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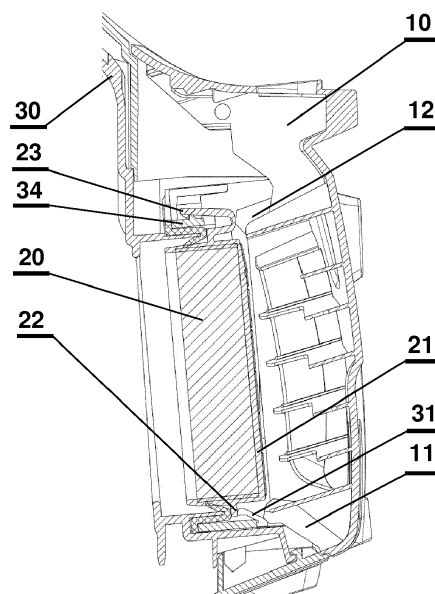
(54) **EXHAUST FILTER ASSEMBLY FOR A VACUUM CLEANER**

(57) An exhaust filter (20) assembly for a vacuum cleaner comprising a filter frame (21) accommodating the filter (20) and a cover (10) pivotally mounted to a vacuum cleaner body (30) and which is pivotally between an open position and a closed position, where the cover (10) comprises at least one first rib (11) formed on an inner surface of the cover (10) for positioning the filter frame (21) into a preliminary position inside a filter cavity (33) placed in the vacuum cleaner body (30) whereas at least one second rib (12) pushes the filter frame (21) into

its end position after setting the cover (10) in the closed position.

The present invention provides an exhaust filter arrangement which is positioned inside the vacuum cleaner body correctly without attention of the user thanks only to the existence of the set of ribs placed on the inner surface of the cover. The present invention provides an easy to use, intuitive, self-positioning exhaust filter arrangement for efficient exhaust air filtering which comes out of the vacuum cleaner during vacuuming.

Fig. 3



Description*FIELD OF THE INVENTION*

[0001] The invention relates to an exhaust filter assembly for a vacuum cleaner comprising a filter frame accommodating the filter and a cover pivotally mounted to a vacuum cleaner body and which is pivotally between an open position and a closed position, where the cover comprises at least one first rib formed on an inner surface of the cover for positioning the filter frame into a preliminary position inside a filter cavity placed in the vacuum cleaner body.

STATE OF THE ART

[0002] The patent application WO 2006 / 024 422 A1 discloses an invention relates to a vacuum cleaner which is provided with a fine dust filter in the outgoing air flow of the suction fan. The fine dust filter is arranged in a filter cassette chamber on the vacuum cleaner and can be exchanged underneath the intermediate element of the sealing element. In order to produce an active sealing arrangement for a fine dust filter in the outgoing air flow of a vacuum cleaner, a lip seal is arranged in a circulating manner on the intermediate area of the lateral edge of the filter cassette receiving element and the lateral edge of the fine dust filter.

[0003] The patent application JP 2007 - 054 266 A1 discloses a vacuum cleaner provided with an electric blower in a cleaner main body to collect dust contained in air sucked into the main body from an entrance by driving of the blower. The vacuum cleaner is provided with: a dust collection chamber which is formed in the main body, to which a dust collection container or a dust collection bag for collecting dust can be mounted alternatively, and where a discharging port for discharging air after collecting the dust is formed; and the pleat filter arranged at the exhaust vent of the dust collection container for removing the dust. A frame for pressing the pleat filter when the dust collection container is mounted in the dust collection chamber is provided at the discharging port.

[0004] The patent application DE 102 11 649 A1 discloses an appliance for floor cleaning having a housing cover with studs enabling it to pivot downwards into a horizontal position. It is provided with a guide frame to accommodate a filter element. Varying the depth of the frame by the amount (t) enables the upper edge of the filter to be inserted into the frame and released so that it drops into position under the force of gravity.

[0005] Presented solutions do not provide effective system for positioning the exhaust filter inside a vacuum cleaner body and placing the exhaust filter into its end position without any attention of the user.

THE AIM OF THE INVENTION

[0006] It is the object of the present invention to provide

a further development with an advantage over the state of the art providing an exhaust filter assembly for a vacuum cleaner which positioning is carried in easy and intuitive manner.

