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(54) Title: DUST CONTAINER FOR A VACUUM CLEANER

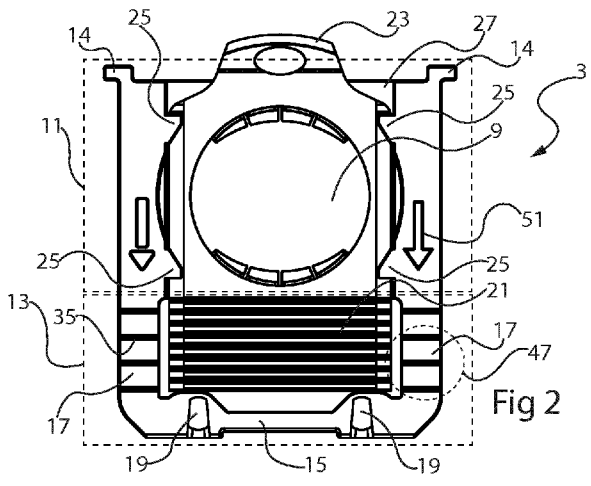

Fig 2

(57) Abstract: The present disclosure relates to a dust container for a vacuum cleaner, which container comprises a dust bag (5), made of an air permeable material, and a connector plate (3), surrounding an opening (9) in the dust bag (5). The connector plate (3) can position the opening correctly within a vacuum cleaner by the being inserted in a holder of the vacuum cleaner. The connector plate (3) extends in a main plane, and comprises an injection molded plastic material. It is provided with a living hinge (35) allowing a part of the connector plate to be flexed out of the main plane. The living hinge has a reinforcement flange (41) stiffening the living hinge until being broken. This facilitates production of the dust container, as the connector plate (3) can be kept flat until it is desired to use the living hinge.

DUST CONTAINER FOR A VACUUM CLEANER

Technical field

The present disclosure relates to a dust container for a vacuum cleaner, the dust container comprising a dust bag, made of an air permeable material, and a connector plate, surrounding an opening in the dust bag, such that the connector plate can correctly position the opening within a vacuum cleaner by the connector plate being inserted in a holder of the vacuum cleaner.

Background

An example of such a container is disclosed for instance in WO-02/24046-A1. Thanks to the connector plate, the opening of the dust bag can be reliably positioned and oriented to receive a flow of dust laden air from the vacuum cleaner inlet. Further, the connector plate can trigger a feedback switch in the holder of the vacuum cleaner to verify that a dust container has been correctly installed in the holder, thus enabling the vacuum cleaner to prevent use in case of an absent or incorrectly installed dust container. Such use could otherwise damage the vacuum cleaner by injecting heavily dust laden air into a fan/motor arrangement.

One problem associated with dust containers of this type is how to provide a dust container which is operable with even more efficient and compact vacuum cleaners, and that can be efficiently produced.

Summary

One object of the present invention is therefore to provide a dust container which allows efficient production and works well with compact vacuum cleaners. This object is achieved by means of a dust container as defined in claim 1. More specifically, in a dust container of the initially mentioned kind, the connector plate extends in a main plane, comprising an injection molded plastic material and having a living hinge. The living hinge allows a part of the connector plate to be flexed out of the main plane, but the living hinge comprises a reinforcement flange stiffening the living hinge until being broken. This connector plate can be operable for instance with vacuum cleaner holders that need a connector plate to be flexible enough to be curved in order to make good use of the inner space of a vacuum cleaner canister. The living hinge can provide the needed flexibility. At the same time, as the reinforcement flange stabilizes

the living hinge until being broken, the connector plate can be produced as a unit that remains flat. This facilitates automatic and efficient production of the dust container, for instance when gluing the connector plate to the dust bag.

The connector plate may comprise a central portion and an extending portion extending from the central portion, the living hinge being provided in the extending portion. A plurality of such living hinges may be provided in the extending portion along the direction in which the extending portion extends from the central portion.

Reinforcement flanges may be provided at each end of a living hinge.

