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Published:

— *with international search report (Art. 21(3))*

A CLEANER-HEAD FOR A VACUUM CLEANER

The present invention relates to the field of vacuum cleaners, and in particular to a cleaner-head for a vacuum cleaner.

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The vacuum cleaner itself may be of any type. For example, the cleaner-head may be a cleaner-head for an upright vacuum cleaner, or alternatively it may be a cleaner head for a floor tool intended to be used with a cylinder vacuum cleaner or stick-vac cleaner. The invention is not limited to cyclonic vacuum cleaners.

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The underside of a cleaner head typically comprises a soleplate. This is the part which engages with the floor in use. The soleplate is normally a flattish plate – formed from metal or plastic – provided with a relatively large opening which acts as the suction inlet for the cleaner head.

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The soleplate may be detachable, either individually or as part of a larger, detachable soleplate assembly. This allows a user to access the inside of the cleaner head for cleaning, removing blockages etc. Alternatively, the soleplate – or soleplate assembly – may be hinged to allow access inside the cleaner head.

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The present invention concerns a cleaner head having a hinged soleplate assembly.

According to the present invention, there is provided a cleaner head for a vacuum cleaner, the cleaner head having a hinged soleplate assembly which can be opened and closed to allow access to the inside of the cleaner head, the soleplate assembly being held closed by a release catch on the cleaner head, the catch being arranged to pivot between a locking position and a release position, the catch incorporating a first cam, which cam is arranged to force open the hinged soleplate assembly as the catch is pivoted from the locking position to the release position.

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Modern vacuum cleaners have many features, many of which are user-operated using various levers, buttons and catches on the machine. As the number of features and functions increases with advances in technology, so too does the number of buttons, catches and levers. Consequently, there is the potential for confusion on the part of the user, who may be unsure about which button, lever or catch performs which function. In relation to a conventional hinged soleplate, there is the added problem that the user may not realize that the soleplate is hinged at all – the initial impression may be that the soleplate is detachable. This can lead to frustration and a poor user experience.

The present invention addresses this problem by forcing the soleplate to hinge open slightly as the catch is being released. Consequently, the user is alerted both to the fact that the catch releases the soleplate and also that the soleplate hinges, rather than detaching entirely. This is achieved by the use of a simple cam-action catch arrangement, which can be implemented at low cost. As the catch turns, so the cam acts to force open the soleplate.

The catch may comprise a second cam, which acts in the reverse sense of the first cam, so that as the catch is rotated back to the locking position, the soleplate assembly is pulled closed: the user does not have to hold the soleplate closed whilst operating the catch.

The cleaner head may comprise two such catches, one catch being arranged towards each end of the cleaner head. The provision of two catches helps prevent accidental unlocking of the soleplate assembly. At the same time, positioning the catches towards either end of the cleaner head provides for convenient unlocking of each catch using a single hand: a user can grasp the end of the cleaner head and use the thumb to release the catch. In this manner, both catches may be released simultaneously - using one hand for each catch – and need not be unlocked one after the other. Deliberate unlocking is quick and intuitive. For similar reasons, the catch(es) may be located towards the rear

of the housing and/or arranged to pivot about a pivot axis which extends towards the front edge.

5 The catch(es) may be mounted on the housing and the cam(s) may thus engage the soleplate assembly.

10 The soleplate assembly may be hingedly connected to the housing along a front edge of the housing. This helps prevent accidental opening of the soleplate in use (during which the cleaner will most likely be pushed more forcefully in a forward direction than a rearward direction).

15 According to another aspect of the present invention, there is provided a housing and a soleplate assembly hingedly connected to the housing, the soleplate assembly and housing being held closed by a releasable catch, the catch being pivotally mounted to one of the housing or the soleplate assembly for rotation between a locking position and a release position, the catch incorporating a first cam, which cam engages the other of the soleplate assembly or the housing as the catch is rotated from the locking position towards the release position, in order to force apart the housing and the soleplate assembly.

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

25 Figure 1 is a perspective view of an upright vacuum cleaner having a cleaner head;

Figure 2a is a perspective view of the above-mentioned cleaner head, but in isolation from the upright vacuum cleaner;

30 Figure 2b is a perspective view of the cleaner head from underneath, showing the suction opening and brushbar;

Figure 3 is a front perspective view of a brush housing forming part of the cleaner head;

Figure 4 is a front perspective view of a soleplate assembly forming part of the cleaner
5 head;

Figure 5 is a rear perspective view of the brush housing;

Figure 6 is a rear perspective view of the soleplate assembly;

Figure 7 is a sectional view along A-A, illustrating the hinged connection between the
10 soleplate assembly and the brush housing;

Figure 8 is a rear perspective view of the assembled cleaner head; and

15 Figures 9a -9c show a rear part of the cleaner head comprising a catch in a locking position, an intermediate position and a release position, respectively.

Figure 1 shows an upright vacuum cleaner 1 having a cleaner head 3.

20 The cleaner head 3 is shown in isolation in Figures 2a and 2b. It comprises two parts: a brush bar housing 5 and a soleplate assembly 7.

25 The brush bar housing 5 is shown in isolation in Figures 3 and 5. It houses a motor-driven brush bar 9 (Figure 2b) which, in use, rotates about the axis A (the drive motor is itself housed inside the brush bar 9).