SUMMARY OF THE INVENTION

[0007] This object is solved by an exhaust filter assembly for a vacuum cleaner whereby at least one second rib of the cover pushes the filter frame into its end position inside the filter cavity after setting the cover in the closed position.

[0008] The exhaust filter is a fibrous or porous material placed in the vacuum cleaner body through which an air is passed in order to separate the air from the contamination like dust, odour or bacteria. The exhaust filter is a barrier for dust and other contamination of air coming out of the vacuum cleaner. The exhaust filter is placed inside the filter frame. The filter frame is made out of plastic or other material and is provided for easy placement of the filter inside the vacuum cleaner body. The filter is attached to the filter frame during mounting process on the assembly line. The exhaust filter with the filter frame is a spare part for the vacuum cleaner and can be easily removed from the vacuum cleaner and replaced by a new one. The advantage of existence of the exhaust filter is that the air coming out of the vacuum cleaner is filtered what is important for the health of humans and animals.

[0009] The cover is a plastic part mounted to the vacuum cleaner body by a hinge which allows the cover to pivot. The cover is provided to fix and protect the filter frame from detaching during usage. The cover is a lattice shaped element. The shape of the cover is designed in such a way to allow the exhaust air to pass out of the vacuum cleaner through the cover.

[0010] The cover is provided with at least one first rib and at least one second rib. Ribs are located on the inner surface of the cover. The inner surface of the cover is a surface which is directed towards the filter cavity. The advantage of positioning first ribs and second ribs on the inner surface of the cover is that the filter frame is positioned inside the filter cavity of the vacuum cleaner body correctly in an automatic way during moving the cover from the open position to the closed position.

[0011] First ribs place the filter frame into its preliminary position. After setting the filter frame in the preliminary position second ribs push the filter frame into its end position inside the filter cavity. The filter frame is in the end position when it fills out the filter cavity in total. The air filtering is provided without leakages. Positioning the filter frame and pushing the filter frame into its end position can be performed by one first rib and one second rib. Advantageously, the cover and ribs are produced as one plastic part.

[0012] The filter cavity is a space in the vacuum cleaner body for receiving the filter frame. The filter frame fits the filter cavity tightly in order to acquire efficient filtering. For achieving better filtering results the filter cavity is sealed.

[0013] The cover is pivotally mounted to the vacuum cleaner body and has two positions: an open position and a closed position. The open position means that the cover is substantially horizontal and the user can easily insert or remove the exhaust filter as the user has a good access to the filter cavity. In the open position of the cover first ribs touch the filter frame slightly.

[0014] The closed position means that the cover is substantially vertical. In this position the cover engages the vacuum cleaner body tightly which means that the cover is snapped on the vacuum cleaner body. In such position of the cover the exhaust filter is positioned and locked in its end position inside the filter cavity.

PREFERED EMBODIMENT OF THE INVENTION

[0015] In the preferred embodiment of the invention at least one second rib is placed on the inner surface of the cover. Second ribs are provided on the inner surface of the cover to push the filter frame into its end position and hold the filter frame in such position for all the time it is used. The favourable effect is that the filter frame is pushed by second ribs automatically during closing the cover without any attention of the consumer.

[0016] In the preferred embodiment of the invention at least one first rib is placed in a vicinity of a rotation axis of the cover. The first ribs are provided at the bottom of the cover on its inner surface. The cover is pivotally mounted to the vacuum cleaner body by one or more hinges and the cover is movable between open position and the closed position in order to remove or replace the exhaust filter. The first ribs are placed in the vicinity of the rotation axis of the cover so after inserting the filter inside the vacuum cleaner body first ribs touch the filter frame lower portion and positions the filter frame with the filter in a preliminary position. The positive effect is that first ribs place the filter frame in the preliminary position even the filter frame was placed incorrect by the user.

