(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 2 385 166 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
09.11.2011 Bulletin 2011/45

(51) Int Cl.:
D06F 39/10 *(2006.01)*

(21) Application number: **10161908.8**

(22) Date of filing: **04.05.2010**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO SE SI SK SM TR
Designated Extension States:
BA ME RS

(71) Applicant: **Electrolux Home Products Corporation N.V.**
1130 Brussel (BE)

(72) Inventors:
- **Buso, Danny**
  33080 Porcia (PN) (IT)
- **Rizzetto, Pietro**
  30029 S. Stino di Livenza (VE) (IT)

(74) Representative: **Nardoni, Andrea et al**
Electrolux Italia S.p.A.
Corso Lino Zanussi, 30
33080 Porcia (PN) (IT)

(54) Washing machine

(57) The invention relates to a washing machine (1), comprising: a washing tub (2), in which a rotatable drum (3) is arranged, a draining sump (4) which is in fluidic communication with the inner of said tub (2) and in fluidic communication with a draining circuit (5) and a housing element (6) arranged in said draining sump (4) in which a filter element (7) is arranged, a maintenance arrangement (8) with an opening (9) arranged in a lateral surface (10) of the drum (3), wherein the opening (9) allows the access to the filter element (7) when facing the housing element (6), wherein the maintenance arrangement (8) comprises a base element (11) and a lid element (12), wherein the lid element (12) can be moved relatively to the base element (11) from a closed position (A) in which the opening (9) is covered by the lid element (12) into an open position (B) in which the opening (9) allows the access to the filter element (7). To improve the handling of the washing machine when cleaning the filter element and to ensure a proper operation after the cleaning operation, the invention is characterized in that the lid element (12) is biased into its closed position (A) by means of an elastic element (13) and/or that connection means (18) are arranged to fix the lid element (12) in its closed position (A) by means of a metal spring element (20) and a pawl element (23).

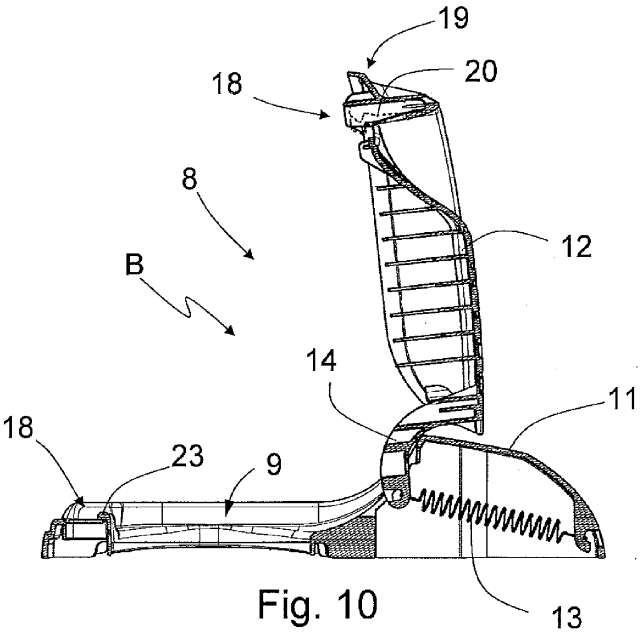

Fig. 10

EP 2 385 166 A1

Description

[0001] The invention relates to a washing machine, comprising a washing tub, in which a rotatable drum is arranged, a draining sump which is in fluidic communication with the inner of said tub and in fluidic communication with a draining circuit and a housing element arranged in said draining sump in which a filter element is arranged, a maintenance arrangement with an opening arranged in a lateral surface of the drum, wherein the opening allows the access to the filter element when facing the housing element, wherein the maintenance arrangement comprises a base element and a lid element, wherein the lid element can be moved relatively to the base element from a closed position in which the opening is covered by the lid element into an open position in which the opening allows the access to the filter element.

[0002] Known washing machines usually comprise an external casing provided with a loading/unloading door which allows the access to a washing tub containing a rotatable perforated drum in which the laundry to be washed can be loaded. Normally, the drum is provided with some lifters adapted to improve the stirring of the laundry during the rotation of the drum. The lifters are substantially prismatic elements fixed to the inner lateral surface of the drum and positioned with their longitudinal axis substantially parallel to the longitudinal axis of the drum.

[0003] In a first type of known washing machines, the so-called "front-loading" washing machines, on the frontal wall of the external casing it is obtained a first opening, adapted for allowing the loading/unloading of the laundry, facing a second opening obtained in the tub and a third opening obtained in one base of the drum. The borders of these first and second openings are connected by a flexible bellows. The first opening is closable by a porthole hinged to the frontal wall of the external casing.

[0004] In a second type of known washing machines, the so-called "top-loading" washing machines, on the upper surface of the external casing it is obtained a substantially rectangular first opening, facing a corresponding second opening obtained in the lateral surface of the tub. Also in this case the borders of the first and second openings are connected by a flexible bellows. The first opening is closable by an external lid hinged to the upper surface of the external casing. On the lateral surface of the rotatable perforated drum, a third opening is obtained, adapted, when it is positioned in correspondence to the first and to the second openings, to allow the loading/unloading of the laundry in the drum. The third opening is closable by one or, most frequently, by two internal lids, which, when closed, substantially constitute a portion of the cylindrical lateral surface of the drum. These internal lids, when opened and placed in the loading position, engage the border of the first opening obtained in the external casing, partially exiting from the latter, and limiting in this way the rotation of the rotatable drum during the opening of the latter.

[0005] Both the above mentioned front-loading and top-loading washing machines comprise a water outlet circuit, typically comprising a drain pump and some draining pipes, adapted to drain water from the tub after the washing and rinsing phases. The water outlet circuit usually comprises filtering means, placed between the bottom of the tub and the drain pump, adapted to retain all undesirable bodies (for example buttons came off from the laundry, coins erroneously introduced into the washing machine, etc.) passed through the holes located on the periphery of the drum, or fell to the bottom of the tub by passing between the drum and the tub, which could damage or obstruct the pump.

[0006] The most common of these filtering means comprise a cylindrical box attached to the base of the washing machine and containing a removable filter fluidly connected upstream of the drain pump. This box containing the filter is accessible through a quick-removable plug that allows the filter to be removed and cleaned, the plug being hidden by a gate located, depending on the case, on the front or back wall of the external casing of the washing machine.

[0007] There are also known washing machines of the top-loading type comprising a draining sump obtained on the lower region of the lateral surface of the tub, and fluidly communicating with the internal of the latter. A filter is placed in a housing obtained inside the draining sump, and the drain pump is attached to the tub in the extension of this draining sump. In this case, one of the above mentioned lifters, arranged longitudinally to the drum and protruding internally to the latter, is removable, in order to allow the access to the underlying housing, and the removal/repositioning of the filter, for example for its cleaning.