30 The soleplate assembly 7 is shown in isolation in Figures 4 and 6. It comprises a chassis 11 and a soleplate 13 which is connected to the chassis 11 via a flexible skirt 15 to give the soleplate 13 a degree of "float" see e.g. PCT Publication No.WO2010/119279.

The soleplate 13 is generally rectangular, and incorporates a relatively large, rectangular suction opening 13a, which forms the suction inlet for the cleaner head 3. The suction opening 13a is oriented so that it aligns with the brush bar 9.

- 5 The soleplate assembly 7 is hinged so that the entire soleplate assembly 7 can be opened and closed, as required, conveniently to access the inside of the brush bar housing 5, for example to access the brush bar 9. The hinge connection between the soleplate assembly 7 and the brush housing 5 is formed by a first hinge part on the soleplate assembly 7, which clips on to a second hinge part on the brush housing 5.

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The first hinge part comprises a series of resilient tabs 19 running along the inside of a bumper 17 provided along the front edge of the chassis 11. You can see these resilient tabs 19 in Figure 6.

- 15 The second hinge part comprises a corresponding series of resilient tabs 21 running along the front edge of the brush housing 5. You can see these resilient tabs 21 in Figure 3.

The two sets of resilient tabs 19, 21 manually clip together – as illustrated in Figure 7 –
20 and co-operate to provide the required hinge action B between the soleplate assembly 7 and the brush housing 5.

The two hinge parts are arranged so that, if it is required to detach the soleplate assembly 7 from the housing 5 – for example to replace or clean the soleplate assembly
25 7 individually – the soleplate assembly 7 can simply be un-clipped from the brush housing 5. This is achieved by over-rotating the soleplate assembly 7 and brush housing 5, effectively levering the bumper 17 against the brush housing to force the resilient tabs 19, 21 out of clipping engagement with one another. In effect, the over-rotation of the soleplate assembly is used to prise apart the resilient tabs 21, so that the soleplate
30 assembly 7 can be detached.

As required, the resilient hinge parts 19, 21 can conveniently be clipped back together to reconnect the soleplate assembly 7 and the brush housing 5. The arrangement thus combines the advantages of a hinged connection and the ability to be able to separate the soleplate assembly 7 and brush housing 5 completely as and when required, simply
5 by manually clipping and un-clipping the hinge parts. No separate tools are required to connect and detach the soleplate assembly 7 and brush housing 5.

The soleplate assembly 7 is held closed by two pivotable catches 19a, 19b mounted on a rear part of the brush housing 5. You can see these catches in Figure 8. The two catches
10 19a, 19b are spaced apart so that the catch 19a is positioned towards the left-hand side of the brush housing 5 (looking from the rear of the brush housing 5, as in Figure 8) and the other catch 19b is positioned towards the right-hand side of the brush housing 5 (again, looking from the rear of the brush housing 5).

15 Figures 9a to 9c illustrate operation of the catch 19a.

The catch 19a is obscured slightly by the brush housing 5 when it is *in situ* (see Figure 8) and so the brush housing 5 has been omitted in Figures 9a to 9c to admit a better view of the catch 19a.

20 The catch 19a is pivotally mounted on the brush housing 5 via a journal part 23 which clips onto a corresponding axle (not shown) on the brush housing 5. The axis of rotation of the catch 19a thus extends into the page in Figures 9a to 9b.

25 The catch 19a comprises a catch recess 23 (hidden from view, but shown in phantom in Figure 9a), a first cam 25 and a second cam 27 which, in this case, is formed by the walls of the catch recess 23.

The catch recess 23 engages with a corresponding projection 29 on the soleplate 7 to
30 hold the soleplate 7 closed. In Figure 9a, the catch 19a is shown in its locking position, fully engaged with the locking projection 29.

To release the catch 19a, the catch 19a is manually rotated anti-clockwise (indicated by the arrow C in Figures 9a and 9b).

- 5 The release action of the catch 19a is a cam-action, resulting from co-operation of the first cam 25 with the locking projection 29. This is illustrated in Figure 9b, which shows an intermediate position for the catch 19a, between the locking position and a full release position. Here, the first cam 25 has engaged with the projection 29 and, as the catch 19a is pivoted towards the full release position, 'pushes' on the projection 29 to
10 force apart the housing 5 and the soleplate assembly 7 (indicated by the arrow D in Figure 9b). This initial pushing movement helps alert the user to the fact that the catch 19a releases the soleplate assembly 7 from the brush housing 5.

- The full release position for the catch 19a is shown in Figure 9c. Here, the recess 23 is
15 fully disengaged from the locking projection 29, allowing detachment of the soleplate assembly 7 from the brush housing 5.

- The locking action of the catch 19a is also a cam-action, resulting from co-operation of the second cam 27 with the locking projection 29. Thus, as the catch 19a is rotated back
20 towards the locking position in Figure 9a, the second cam 27 'pulls' against the locking projection 27a to force the soleplate assembly 7 and housing 5 back together. The catch 19a is effectively designed to 'gather' the locking projection as it pivots back towards the locking position. Consequently, the user does not need to hold the soleplate assembly 7 and housing 5 together when locking the catch 19a: close proximity of the
25 relevant edges of the housing 5 and soleplate assembly 7 will suffice.

The catch 19b pivots in the reverse sense to catch 19a, but otherwise operates in the same way.

- 30 The catches 19a, 19b can each be operated by grasping the respective end of the cleaner head 3 and using the thumb to pivot the catch. The catches 19a, 19b are thus arranged

for simultaneous operation using two hands. This is facilitated in part by the fact that the catches pivot about respective pivot axes which extend front-to-back (into the page in Figures 9a to 9c), providing for a natural, comfortable movement of the user's thumb to pivot the catches 19a, 19b between the locking position and release position.