[0017] In another embodiment of the invention at least one second rib pushes the upper portion of the filter frame. The filter frame is in preliminary position. By moving the cover from the open position to the closed position second ribs push the filter frame into its end position towards the filter cavity. The positive effect is that the filter frame is pushed into the end position by the second ribs even the filter frame was not placed correctly by the user. Such arrangement eliminates the risk of placing the filter frame incorrectly, therefore reduces the risk of leakages of the exhaust air and poor air filtering.

[0018] In another embodiment of the invention at least one first rib leads a rim of the filter frame to pass over at least one pin placed on the wall of the filter cavity. The filter frame is equipped with the rim which is circumferentially disposed on the filter frame. The rim and the filter frame are made as one element. The positive effect is that the mounting process is eliminated. The rim can be disposed also only on a part of the filter frame so the part is cheaper in production. Preferably, the rim is disposed

at the lower portion of the filter frame. The rim passes over a pin so the filter frame is attached partially inside the filter cavity. The pin is an element of the vacuum cleaner body and is placed on the bottom wall of the filter cavity. In a preferred solution the pin is an elastic element. The advantage is that less force is required for passing the rim over the pin when the pin is made out of the elastic material. The filter frame is pushed by the first ribs towards the filter cavity and the rim pass over the pin and next falls slightly down by the force of gravity. In such position the lower portion of the filter frame is fixed.

[0019] In a preferred embodiment of the invention in the end position of the filter frame a holder of the filter frame engages a protrusion of the vacuum cleaner body. Preferably the holder is provided with at least one engaging element. The filter frame is equipped with a holder. The holder is placed at the top surface of the filter frame. After pushing the filter frame into its end position by the second ribs the engaging element engages the protrusion of the vacuum cleaner body. The engaging element and a holder are made as one part and the engaging element is situated on the bottom surface of the holder. The protrusion is a hook like element for engaging the engaging element. The engaging element provides firmly connection of the filter frame with the vacuum cleaner body.

[0020] The present invention provides an exhaust filter arrangement which is positions inside the vacuum cleaner body correctly without attention of the user thanks only to the existence of the set of ribs placed on the inner surface of the cover. The present invention provides an easy to use, intuitive, self-positioning exhaust filter arrangement for efficient exhaust air filtering which comes out of the vacuum cleaner during vacuuming.

BRIEF DESCRIPTION OF THE FIGURES

[0021] The construction of the invention, however, together with additional objects and corresponding advantages will be best understood from the following description of specific embodiments and in connection with the accompanying drawings.

[0022] Further benefits and advantages of the present invention will become apparent after a careful reading of the detailed description with appropriate reference to the accompanying drawings.

[0023] In the drawings:

Fig. 1 shows a cover of the vacuum cleaner in isometric view.

Fig. 2 shows a cross section of a part of a vacuum cleaner body with the filter and filter frame and a cover in an open position.

Fig. 3 shows a cross section of a part of a vacuum cleaner body with the filter and filter frame and a cover in a closed position.

Fig. 4 shows a filter frame in isometric view.

Fig. 5 shows a side view of a filter frame.

DETAIL DESCRIPTION OF THE INVENTION

[0024] In cooperation with attached drawings, the technical contents and detailed description of the present invention are described thereafter according to a preferable embodiment, being not used to limit its executing scope. Any equivalent variation and modification made according to appended claims is all covered by the claims claimed by the present invention.

[0025] In the following description of the preferred embodiments of the present invention, similar identical reference numbers designate identical or comparable components.

[0026] The electrical vacuum cleaner is a device for sucking up dust from the cleaning surface. Inside the vacuum cleaner there is a motor and the fan for creating air stream and filter system for collecting dust.

[0027] Fig. 1 shows an inner side of the cover 10 of the vacuum cleaner body 30. The cover 10 is a grill shaped element and is provided with two first ribs 11 located at the bottom of the cover 10 near the rotation axis 13 and with two second ribs 12 at the upper portion of the cover 10. The cover 10 is attached to the vacuum cleaner body (not shown on the figure) by two hinges located at the bottom portion of the cover 10. The cover 10 on the fig.1 is shown in substantially vertical position. The cover 10 with the first ribs 11 and the second ribs 12 are made as one element.

