container, the baffle member 70 being inclined downwardly in the direction of the inlet 22.

In more detail, firstly, the member 50 will be positioned in the container with its part 52 lying within the lowermost edge of the outwardly-displaced wall portion 24 of the container. Subsequently, the baffle member 70 will be fitted, as illustrated. Alternatively, the baffle member 70 and directing member 50 may be fitted together, and then installed as a single unit. Water will be introduced into the container to approximately the level of the uppermost part of the free end of the third passage portion 58.

In use, operation of the source of suction of the cleaner lowers the air pressure slightly within the container 10 drawing air into the container from whatever is being cleaned, by way of the suction hose and its end fitting 26. The inlet assembly causes such suction airflow to be directed into the water within the container, providing effective removal of dust particles from the airflow. The baffle plate 72 disposed above the free end of the passage portion 58 prevents water from being splashed upwardly by bubbles of the suction airflow.

When used in this specification and claims, the terms "comprises" and "comprising" and variations thereof mean that the specified features, steps or integers are included. The terms are not to be interpreted to exclude the presence of other features, steps or components.

The features disclosed in the foregoing description, or the following claims, or the accompanying drawings, expressed in their specific forms or in terms of a means for performing the disclosed function, or a method or process for attaining the disclosed result, as appropriate, may, separately, or in any combination of such features, be utilised for realising the invention in diverse forms thereof.

Claims

1. A method of converting a suction cleaner for water filtration, the cleaner comprising:

a container for separated dust, able to retain liquid in a lowermost part thereof,

a source of suction communicating with the container for drawing air from the interior thereof at an upper part of the container, and

an inlet for suction airflow into the container at a position spaced above the lowermost part of the container,

the method comprising:

providing, within the container, an airflow-directing member, affording a passage extending downwardly from the inlet to the lowermost part of the container to discharge incoming air in the lowermost part, the airflow directing member comprising a first, a second and a third portion,

arranging the first portion so that it extends generally horizontally from the inlet and the second portion so that it extends downwardly from the first portion, and the third portion so that it extends generally horizontally from the second portion and configured so that the third portion ends at a position which, in plan view, is remote from the inlet, and

arranging, within the container, a baffle member adapted to extend over the outlet of the directing member at a position spaced above the lowermost part of the container, the baffle member being inclined downwardly in the direction of the inlet.

2. A kit of parts for converting a suction cleaner for water filtration, the cleaner comprising:

a container for separated dust, able to retain liquid in a lowermost part thereof,

a source of suction communicating with the container for drawing air from the interior thereof at an upper part of the container, and

an inlet for suction airflow into the container at a position spaced above the lowermost part of the container,

the kit of parts comprising:

an airflow directing member affording a passage extending downwardly from the inlet to the lowermost part of the container, for discharging incoming air in the lowermost part of the container, the airflow directing member comprising:

a first portion extending generally horizontally from the inlet,

a second portion extending downwardly from the first portion, and

a third portion extending generally horizontally from the second portion and configured so that the third portion ends at a position which, in plan view, is remote from the inlet; and

a baffle member adapted to fit in the container and extend over the outlet of the directing member at a position spaced above the lowermost part of the container, the baffle member being inclined downwardly in the direction of the inlet.

3. A kit of parts according to claim 2, wherein the first and second portions are formed as a single component.

4. A kit of parts according to claim 2 or claim 3, further including a generally U-shaped member configured for engaging a similarly-shaped recess in a portion of the wall of the container, so as to support a portion of the passage of the airflow directing member.

5. A kit of parts according to any one of claims 2 to 5, further including a bracing web extending from the first passage portion and second passage portion so as to contact a portion of the internal surface of the wall of the container.

6. A kit of parts according to claim 5 wherein the bracing web contacts the internal surface of the wall of the container below and generally aligned with the inlet.

7. A kit of parts according to any one of claims 2 to 6, wherein the baffle member includes a baffle plate part which is adapted to conform with the a portion of the internal wall of the container so as to overlie the outlet of the directing member.

8. A kit of parts according to claim 7, wherein the baffle plate provides a formation for engaging a portion of the passage of the airflow directing member.

9. A kit of parts according to claim 7 or claim 8, wherein the second passage portion provides a shelf for supporting a portion of the baffle plate.

10. A kit of parts according to any one of claims 2 to 9, wherein the baffle member provides downwardly-extending legs for supporting the baffle member on the lower wall of the container.

11. A kit of parts according to any one of claims 2 to 10, wherein the baffle member provides a manually-graspable upwardly extending portion.