[0008] Such a prior art washing machine according of the kind mentioned above and containing a filter used to prevent residual particles of dirt from reaching and obstructing the pump and its drainage duct, and which can be removed from the internal of the tub, for inspection, cleaning and replacement, is disclosed in EP 1 849 904 A1.

[0009] A similar solution is disclosed in GB 1 197 919, which shows a washing machine comprising a tank (i.e. a tub) for liquid with an opening in its base, a draining pump connected by a pipe to the opening of the tank, and a basket (i.e. a rotary drum) disposed within the tank. A cup-like filter element having filter openings in its side wall is removably seated in the tank opening, and an opening is provided in the basket, provided with a removable closure, to provide access to the filter element.

[0010] Another similar solution of a washing machine provided with a filter which can be removed from the internal of the tub is disclosed in FR 2 190 966, which shows a top-loading washing machine comprising a tub containing a rotary drum provided, on its lateral surface, with a first door, adapted for loading/unloading the laundry, and with a second door, disposed opposite to the first door and adapted for allowing the recovering of linen which

would have slipped between the tank and the drum. A connector is fixed to the bottom of the tub, such connector being provided, at his inferior region, with a duct adapted to receive one of the extremities of a discharging pipe. A housing is provided in the connector, adapted to receive a filter accessible by simultaneously opening the two doors of the drum.

[0011] In EP 1 849 910 A1 a washing machine is disclosed with a similar design. Here, a ratchet mechanism is employed, but this solution has some drawbacks with regard to the endurance of the system. The lid is simply closed by a hook element.

[0012] In the pre-known applications it is - both in the case of top-loaded and front-loaded washing machines - currently not possible to get an easy access to the filter element to maintain the washing machine and to ensure at the same time that it is made sure that the opening to the filter remains closed during regular operation of the washing machine.

[0013] Thus, it is an object of the invention to propose a solution by which it is possible to improve the handling of the system when cleaning or inspecting the filter element and to ensure a proper operation after the cleaning or inspection operation, i.e. that the opening remains closed securely. Thus, it is aimed for a washing machine which facilitates the access to the filter and consequently to facilitate and to speed up the cleaning and/or the removing or repositioning of a filter element from or to the housing associated to the tub.

[0014] The solution of this object is characterized in that the lid element is biased into its closed position by means of an elastic element and/or that connection means are arranged to fix the lid element in its closed position by means of a metal spring element and a pawl element.

[0015] Preferably, the metal spring element is arranged in the lid element and the pawl element is arranged in the base element. However a further embodiment is possible, in which the metal spring element can be arranged in the lid base element and the pawl element can be arranged in the lid element.

[0016] The lid element can be arranged pivotable relatively to the base element. In this case the axis of the pivot movement is preferably, but not necessarily, arranged substantially perpendicular to the projection of the axis of rotation of the drum.

[0017] The lid element can comprise a lever arm which is connected with a cover part of the lid element, wherein the elastic element is arranged between the lever arm and the base element or directly with the drum. The lever arm can comprise at least two bar elements being arranged parallel to another.

[0018] The elastic element can be a coil spring. Also, the elastic element can be made of spring steel. An alternative suggests that the elastic element can comprise a rubber band. A further alternative comes up with the elastic element comprising a pneumatically operating spring element (called also "gas spring").

[0019] The connection means can be arranged at one end side of the lid element.

[0020] The spring element can be a bent sheet metal part made of metal, for example spring steel.

[0021] The spring element can be fixed in the lid element or in the base element for example by means of a snap connection.

[0022] It should be mentioned that the base element can be directly formed by a section of the drum; i.e. it needs not to be a separate part which is mounted in the inner surface of the drum.

[0023] The washing machine can also include a dryer function. In this case the proposed machine is a washer-dryer.

[0024] According to the invention a washing machine is proposed with a lifter which can be tiled for allowing the access to the filter which is placed in the sump obtained in the tub. It becomes possible to easily maintain and/or to substitute the filter element with an easy handling of the system. On the other hand it is ensured that the lid cannot open during normal operation of the washing machine.

[0025] This is established by the presence of elastic means (e. g. in the form of the mentioned spring element) adapted to automatically take the lifter (lid) in the closed position.

[0026] On the other hand, it is possible to employ a retaining mechanism for retaining the lifter (lid) in the closed position, comprising a metal spring associated to the lifter (lid) and adapted to engage the pawl element associated to the frame (base element) or directly to the drum to which the lifter is pivoted.

[0027] The proposed solution is useful for washing machines of the top loading type as well as for such of the front loading type.

[0028] In the drawings embodiments of the invention are depicted.

FIG 1 shows a schematically front view of a washing machine,

FIG 2 shows a perspective view of the washing tub of the washing machine with a maintenance arrangement in the drum of the washing tub, where a lid element of the maintenance arrangement is in its closed position,

FIG 3 shows a perspective view of the washing tub according to FIG 2, where the lid element of the maintenance arrangement is in its open position,

FIG 4 shows a perspective view of the washing tub according to FIG 3 with the lid in its open position, partially in sectional view,

FIG 5 shows an enlarged view of the maintenance arrangement according to FIG 4,

FIG 6 shows a side view of the washing tub with the lid in its open position, partially in sectional view,

FIG 7 shows a perspective view of the maintenance arrangement with the lid in its closed position,

FIG 8 shows a perspective view of the maintenance

arrangement with the lid in its open position,
FIG 9 shows an explosion view of the maintenance arrangement,
FIG 10 shows a side view of the maintenance arrangement with the lid in its open position,
FIG 11 shows the bottom view of the maintenance arrangement with the lid in its closed position,
FIG 12 shows the maintenance arrangement with the lid in its closed position, where connection means are shown in detail to fix the lid in its closed position,
FIG 13 shows an enlarged view of the left part of the maintenance arrangement according to FIG 12,
FIG 14 shows the maintenance arrangement with the lid in its closed position, similar to
FIG 12,
FIG 15 shows an enlarged view of the right part of the maintenance arrangement according to FIG 14,
FIG 16 shows the maintenance arrangement with the lid in a position shortly before the closed position is reached, similar to FIG 12,
FIG 17 shows an enlarged view of the right part of the maintenance arrangement according to FIG 16.

[0029] In FIG 1 a washing machine 1 is schematically shown which has a washing tub 2, in which a rotatable drum 3 is arranged. The drum 3 rotates during the washing operation around the axis of rotation D. In the bottom region of the tub 2 a draining sump 4 is arranged. The draining sump 4 is fluidically connected with the tub 2 as well as with a draining circuit 5.