CLAIMS

1. According to the present invention, there is provided a cleaner head for a vacuum cleaner, the cleaner head having a hinged soleplate assembly which can be opened and closed to allow access to the inside of the cleaner head, the soleplate assembly being held closed by a release catch on the cleaner head, the catch being arranged to pivot between a locking position and a release position, the catch incorporating a first cam, which cam is arranged to force open the hinged soleplate assembly as the catch is pivoted from the locking position to the release position.
2. A cleaner head according to claim 1, in which the catch comprises a second cam, which second cam engages the soleplate assembly or the housing, as the case may be, to pull together the housing and the soleplate assembly as the catch is rotated from the release position back to the locking position.
3. A cleaner head according to claim 1 or 2, comprising two catches, one positioned towards either end of the cleaner head.
4. A cleaner head according to any preceding claim, in which the catch is mounted on the housing and the cam(s) engages the soleplate assembly.
5. A cleaner head according to any preceding claim, in which the soleplate assembly is hingedly connected to the housing along a front edge of the housing.
6. A cleaner head according to claim 5, in which the catch is located towards the rear of the housing.
7. A cleaner head according to claim 6, in which the catch is arranged to pivot about a pivot axis which extends towards the front edge.

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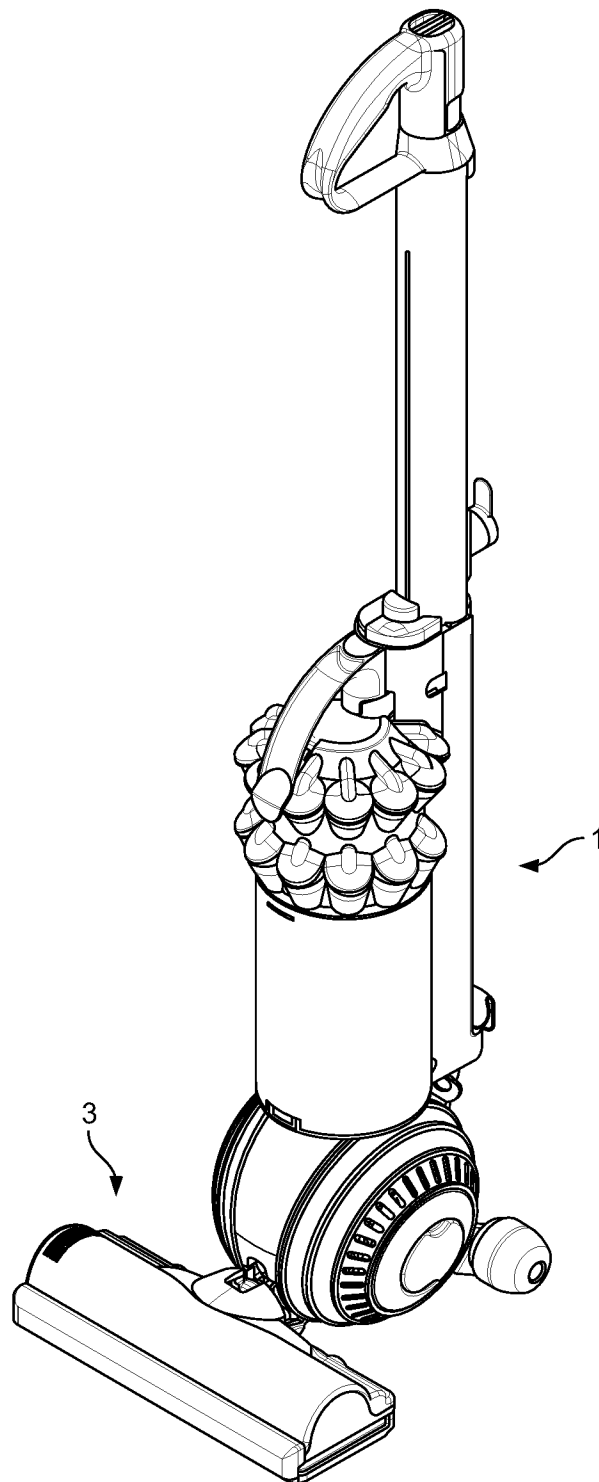


FIG. 1

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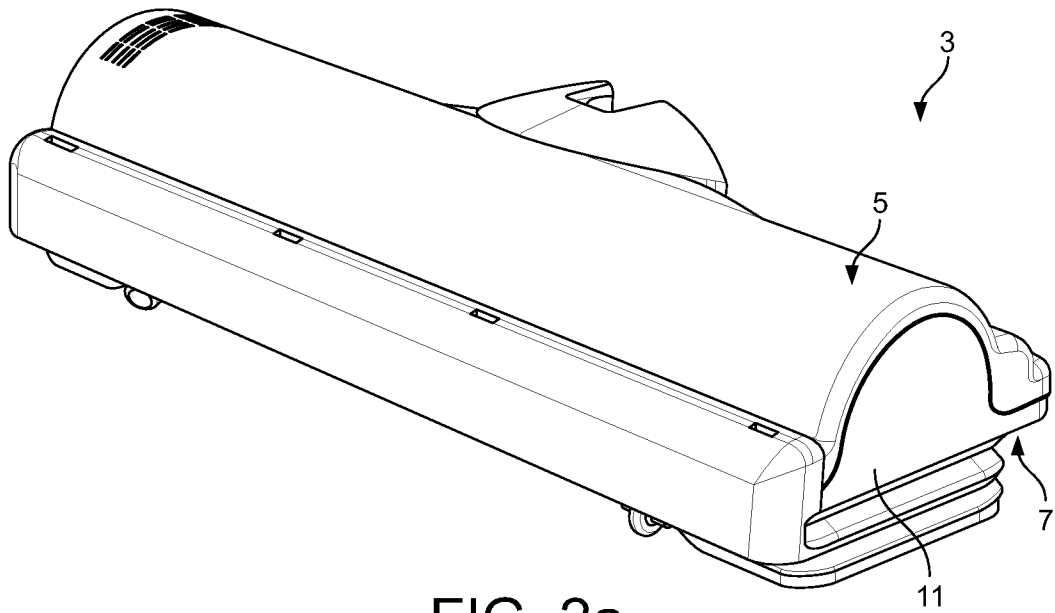