Such an extending portion may comprise lateral arm portions, which extend from the central portion, and a bridge portion, which interconnect the arms at their distal ends. Such a configuration leaves space in between the arms e.g. to provide a flexible shutter that can seal the dust bag opening after use. Typically, two to six, and in one example four such living hinges are provided in each arm portion.

The thickness of the reinforcement flange may typically be in the range 0.1-0.6 mm.

The connector plate may be made for instance in polypropylene, PP.

A tab may extend laterally from the central portion at least at one of the corners most distant from the extending portion, and may rest on the insertion point of the holder.

A gasket may be attached to the connector plate at its opening.

Brief description of the drawings

Fig 1 shows a dust container for a vacuum cleaner.

Fig 2 shows a connector plate for a dust container.

Fig 3 shows a side view of a connector plate, as produced.

Fig 4 shows a side view of the plate in fig 3 when being used.

Fig 5 illustrates schematically a living hinge.

Fig 6 shows an enlarged detail of an arm portion of fig 2.

Fig 7 illustrates schematically another example of a living hinge.

Fig 8 shows a perspective view of corresponding to fig 4.

Fig 9 illustrates a connector plate where an opening is closed by a shutter.

Detailed description

The present disclosure relates to a dust container for a vacuum cleaner, as illustrated with an example in fig 1. The dust container has a dust bag 5, which is schematically indicated, and is made of an air permeable material, as is well known per se. A connector plate 3 is attached to the dust bag 5, for instance by being glued thereto, and has an opening 9 coinciding with an opening in the dust bag 5, such that the opening of the connector plate also becomes the opening of the dust bag as a whole. The connector plate 3 is configured to position the opening 9 of the dust bag in a correct manner in relation to an air inlet in the body of a vacuum cleaner. This can be carried out by sliding the connector plate into a holder or socket in the vacuum cleaner. This operation positions the opening 9 to receive a flow of dust laden air which thereby enters the bag, which is capable of removing most of the dust from the air flow. A gasket 7 may be attached to the connector plate 3 at the opening 9 so as to provide a sealing function, reducing leaks in the flow from an inlet hose to the bag 9.

Fig 2 shows a plan view of a connector plate 3. In the present disclosure, the connector plate 3 may comprise a central portion 11, which is central with respect to the opening 9 which it surrounds, and may be substantially flat and rectangular. Further, the connector plate 3 comprises an extending portion 13, which may project from an edge of the central portion 11.

When used in a vacuum cleaner, the connector plate 3 may be slid into a holder in the vacuum cleaner with the extending portion leading in the direction of insertion and the central portion as a trailing portion. The width of the central portion 11 and the extending portion 13 may be substantially uniform width from a distal edge 29 of the extending portion, being inserted first, to the edge 31 of the central portion 11 opposite to the distal edge 29. This allows the holder to guide the insertion of the connector plate. Indicator arrows 51 may be embossed in the connector plate 3 to make sure that the user inserts the connector plate correctly. Edges of the connector plate 3 become supported by the holder. A tab 14 extending laterally from the central

portion 11 may be provided at least at one of the corners most distant from the extending portion 13, to rest on the exterior of the holder at its entry point.

The central and the extending portions 11, 13, may extend in a common plane, and may be made in one piece, for instance by injection molding polypropylene, PP. Together, the central and extending portions 11, 13 provide a reliable fixation of the dust bag opening 9 in the vacuum cleaner. Additionally, the extending portion 13 may provide a locking function that retains the connector plate in the holder, and an indicating function, triggering a sensor or switch in the holder, that makes the vacuum cleaner aware of a dust bag being correctly inserted, thereby allowing the vacuum cleaner to disable use of a suction function unless a dust bag is correctly fitted.

As is further illustrated in fig 2, the extending portion 13 may comprise lateral arm portions 17, extending from the central portion 11 and a bridge portion 15, interconnecting the arms at their distal ends. This serves to leave a free space in between the arm portions 17, which may be used by a shutter arrangement, as will be shown. The bridge portion 15 may comprise locking openings 19, which interact with a locking arrangement in the holder, snapping into the openings when the connector plate is fitted, thereafter requiring a predetermined pulling force, in the direction opposite to the insertion direction, in order to remove the dust bag. Thereby, the dust bag is not removed inadvertently.