[0030] The draining sump 4 comprises a housing element 6 in which a filter element 7 is arranged. The filter element 7 filters particles which should not be drained via the draining circuit 5. So, it is necessary from time to time to inspect the filter element 7 and possibly to clean it or to replace it. The filter element 7 can be removable, as in the example illustrated in the enclosed figures, or a non-removable filter element 7 can be employed, i.e. a filter which is fixed to the sump 4; in the last case only a cleaning process takes place, not an exchange of the filter element 7.

[0031] To allow the access to the filter element 7 a maintenance arrangement 8 is located at a circumferential position of the drum 3, i.e. at a lateral surface 10 of the drum 3. The maintenance arrangement 8 has an opening 9 which is covered by a lid element 12 during regular use of the washing machine 1. Advantageously the maintenance arrangement 8 has a base element 11 which bears the lid element 12. It should be mentioned that the base element 11 needs not necessarily to be a separate part; it is also possible that the base element 11 is directly formed into the inner surface of the drum 3, i.e. that a part of the drum 3 forms the base element. In this case the lid element 12 can be hinged directly to the drum 3.

[0032] The lid element 12 can be placed in two different positions: in a closed position (hereinafter specified as position A) the opening 9 is covered by the lid element 12. In an open position (hereinafter specified as position B) the lid element 12 is pivoted around an axis C (shown in FIG 9 and 11) so that the access to the opening 9 and thus - when the drum is placed in the right position - to the filter element 7 is given.

[0033] In FIG 2 the drum 3 with the maintenance arrangement 8 can be seen, wherein the lid element 12 of the maintenance arrangement 8 is in the closed position A. Thus, in this state the washing machine is ready for normal use.

[0034] In FIG 3 the maintenance arrangement 8 is shown in the state where the lid element 12 is in its open position B. The drum 3 is positioned in such a way that the maintenance arrangement 8 is in the lowermost position. Thus, after opening (pivoting) of the lid element 12, access is given to the filter element 7 in the housing element 6 of the draining sump 4.

[0035] This situation is shown with some details in FIG 4. Also here, the lid element 12 is in its open position B. Is can be seen that access is given via the opening 9 to the filter element 7.

[0036] According to the invention it is proposed that the lid element 12 is biased into its closed position A by means of an elastic element 13. This can be seen in FIG 5. Here, an elastic element 13 in the form of a coil spring is engaged to make sure that the lid 12 is steadily forced, i.e. biased into the closed position A.

[0037] It should be noted that any kind of elastic element 13 can be employed. Other preferred solutions are coming up with the elastic element comprising a rubber band or a "gas spring", i.e. a pneumatically working spring element. Clearly one or more elastic element can be used.

[0038] In the embodiment according to FIG 5 the lid element 12 comprises a cover part 15 which is connected with a lever arm 14. At one end of the lever arm 14 one end of the spring element 13 is fixed. The other end of the spring element 13 is fixed at the base element 11 of the maintenance arrangement 8. Thus, due to the spring force of the spring element 13 always a spring force is acting which tries to close the lid element 12.

[0039] More details of this design are shown in the further figures.

[0040] In FIG 7 the maintenance arrangement 8 is shown comprising the base element 11 and the lid element 12 which can be pivoted relatively to the base element 11.

[0041] In FIG 8 the lid element 12 can be seen which comprises the cover part 15 and the lever arm 14; cover part 15 and lever arm 14 are made as a one-piece element, e. g. as an injection moulded part. Of course, it is also possible that the lever arm 14 and the cover part 15 are made as separate parts, which are assembled after their production.

[0042] In the example illustrated in the enclosed figures, the lever arm 14 advantageously comprises three bar elements 14', 14" and 14"' which are arranged parallel to another. In this particular example the free end of

bar element 14" which is placed among the other two bar elements (14' and 14"'), is connected to the elastic element 13, while the two lateral bar elements 14' and 14"' comprise a connecting arm 14a, preferably substantially perpendicular to the bar element 14", which free end comprises a hinging element 14b, for example a pin, rotatably connected to the base element 11. In FIG 9 there are represented only the connecting arm 14a and the hinging element 14b of the bar element 14"'. In the example shown in FIG 9 the hinging elements 14b define the axis C around which the lid element 12 is pivotable.

[0043] From FIG 9 another feature of the proposed design becomes apparent: at the end side 19 of the lid element 12, remote from the lever arm 14, connection means 18 are arranged which make sure that the lid element 12 is kept in the closed position A when the lid element 12 has been closed. For this, the connection means 18 comprise a spring element 20 which is mounted in the lid element 12 in proximity of the end side 18; the spring element 20 is a sheet metal part from elastic material (spring metal) which is formed into the shown shape.

[0044] The spring element 20 could also be a plastic part. In this case the lid element 12 and the spring element 20 can be designed as a one-piece part, wherein the spring element 20 is in-situ formed by the injection moulding process during the production of the lid element 12.

[0045] From the further figures is can be seen how the connection means 18 are designed and how them work. The spring element 20 is pressed into a respective recess 24 in the lid element 12 and is fixed here by means of a snap connection 21; this can be seen specifically from FIG 13, FIG 15 and FIG 17. However it is clear that the spring element 20 can be fixed into the recess 24 also by other type of connections, for example by force fittings, by gluing, or also by overmolding the lid element 12 on the spring element 20.

[0046] The free end 22 of the spring element 20 is shown in its position during the closing operation with dashed lines and in the final closed position with normal lines in FIG 13 and FIG 15. Here, it can be seen that the free end 22 can elastically be engaged with a pawl element 23 in the base element 11 to ensure a proper hold of the lid element 12 when the lid element 12 has reached the closed position A.

[0047] In FIG 16 and FIG 17 the situation is shown just before the end position is reached. The pawl element 23 deviates the free end 22 when the lid element 12 is closed and biases it. When the free end 22 of the spring element 20 can snap behind the pawl element 23 the lid element 12 is secured in its closed position A.

[0048] Advantageously the maintenance arrangement 8 comprises means for allowing a user to disengage the spring element 20 and the pawl element 23, so as to allow the opening of the lid element 12. In the embodiment illustrated in the enclosed figures these means advantageously comprise an opening 25 provided on the lateral surface of the recess 24 containing the spring element 20, and arranged in such a way to allow a user to press the spring element 20 in a direction opposite from the pawl element 23, so as to disengage the spring element 20 from the pawl element 23.

[0049] In a further embodiment, not illustrated, the spring element 20 can be provided on the base element 11, while the pawl element 23 can be provided on the lid element 12.

[0050] While the depicted embodiments show a combination of the employment of the elastic element 13 and the connection means 18 (with the spring element 20 cooperating with the pawl element 23) it should be mentioned that it is also possible that only the lid element 12 biased by the elastic element 13 is arranged without using the connection means 18. On the other hand, the lid element 12 can also be equipped with the connection means 18 and without the biasing elastic element 13.