FIG. 2a

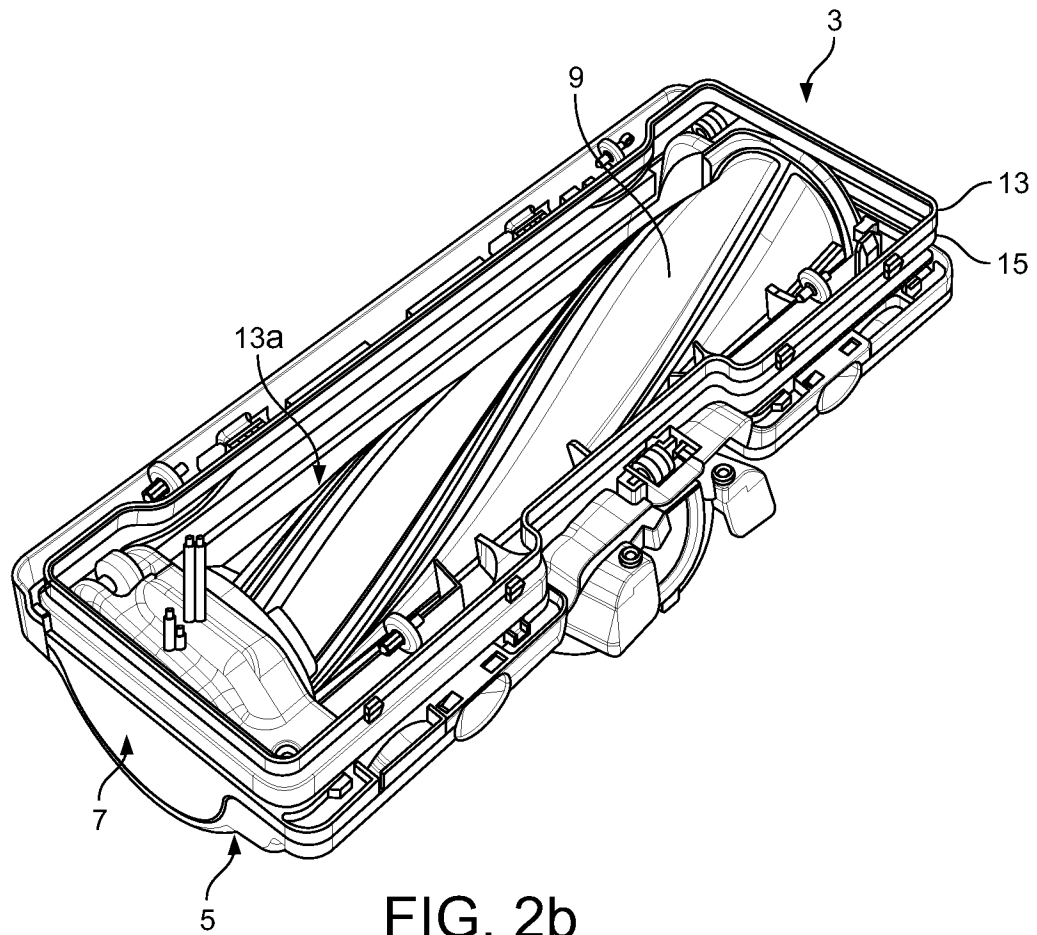


FIG. 2b

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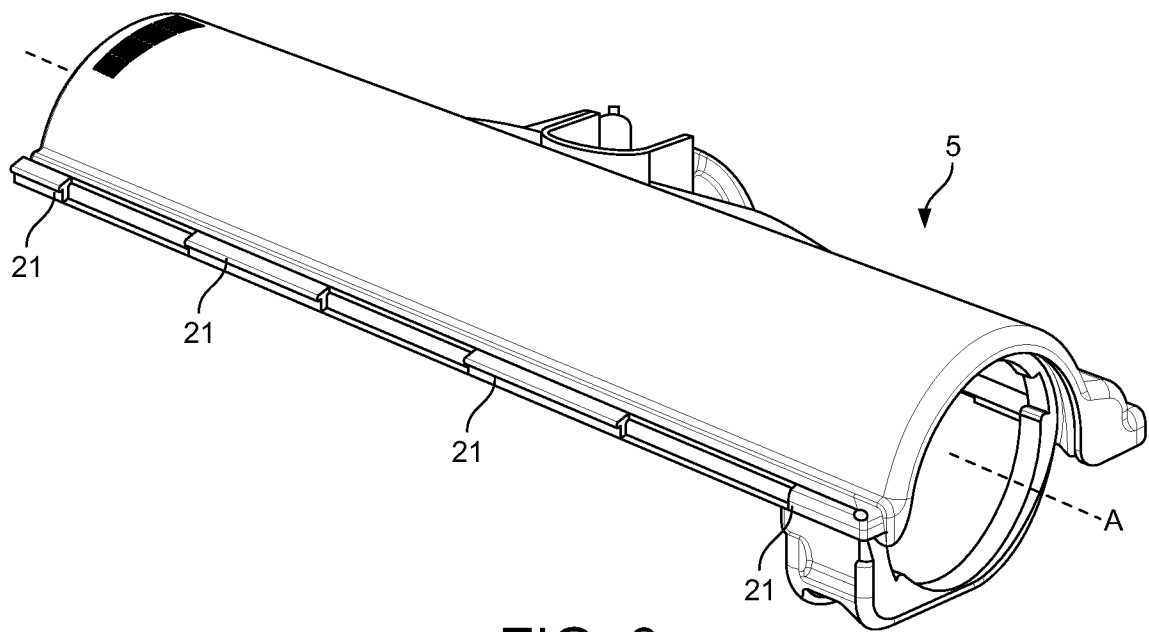