[0028] Fig. 2 shows a cross section of a part of a vacuum cleaner body 30 with the filter 20 and filter frame 21 and a cover 10 in an open position. In such position of the cover 10 first ribs 11 touches the filter frame 21 slightly. The filter frame 21 is provided with a rim 22. In the open position of the cover 10 the user puts the filter frame 21 with the filter 20 at a random position in which the filter frame 21 is ready to be pushed by the first ribs 11 into a preliminary position. The upper portion of the filter frame 21 leans against the protrusion 34 but do not engages it.

[0029] Fig 3 shows a cross section of a part of a vacuum cleaner body with the filter 20 and filter frame 21 and a cover 10 in a closed position. In the closed position the top portion of the cover 10 is snapped to the vacuum cleaner body 30. Second ribs 12 touches the holder 23 placed at the upper portion of the filter frame 21. The engaging element 24 engages the protrusion 34 of the vacuum cleaner body 30. The filter frame 21 fills out the filter cavity 33. The rim 22 is laying between the pin 31 and the sealing of the filter cavity 33. The filter 20 with the filter frame 21 is secured against detaching during usage by the cover 10.

[0030] Fig 4 shows a filter frame 21 in isometric view. The filter frame 21 is a plastic part made as a lattice and is designed to receive the filter 20 (not shown on the figure). The filter frame 21 is equipped with a rim 22. The rim 22 is circumferentially disposed on the filter frame 21. At the upper portion of the filter frame 21 the holder 23 is disposed. The holder 23 is designed for easy and convenient carrying the filter frame 21 with the filter 20

by the user in order to replace it.

[0031] Fig. 5 shows a filter frame 21 side view. The bottom side of the holder 23 is equipped with an engaging element 24. The engaging element 24 is designed in such a way to engage the protrusion 34 of the vacuum cleaner body 30 (not shown on the figure). The engaging element 24 and the protrusion 34 are hook-like shaped.

[0032] The present invention provides an exhaust filter arrangement which is positions inside the vacuum cleaner body correctly without attention of the user thanks only to the existence of the set of ribs placed on the inner surface of the cover. The present invention provides an easy to use, intuitive, self-positioning exhaust filter arrangement for efficient exhaust air filtering which comes out of the vacuum cleaner during vacuuming.

LIST OF REFERENCE SIGNS

[0033]

10	cover
11	first rib
12	second rib
13	rotation axis
20	filter
21	filter frame
22	rim
23	holder
24	engaging element
30	vacuum cleaner body
31	pin
33	filter cavity
34	protrusion

Claims

1. An exhaust filter (20) assembly for a vacuum cleaner comprising a filter frame (21) accommodating the filter (20) and a cover (10) pivotally mounted to a vacuum cleaner body (30) and which is pivotally between an open position and a closed position, where the cover (10) comprises at least one first rib (11) formed on an inner surface of the cover (10) for positioning the filter frame (21) into a preliminary position inside a filter cavity (33) placed in the vacuum cleaner body (30) **characterized in that** at least one second rib (12) of the cover (10) pushes the filter frame (21) into its end position inside the filter cavity (33) after setting the cover (10) in the closed position.
2. The exhaust filter (20) assembly according to claim 1, **characterized in that** at least one second rib (12) is placed on the inner surface of the cover (10).
3. The exhaust filter (20) assembly according to claim

- 1, **characterized in that** at least one first rib (11) is placed in a vicinity of a rotation axis (13) of the cover (10).
4. The exhaust filter (20) assembly according to claim 1, **characterized in that** at least one second rib (12) pushes the upper portion of the filter frame (21).
5. The exhaust filter (20) assembly according to claim 1, **characterized in that** at least one first rib (11) leads a rim (22) of the filter frame (21) to pass over at least one pin (31) placed on a wall of the filter cavity (33).
6. The exhaust filter (20) assembly according to claim 1, **characterized in that** in the end position of the filter frame (21) a holder (23) of the filter frame (21) engages a protrusion (34) of the vacuum cleaner body (30).
7. The exhaust filter (20) assembly according to claim 6, **characterized in that** the holder (23) is provided with at least one engaging element (24).
6. The vacuum cleaner according to claim 5, **characterized in that** the holder (23) is provided with at least one engaging element (24).