12. A suction cleaner comprising a container for separated dust, able to retain liquid in a lowermost part thereof, a source of suction communicating with the container for drawing air from the interior thereof at an upper part of the container, and an inlet for suction airflow into the container at a position spaced above the lowermost part of the container;
and a kit of parts according to any one of claims 2 to 11 fitted within the container.

13. A suction cleaner according to claim 12 wherein the container is generally cylindrical with its axis upright, and the baffle member is generally semi-circular in plan view extending over a part of the container remote from the inlet.

14. A method of converting a suction cleaner for water filtration, a kit of parts for effecting the method, or a suction cleaner provided with the kit of parts, substantially as hereinbefore described with reference to and as shown in the accompanying drawings.

15. Any novel feature or novel combination of features described herein and/or in the accompanying drawings.

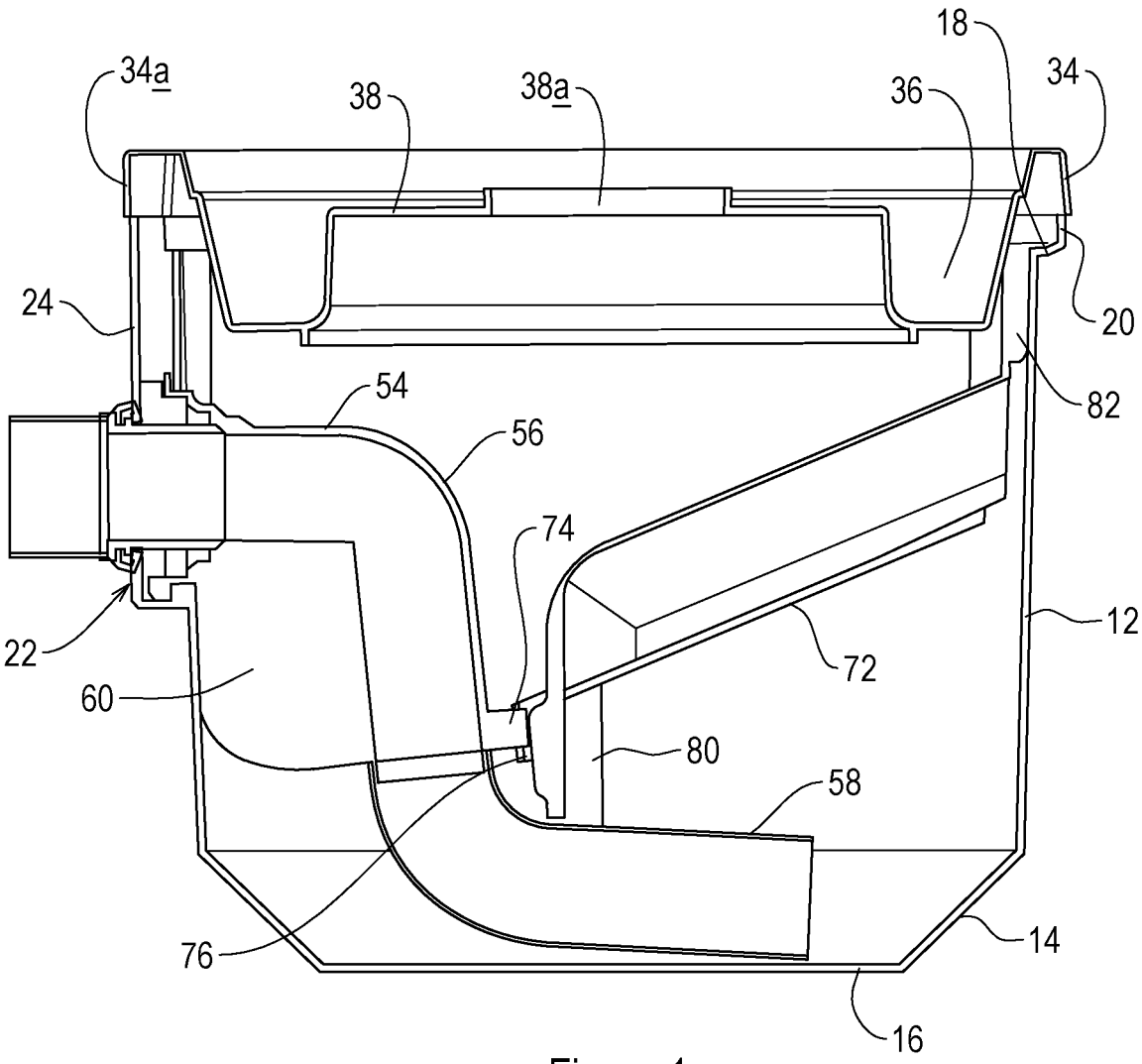

Figure 1

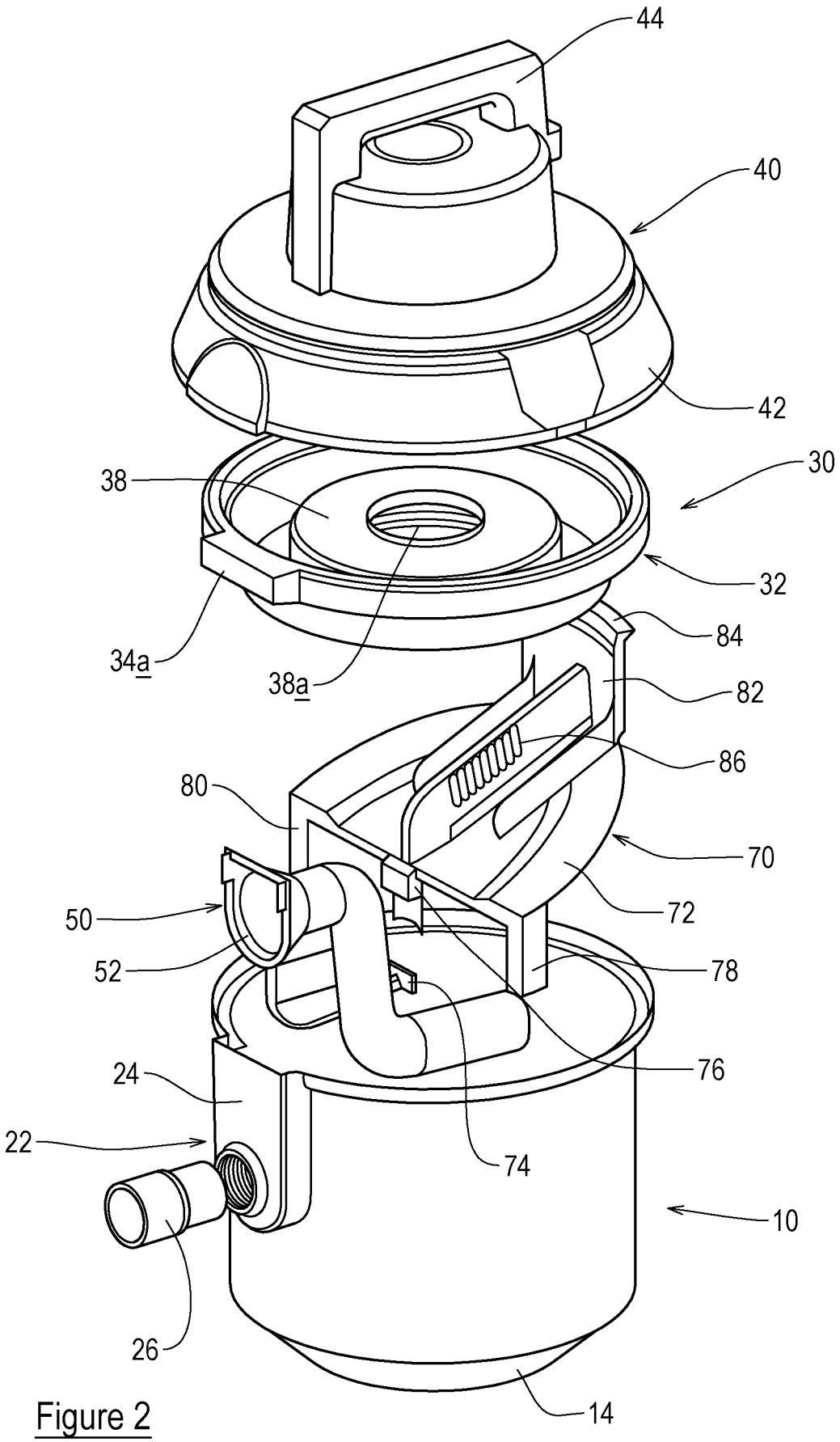
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Figure 2

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2014/052402

A. CLASSIFICATION OF SUBJECT MATTER
INV. A47L5/22 A47L9/18 A47L7/00
ADD.

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)
A47L

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

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, PAJ, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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[X] Further documents are listed in the continuation of Box C.

[X] 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

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Date of the actual completion of the international search	Date of mailing of the international search report
13 October 2014	21/10/2014

Name and mailing address of the ISA/	Authorized officer
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Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2014/052402

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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INTERNATIONAL SEARCH REPORT

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