FIG. 3

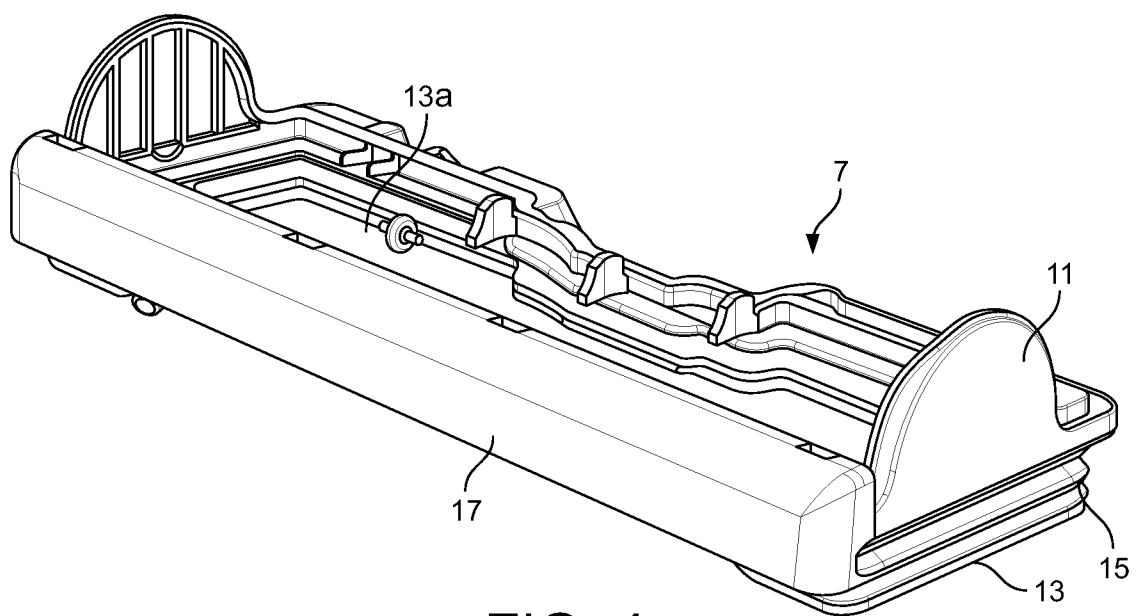


FIG. 4

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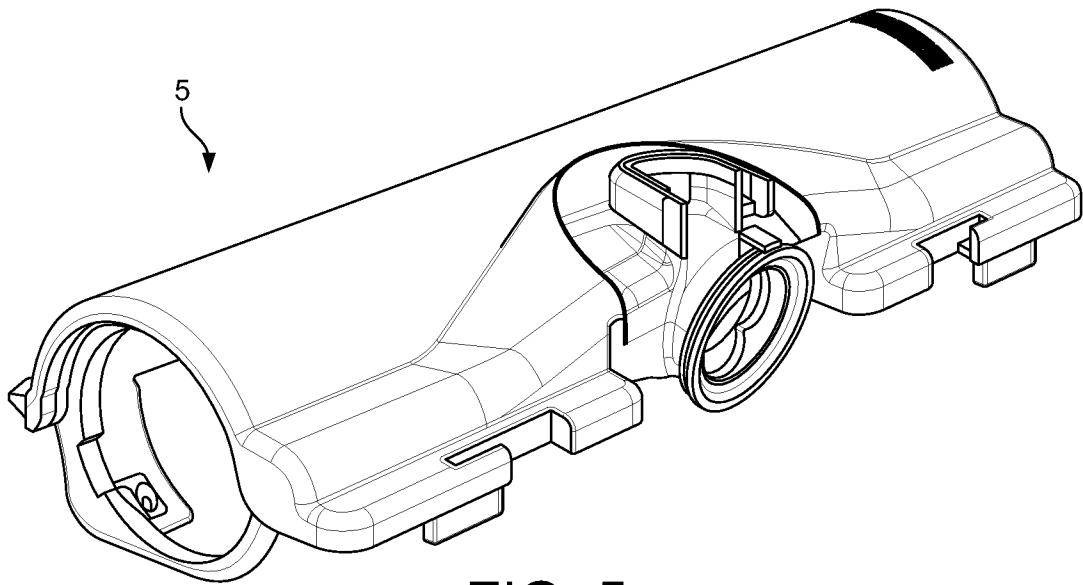