In the present disclosure the connector plate 3 consists of an injection molded plastic material and extends in a main plane as illustrated in a main plane as shown in fig 3.

It is desired to provide a part of the connector plate with a living hinge to allow this part of the connector plate to be flexed out of the main plane as illustrated in fig 4. In fig 4, living hinges 35 are provided to allow the connector plate 3 to flex to a varying degree at four locations. This can be advantageous, for instance since it allows the connector plate to be easily inserted into a curved holder which bends a part of the connector plate.

Fig 5 illustrates schematically and in cross section a living hinge 35. The living hinge generally comprises a thin, interconnecting portion 37 joining two wider segment portions 39, all being made in one piece through injection molding. A V-shaped groove is formed in between the two segment portions 39. Polypropylene, PP, and polyethylene, PE, are considered suitable materials, although other alternatives exist.

Living hinges are well known per se. The hinge forms a joint that can be very easily bent, and with a plurality of living hinges located at regular interval as illustrated in fig 4, the extending portion as a whole becomes very easy to bend into a step-wise curvature.

In an example, the segment portions 39 have a thickness of 3 mm, while the interconnecting portion 37 is only 0.3 mm thick. An interval between 2.0-4.5 mm is considered for the thicker portion, and 0.1-0.40 for the thinner. The cc distance between adjacent living hinges may be in the interval between 5-10 mm, a suitable distance being 8 mm.

While the living hinges make it easy to bend a part of the connector plate, it is still desired that the connector plate remains substantially flat during production. That is, until the dust container is to be used, it is preferred that the connector remains in the flat shape illustrated in fig 3. This makes it easier for instance to attach the connector plate 3 to the dust bag 5 in an efficient automated process.

With reference again to fig 5, a reinforcement flange 41 is provided which interconnect the segment portions 39 at a location along the length of the living hinge 35. This reinforcement flange 41 substantially inhibits the function of the living hinge 35, i.e. prevents the connector plate to be bent in the living hinge 35, until the reinforcement flange 41 is broken. The reinforcement flange thus stiffens the living hinge until being broken. As the reinforcement flange 41 may be very thin, the breaking can be easily done, but unless bent with some force, the connector plate remains more or less flat. A thickness of about 0.3 mm along the length of the living hinge 35, i.e. perpendicular to the direction of the plane of the paper in fig 5 is considered. Generally, the thickness of the reinforcement flange may be in the range 0.1-0.6 mm.

The connector plate 3 as mentioned comprises a central portion 11, which surrounds the dust bag opening, and an extending portion 13, extending from the central portion. It is considered to provide the living hinges in the extending portion 13, across the direction in which the extending portion 13 extends from the central portion 11. In the illustrated example, the extending portion is configured to be bent at four locations, and living hinges may be provided at each such location.

As mentioned, and again with reference to fig 2, the connector plate may have an extending portion 13 comprising two lateral arm portions 17 extending from the

central portion 11 and a bridge portion 15 interconnecting the arm portions 17 at their distal ends. An enlarged detail 47 of an arm portion of fig 2 is shown in fig 6. As shown in fig 2, four living hinges are provided in each arm portion 17, and three of the hinges 35 in one arm are illustrated in greater detail in fig 6. As shown, reinforcement flanges 41 are provided at each end of a living hinge 35. Needless to say, a reinforcement flange 41 may be provided at any location along a living hinge 35. An example is schematically illustrated in fig 7, where in a living hinge 35 corresponding to the cross section in fig 5, a reinforcement flange 41 connecting two segment parts 39 is provided in center of the hinge extension.

Fig 8 shows a perspective view of a connector plate in the state where it is inserted into a vacuum cleaner holder. In this state the reinforcement flanges 41 will be broken, and the extending part bent into a curvature.