Claims

1. Washing machine (1), comprising:

   - a washing tub (2), in which a rotatable drum (3) is arranged,
   - a draining sump (4) which is in fluidic communication with the inner of said tub (2) and in fluidic communication with a draining circuit (5) and
   - a housing element (6) arranged in said draining sump (4) in which a filter element (7) is arranged,
   - a maintenance arrangement (8) with an opening (9) arranged in a lateral surface (10) of the drum (3), wherein the opening (9) allows the access to the filter element (7) when facing the housing element (6),

   wherein the maintenance arrangement (8) comprises a base element (11) and a lid element (12), wherein the lid element (12) can be moved relatively to the base element (11) from a closed position (A), in which the opening (9) is covered by the lid element (12), into an open position (B), in which the opening (9) allows the access to the filter element (7),

   characterized in

   that the lid element (12) is biased into its closed position (A) by means of an elastic element (13) and/or

   that connection means (18) are arranged to fix the lid element (12) in its closed position (A) by means of a metal spring element (20) and a pawl element (23).

2. Washing machine according to claim 1, **characterized in that** the metal spring element (20) is arranged in the lid element (12) and the pawl element (23) is arranged in the base element (11).

3. Washing machine according to claim 1 or 2, **char-**

acterized in that the lid element (12) is arranged pivotable relatively to the base element (11).

4. Washing machine according to claim 3, **characterized in that** the axis (C) of the pivot movement is arranged substatially perpendicular to the projection of the axis of rotation (D) of the drum (3).

5. Washing machine according to one of claims 1 to 4, **characterized in that** the lid element (12) comprises a lever arm (14) which is connected with a cover part (15) of the lid element (12), wherein the elastic element (13) is arranged between the lever arm (14) and the base element (11) or directly with the drum (3).

6. Washing machine according to claim 5, **characterized in that** the lever arm (14) comprises at least two bar elements (14', 14", 14"') arranged parallel to another.

7. Washing machine according to one of claims 1 to 6, **characterized in that** the elastic element (13) comprises a coil spring.

8. Washing machine according to one of claims 1 to 7, **characterized in that** the elastic element (13) is made of spring steel.

9. Washing machine according to one of claims 1 to 6, **characterized in that** the elastic element (13) comprises a rubber band.

10. Washing machine according to one of claims 1 to 6, **characterized in that** the elastic element (13) comprises a pneumatically operating spring element.

11. Washing machine according to one of claims 1 to 10, **characterized in that** the connection means (18) are arranged in proximity of one end side (19) of the lid element (12).

12. Washing machine according to one of claims 1 to 11, **characterized in that** the metal spring element (20) comprises a bent sheet metal part made of steel, especially made of spring steel.

13. Washing machine according to one of claims 1 to 12, **characterized in that** the spring element (20) is fixed in the lid element (12) or in the base element (11) by means of a snap connection (21).

14. Washing machine according to one of claims 1 to 13, **characterized in that** the base element (11) is directly formed by a section of the drum (3).