FIG. 5

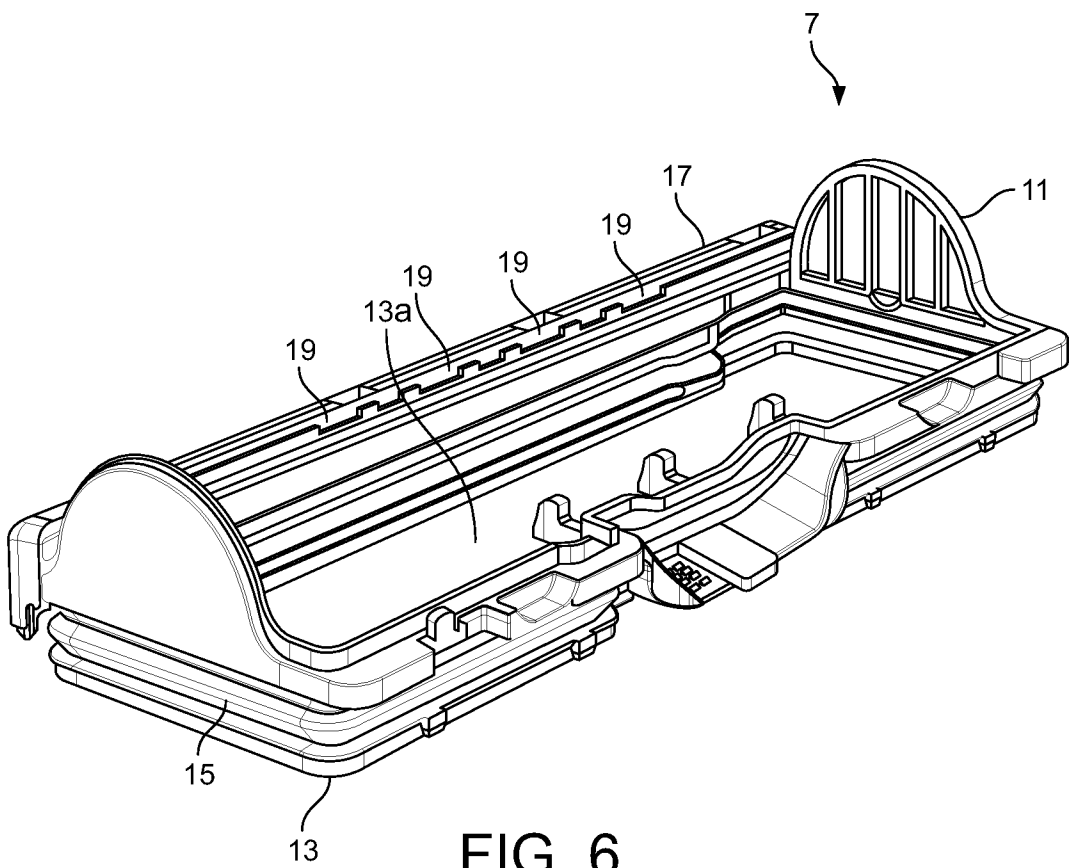


FIG. 6

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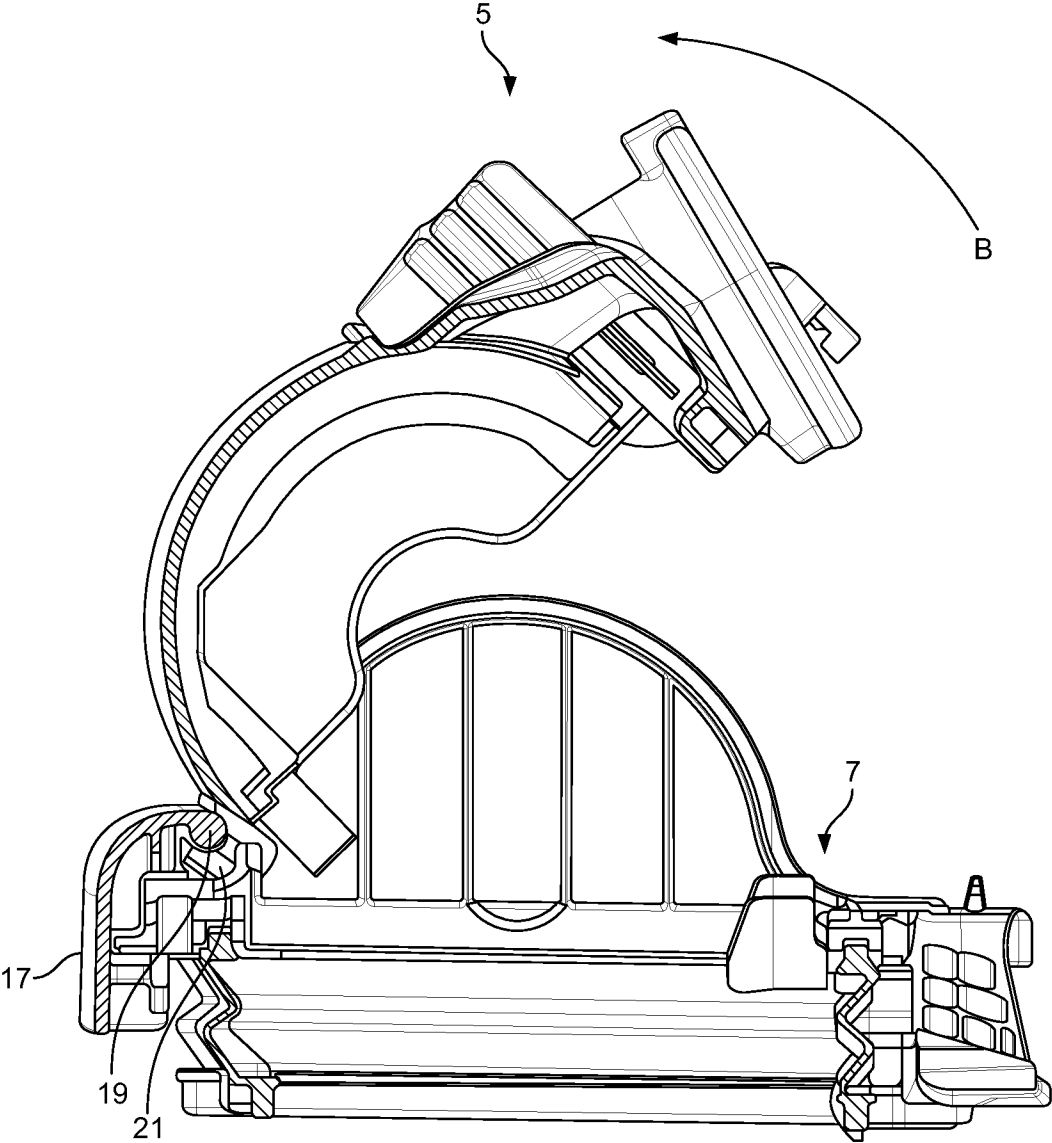