Fig 9 illustrates use of the shutter 21 on the connector plate 3. Generally, the shutter 21 can be used to close the opening 9 once the dust bag 5 is full and the dust container 1 is to be replaced. As the shutter 21 substantially seals the opening 9, it can be prevented to a great extent that collected dust leaks out of the dust bag when handled to be disposed.

In the present disclosure, the shutter 21 is thin enough to be easily folded, and is connected to the central portion 11 in between the lateral arm portions 17. It may be made in one piece with the remainder of the connector plate 3. The shutter 21 has an opening 33, and is folded on top of the central portion 11 such that the shutter opening 33 coincides with the opening 9 of the dust bag 5, which is the state illustrated in fig 2. The shutter is tucked in under guide tabs 25 provided at both sides of the opening and remains slidable, guided by the guide tabs 25 and the rear surface 27 behind the guide tabs. The shutter can thus be slid upwards in fig 2, away from the extending part 13, such that the shutter opening 33 moves away from the dust bag opening 9, thereby effectively closing this opening. This state is shown in a front view in fig 9. The distal end of the shutter may comprise a handle 23 to facilitate this operation.

The present disclosure is not limited to the examples described above, and may be varied and altered in different ways within the scope of the appended claims. For instance, although in the example the connector plate has a central portion and an

extending portion, the present disclosure is useful in any dust bag connector plate where there is provided a living hinge, and where it is desired that the plate remains in a fixed shape, e.g. flat, until the living hinge is activated or used.

CLAIMS

1. Dust container (1) for a vacuum cleaner, the dust container comprising a dust bag (5), made of an air permeable material, and a connector plate (3), surrounding an opening (9) in the dust bag (5), whereby the connector plate (3) can correctly position the opening (9) within a vacuum cleaner by the connector plate being inserted in a holder of the vacuum cleaner, characterized by the connector plate (3) extending in a main plane, comprising an injection molded plastic material and having a living hinge (35) allowing a part of the connector plate to be flexed out of the main plane, wherein the living hinge comprises a reinforcement flange (41) stiffening the living hinge until the reinforcement flange is broken.

2. Dust container according to claim 1, wherein the connector plate comprises a central portion and an extending portion extending from the central portion, the living hinge being provided in the extending portion.

3. Dust container according to claim 2, wherein a plurality of living hinges are provided in the extending portion along the direction in which the extending portion extends from the central portion.

4. Dust container according to any of the preceding claims, wherein reinforcement flanges are provided at each end of a living hinge.

5. Dust container according to any of the claims 2-4, wherein the extending portion (13) comprises lateral arm portions (17) extending from the central portion (11) and a bridge portion (15) interconnecting the arms at their distal ends.

6. Dust container according to claim 5, wherein 2-6 living hinges are provided in each arm portion.

7. Dust container according to any of the preceding claims, wherein the thickness of the reinforcement flange is in the range 0.1-0.6 mm.

8. Dust container according to any of the preceding claims, wherein the connector plate is made in polypropylene, PP.

9. Dust container according to any of the preceding claims, wherein a tab (14) extends laterally from the central portion (11) at least at one of the corners most distant from the extending portion (13).

10 Dust container according to any of the preceding claims, wherein a gasket (7) is attached to the connector plate (3) at the opening (9).