15. Washing machine according to one of claims 1 to 14, **characterized in that** it also includes a dryer function.

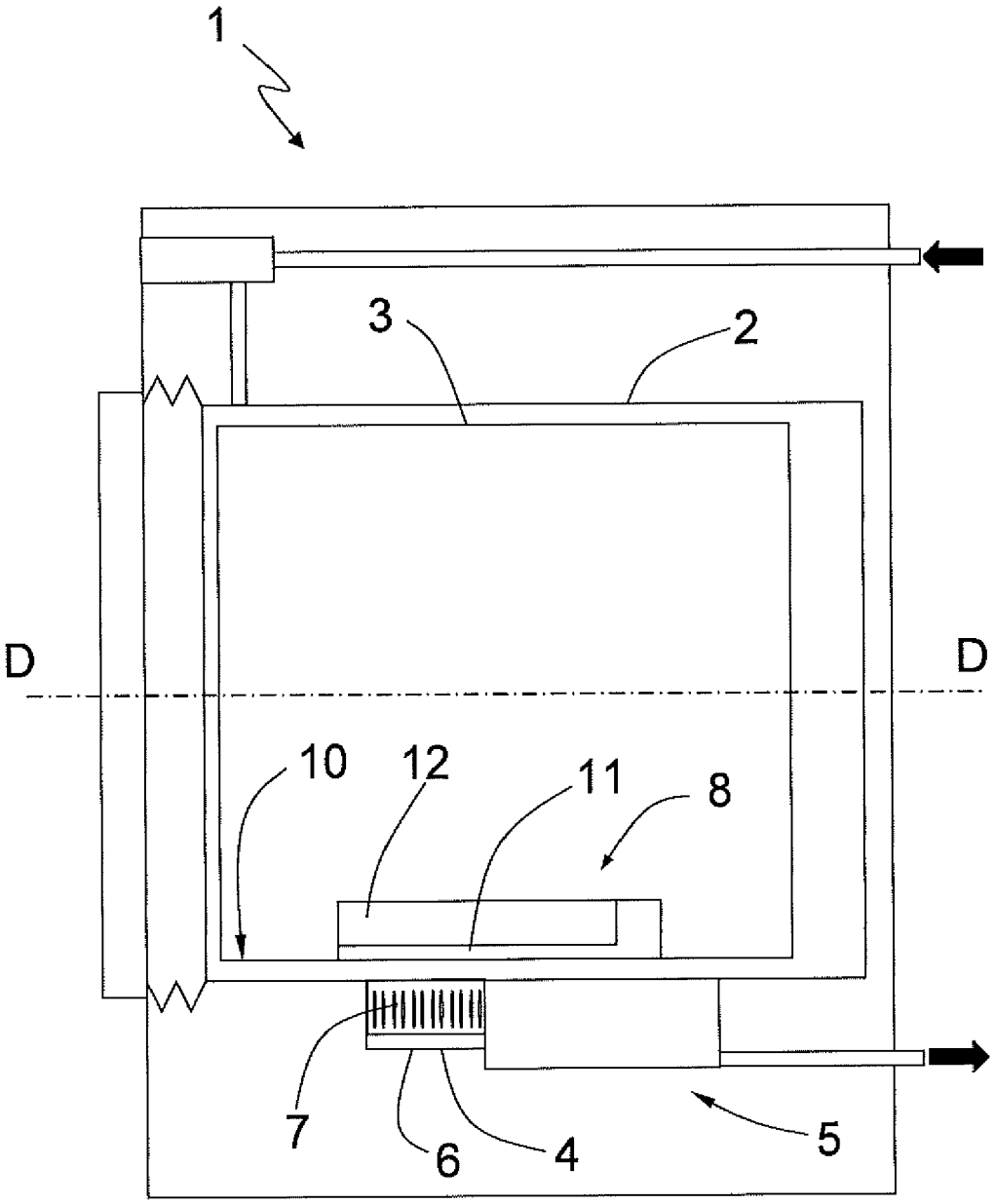

Fig. 1

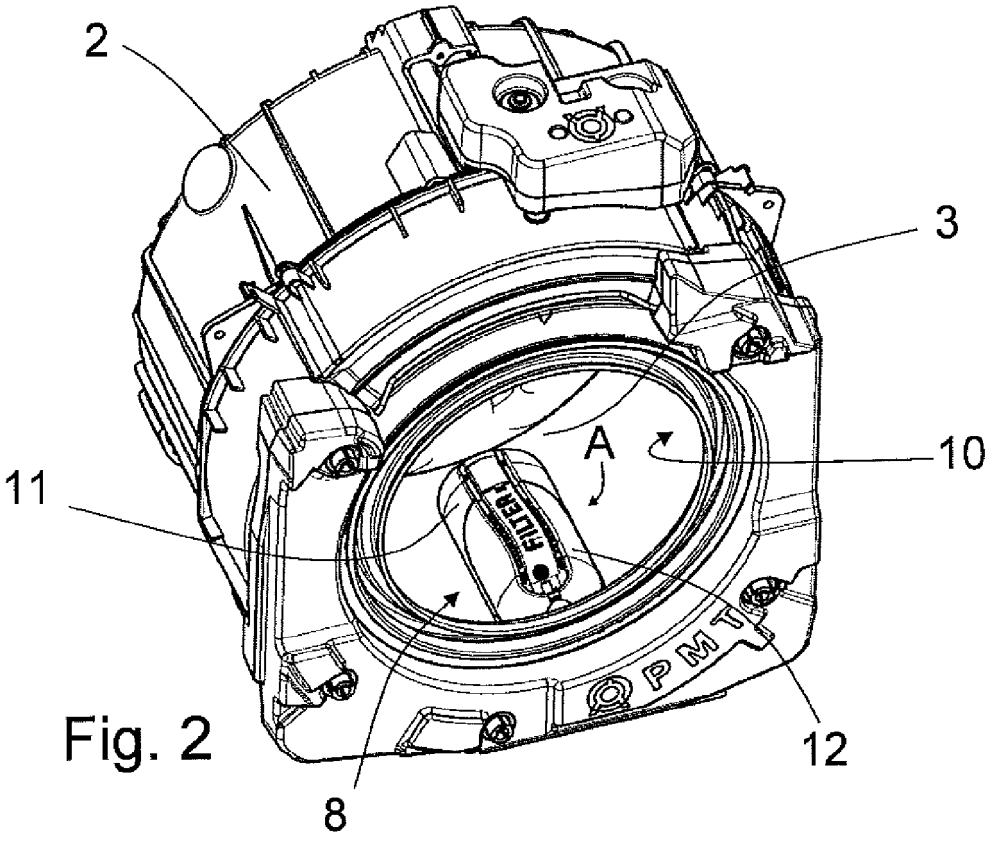