FIG. 7

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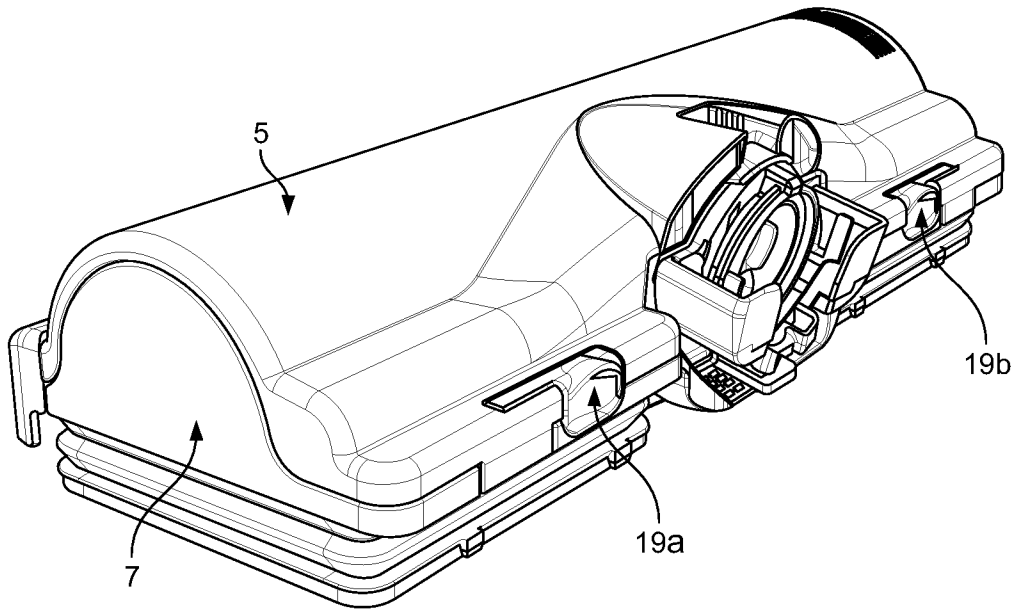