Amended claims in accordance with Rule 137(2) EPC.

1. A vacuum cleaner having an exhaust filter (20) assembly comprising a filter frame (21) accommodating the filter (20) and a cover (10) pivotally mounted to a vacuum cleaner body (30) and which is pivotally between an open position and a closed position, where the cover (10) comprises at least one first rib (11) formed on an inner surface of the cover (10) for positioning the filter frame (21) into a preliminary position inside a filter cavity (33) placed in the vacuum cleaner body (30) and at least one second rib (12) of the cover (10) pushes the filter frame (21) into its end position inside the filter cavity (33) after setting the cover (10) in the closed position **characterized in that** at least one first rib (11) leads a rim (22) of the filter frame (21) to pass over at least one pin (31) placed on a wall of the filter cavity (33).
2. The vacuum cleaner according to claim 1, **characterized in that** at least one second rib (12) is placed on the inner surface of the cover (10).
3. The vacuum cleaner according to claim 1, **characterized in that** at least one first rib (11) is placed in a vicinity of a rotation axis (13) of the cover (10).
4. The vacuum cleaner according to claim 1, **characterized in that** at least one second rib (12) pushes the upper portion of the filter frame (21).
5. The vacuum cleaner according to claim 1, **charac-**

Fig. 1

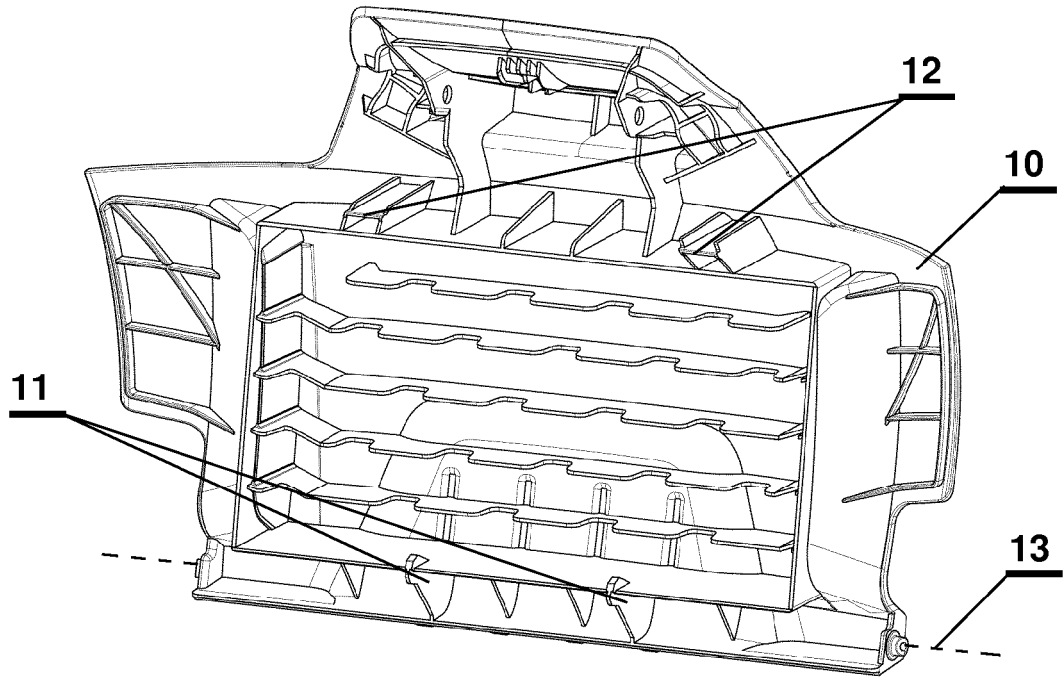


Fig. 2

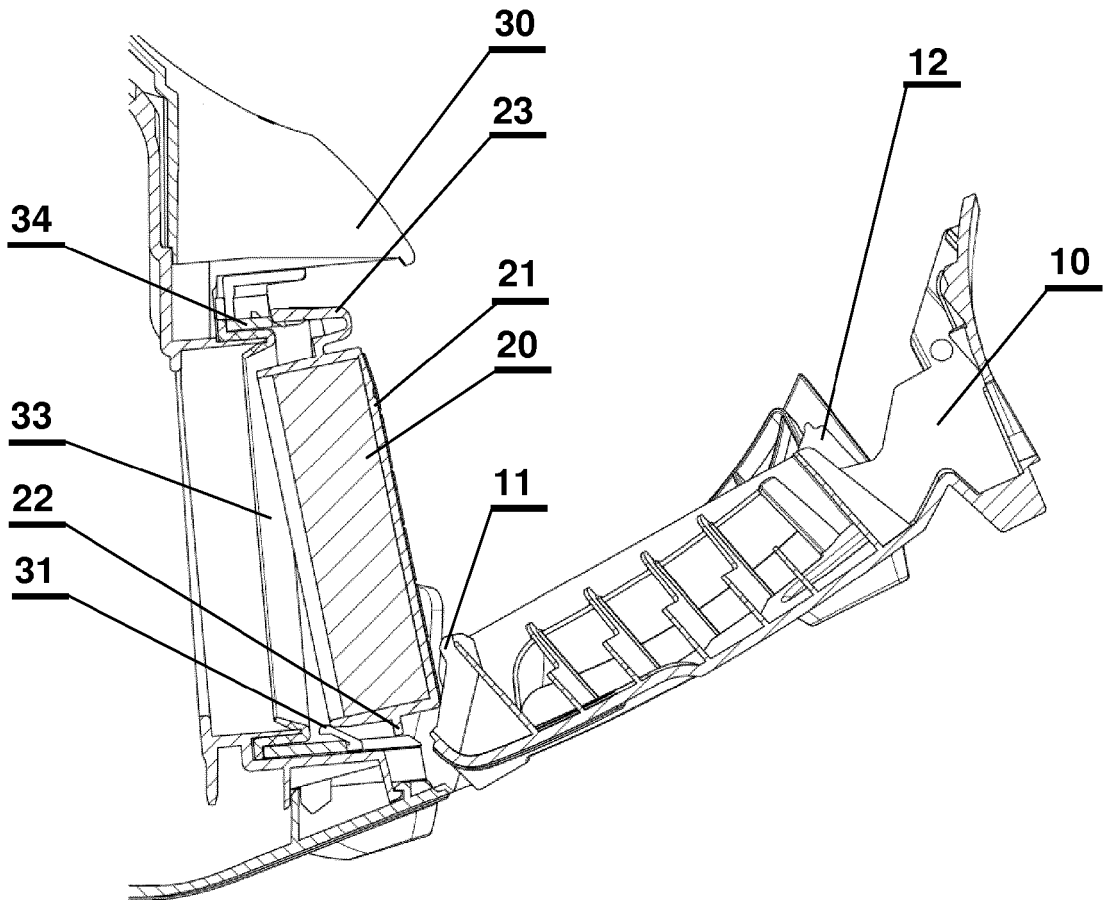


Fig. 3

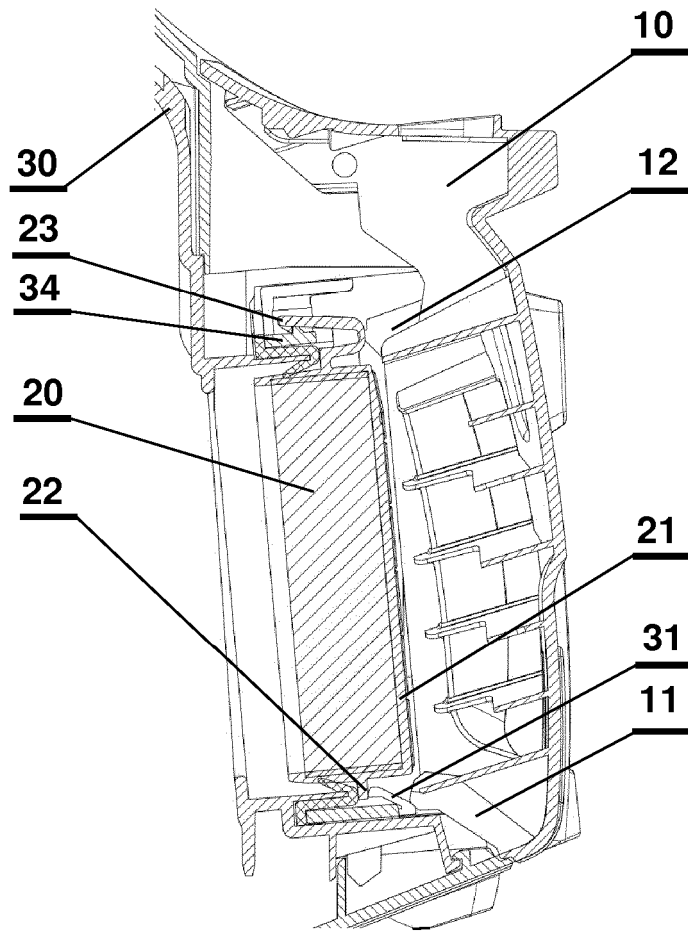


Fig. 4

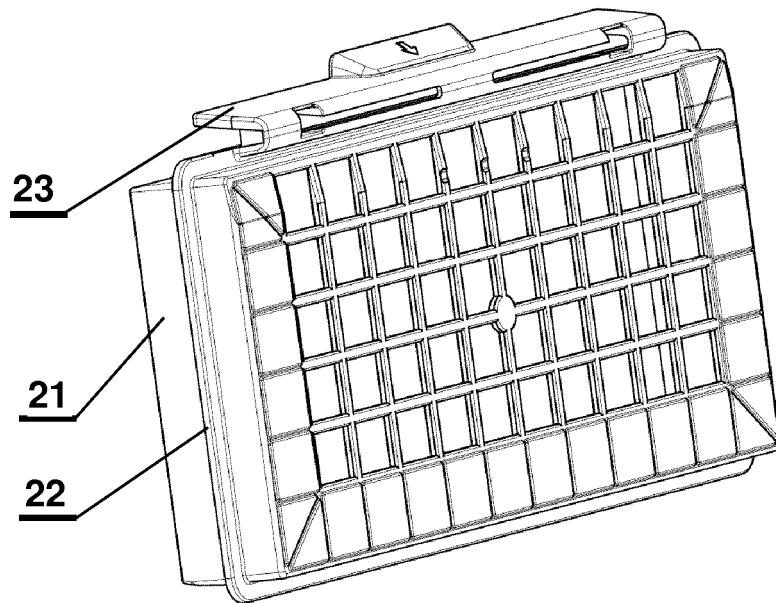
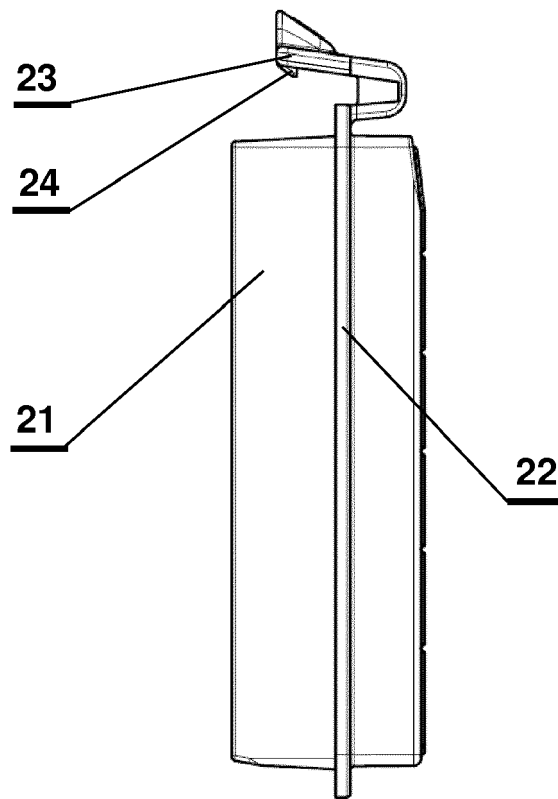


Fig. 5





EUROPEAN SEARCH REPORT

Application Number
EP 18 19 1257

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			TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 14 February 2019	Examiner Masset, Markus
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03.02 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT
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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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