Fig. 2

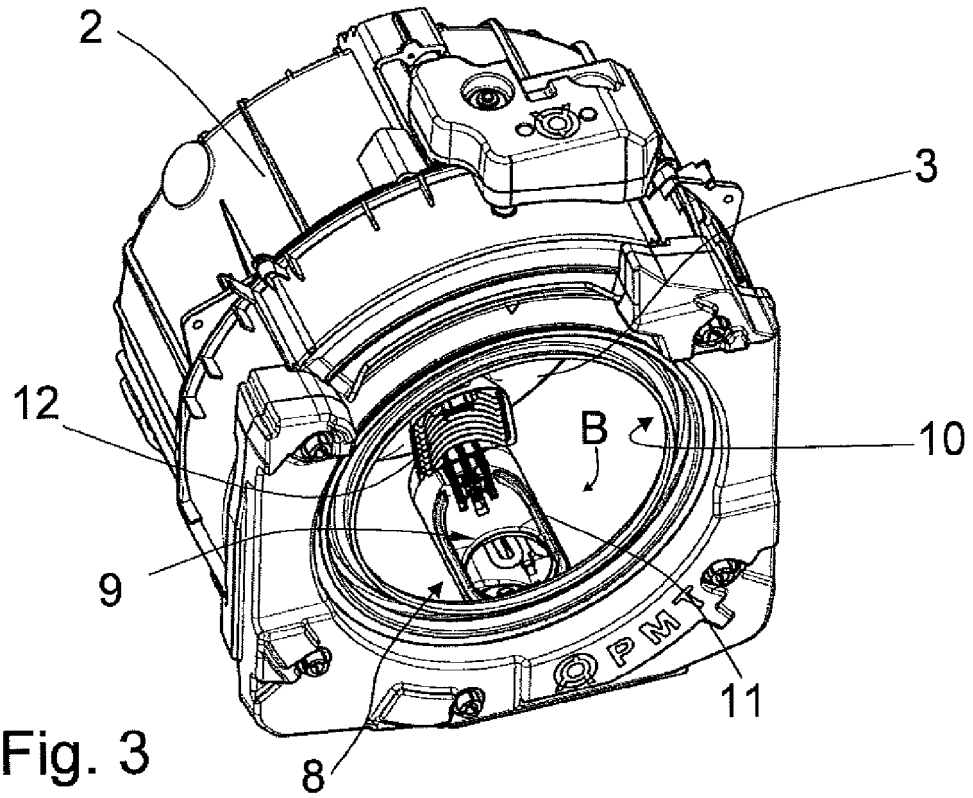

Fig. 3

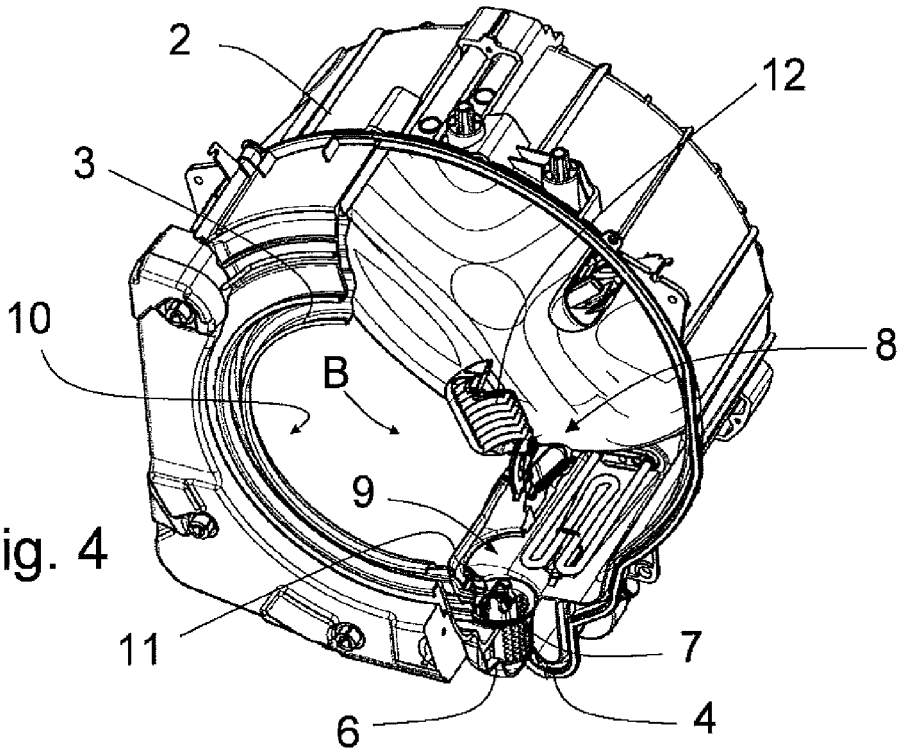

Fig. 4

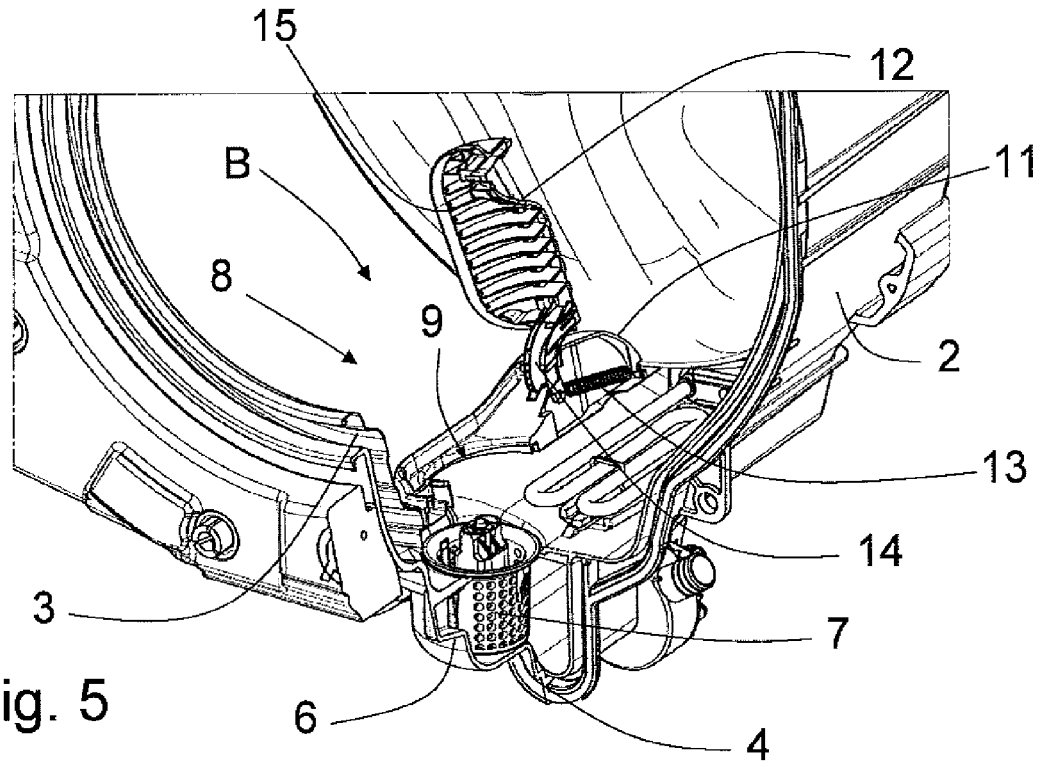

Fig. 5