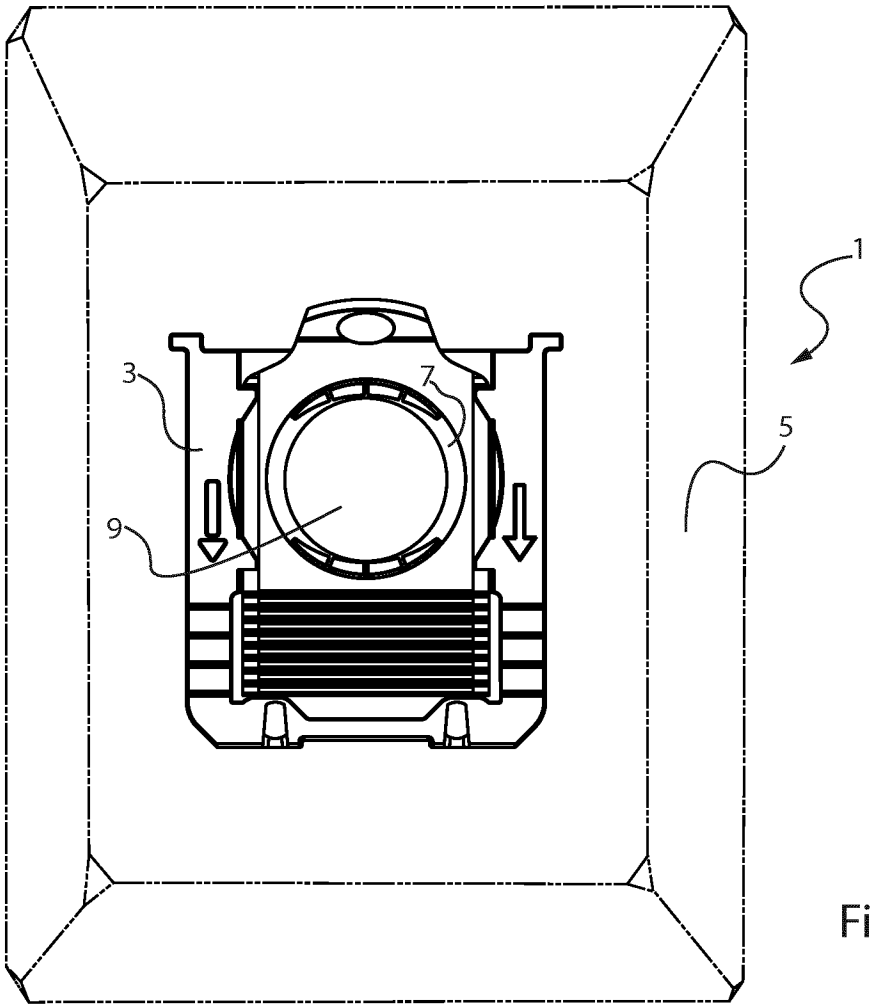

Fig 1

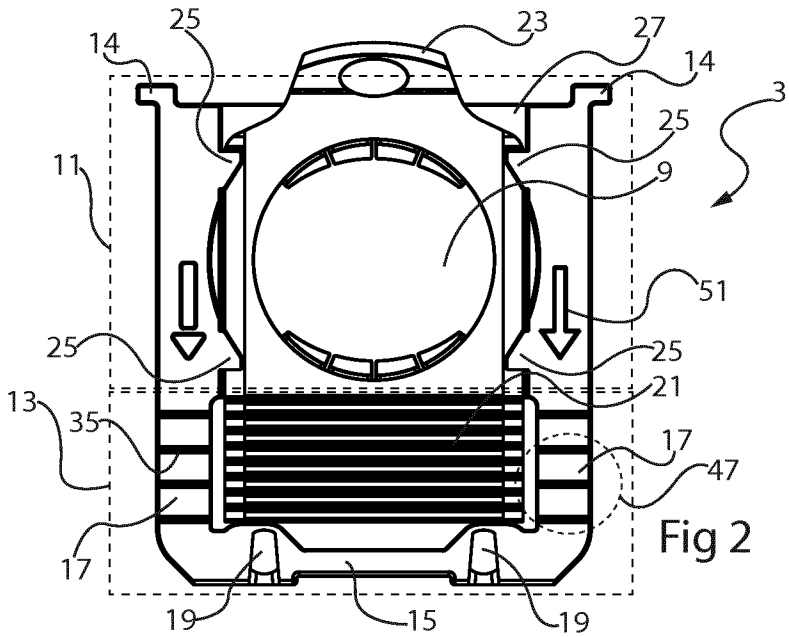

Fig 2

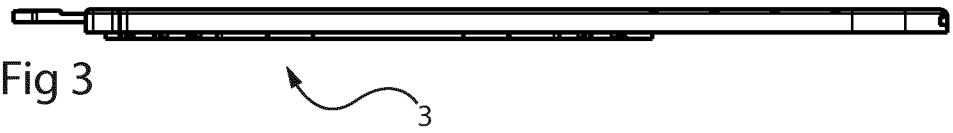

Fig 3

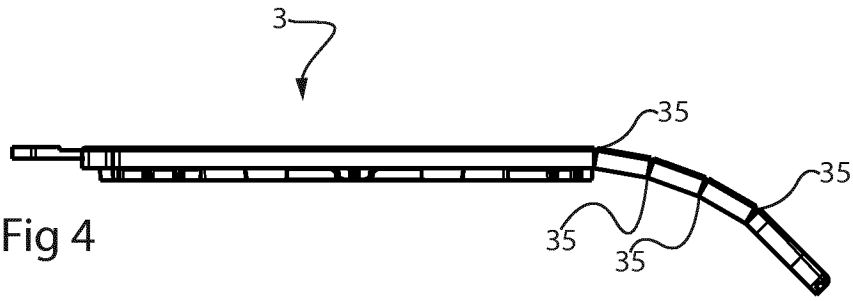

Fig 4

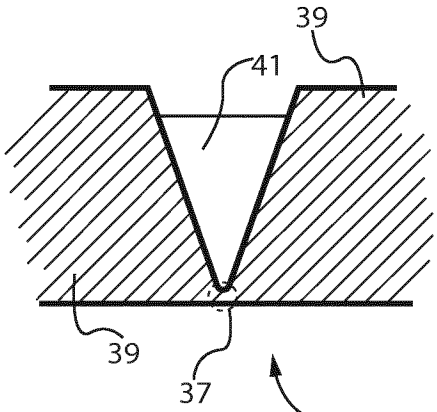

Fig 5

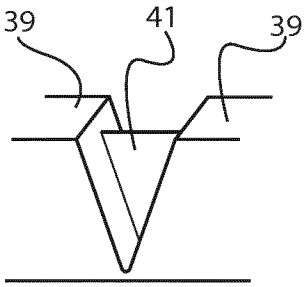

Fig 7

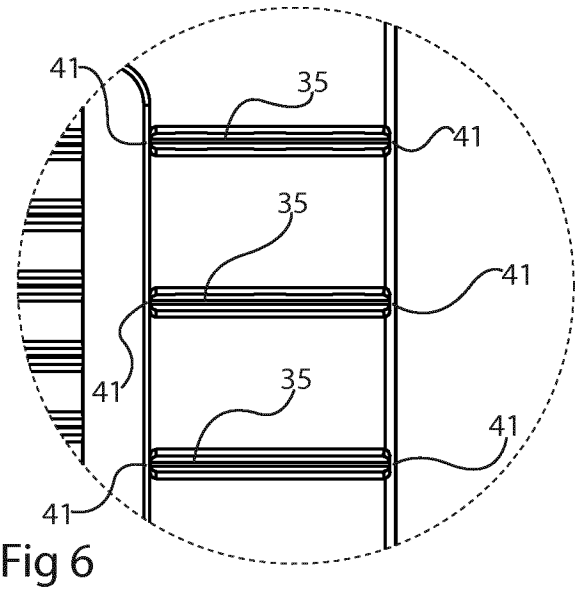

Fig 6

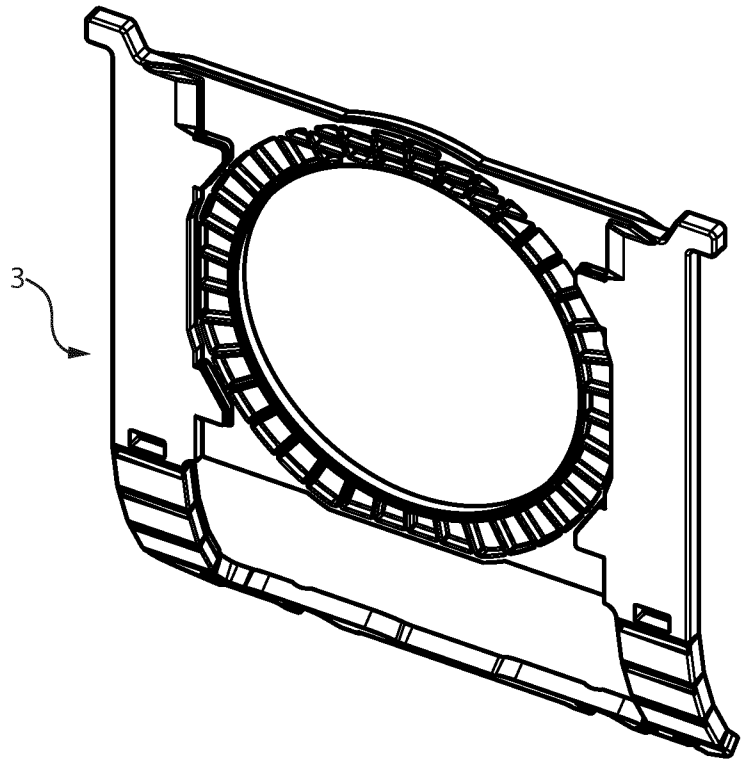

Fig 8

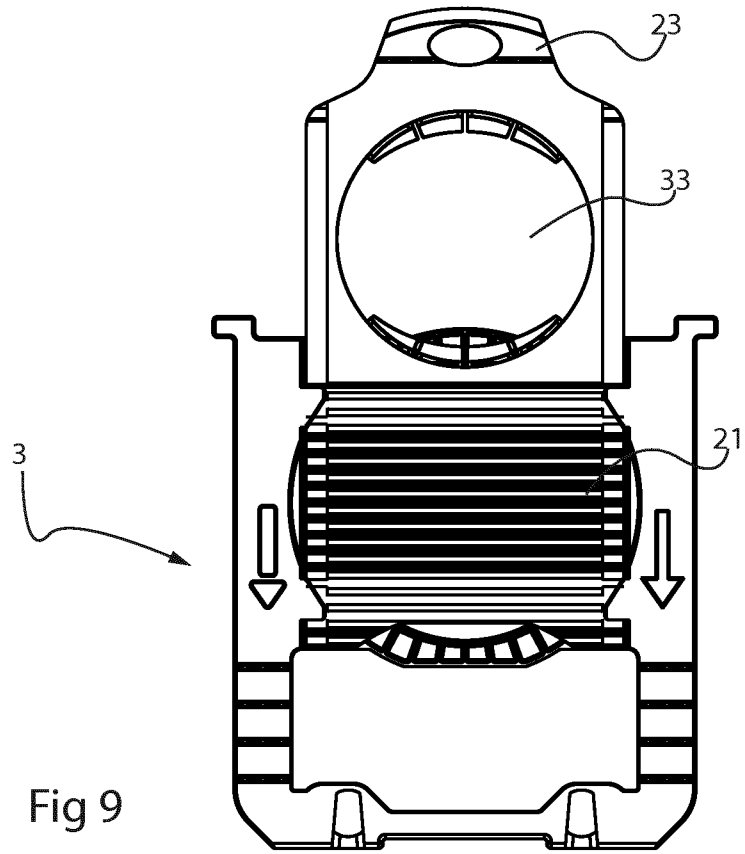

Fig 9

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2016/060309

A. CLASSIFICATION OF SUBJECT MATTER
INV. A47L9/14
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, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 02/24046 A1 (ELECTROLUX AB [SE]; HENGVOSS INGRID [SE]; BILLSKOG PATRIK [SE]) 28 March 2002 (2002-03-28) cited in the application claims; figures	1
A	DE 201 01 471 U1 (WOLF GMBH [DE]) 19 April 2001 (2001-04-19) pages 4-6; figures	1
A	US 4 678 486 A (JACOB GERNOT [DE] ET AL) 7 July 1987 (1987-07-07) figures	1
A	EP 1 917 897 A2 (BRANOFILTER GMBH [DE]) 7 May 2008 (2008-05-07) paragraphs [0022] - [0036]; figure 3	1

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

☒ See patent family annex.

* Special categories of cited documents :

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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

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"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
19 December 2016	05/01/2017

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Lopez Vega, Javier

1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
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