FIG. 8

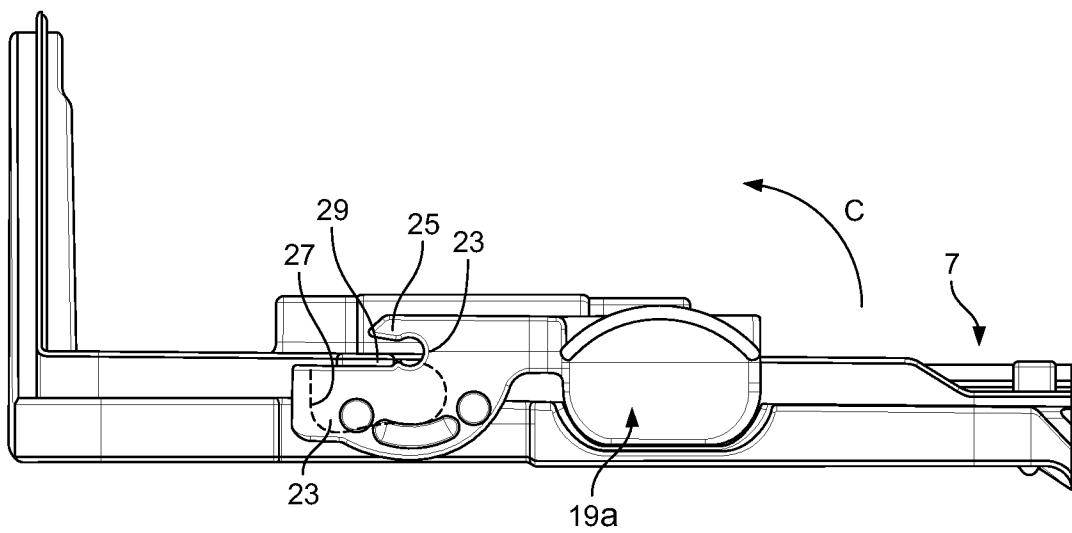


FIG. 9a

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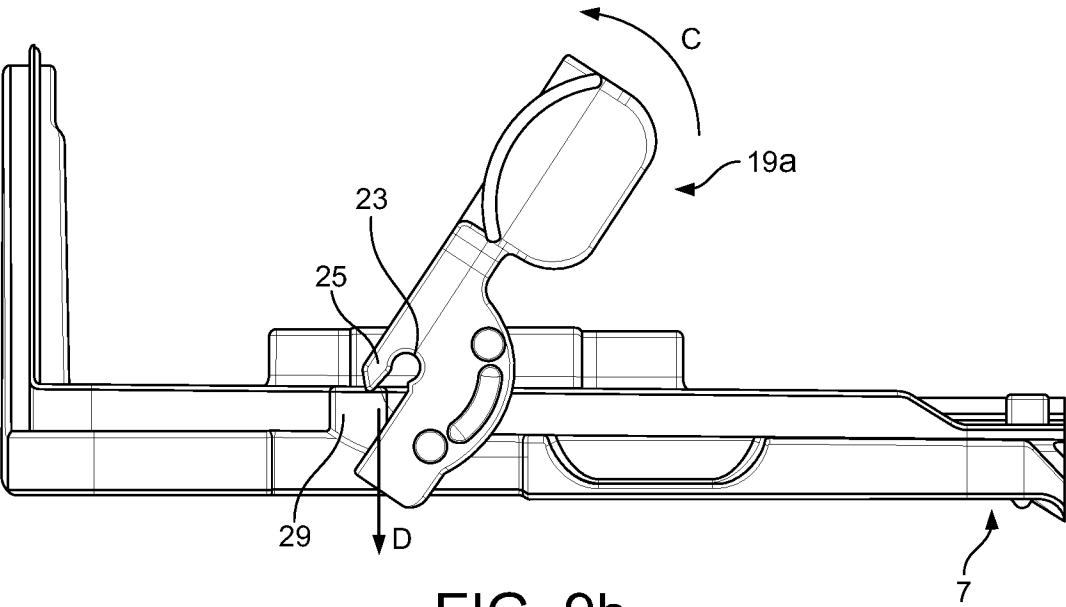


FIG. 9b

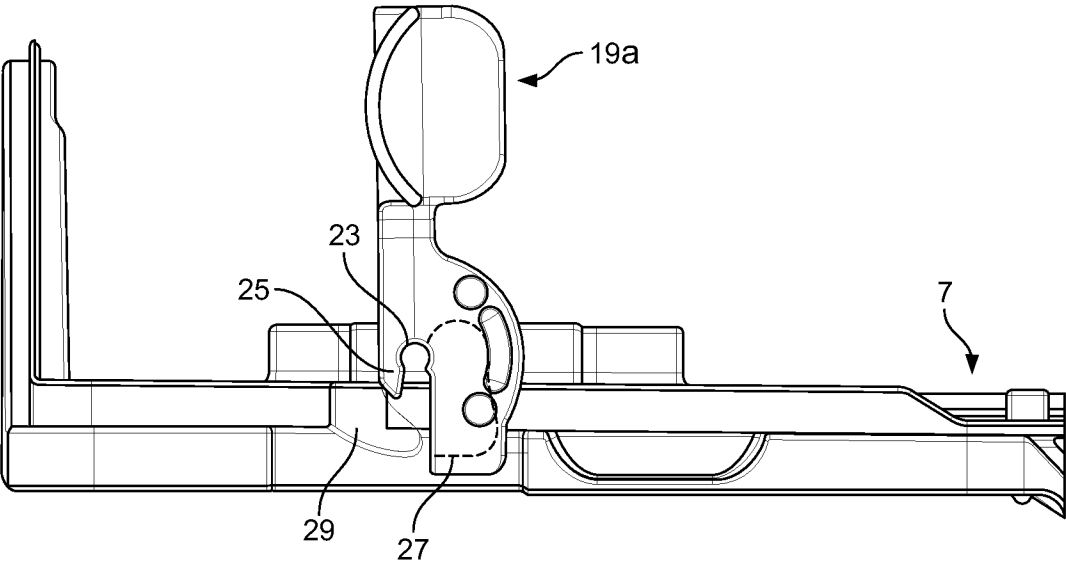


FIG. 9c

INTERNATIONAL SEARCH REPORT

International application No
PCT/IL2013/050800

A. CLASSIFICATION OF SUBJECT MATTER
INV. A47L9/02
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)

EP0-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	EP 0 650 689 A1 (REXAIR INC [US]) 3 May 1995 (1995-05-03) abstract; figure 3 -----	1-7
A	WO 2005/111084 A2 (DYSON TECHNOLOGY LTD [GB]; BYATT NICHOLAS GEORGE [GB]; CAMERON JAMES E) 24 November 2005 (2005-11-24) abstract; figures 2b,3 -----	1-7



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

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"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

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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

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Date of the actual completion of the international search

3 December 2013

Date of mailing of the international search report

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IL2013/050800

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