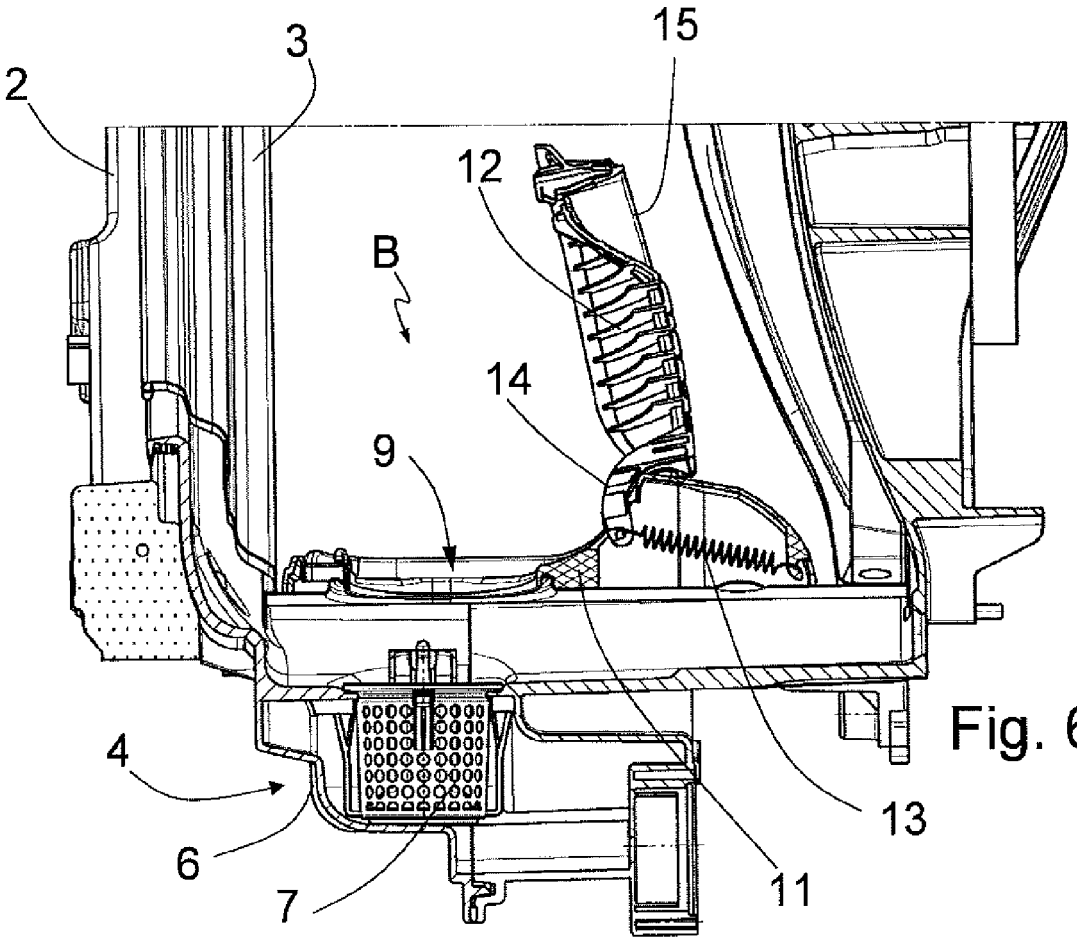

Fig. 6

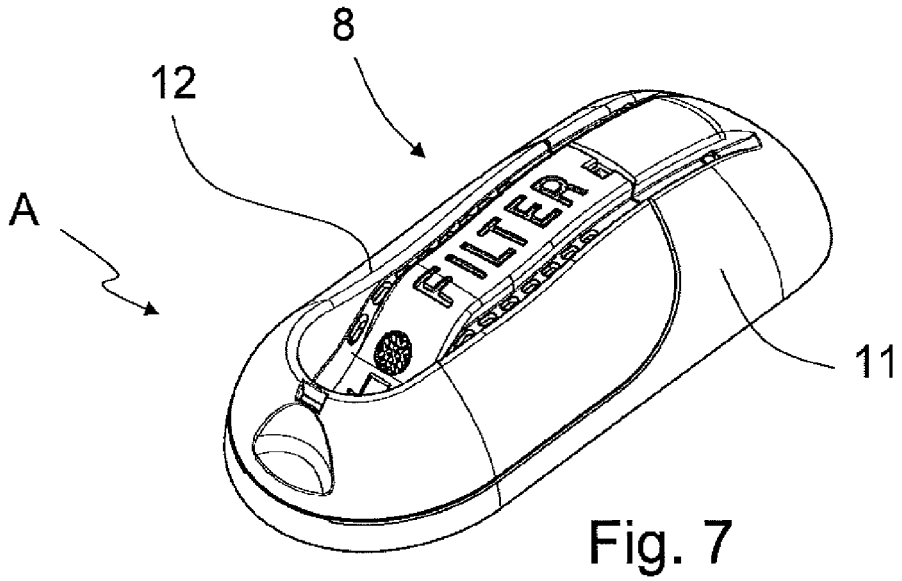

Fig. 7

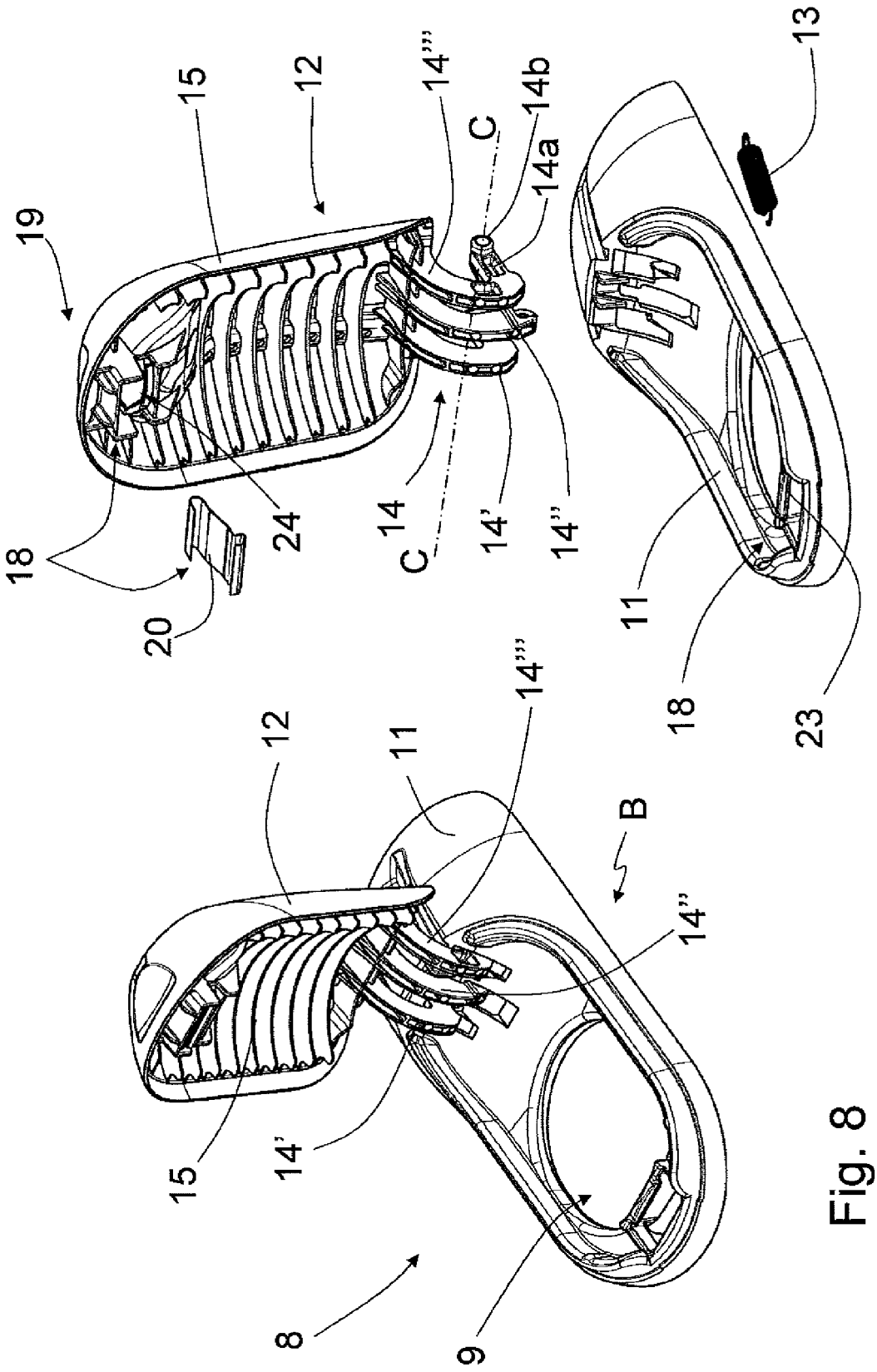
19
15
12
14'''
C
14b
14a
13
18
24
14
14'
14''
20
C
11
18
23

Fig. 9

14'''
12
11
B
14''
15
14'
8
9

Fig. 8

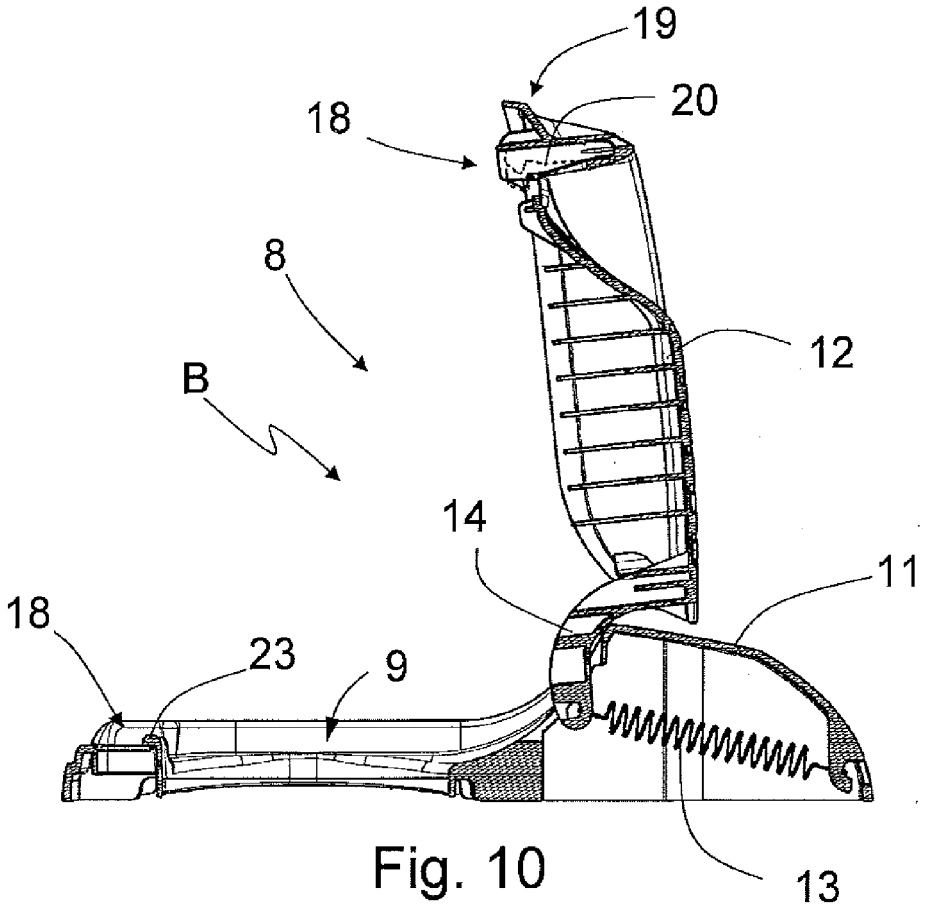

Fig. 10

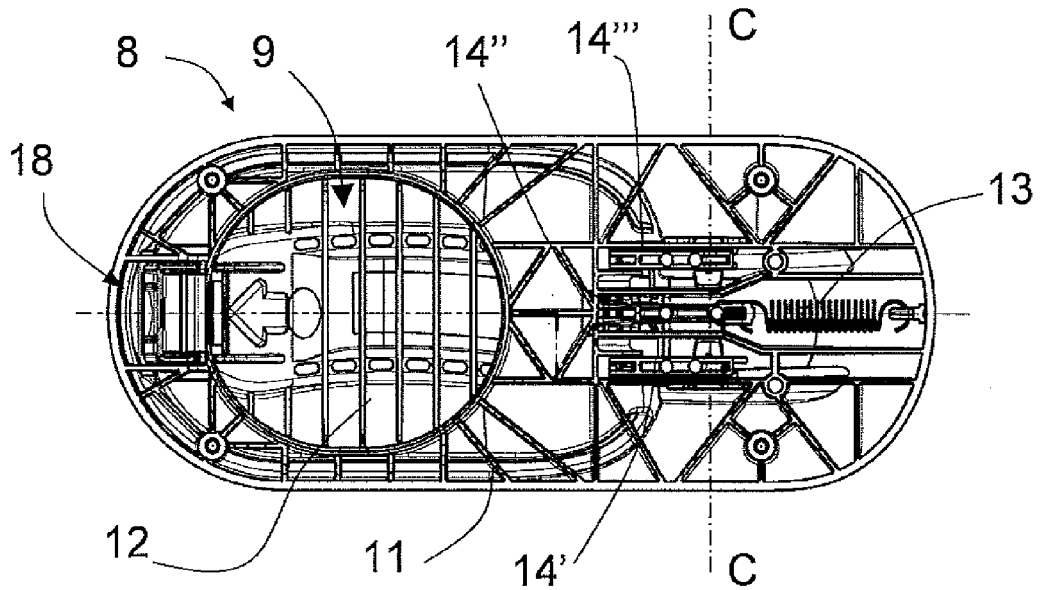

Fig. 11

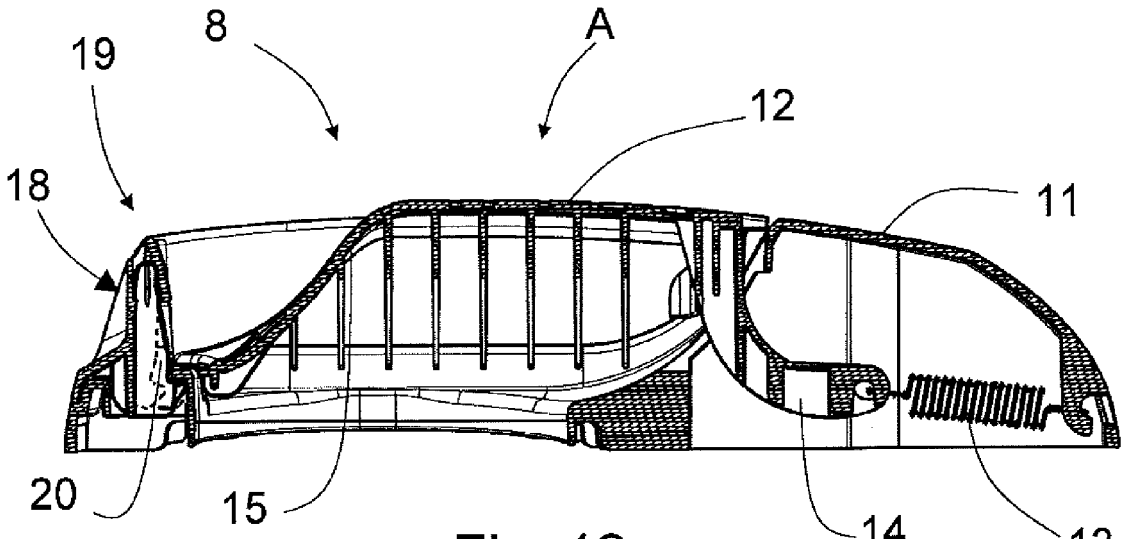

Fig. 12

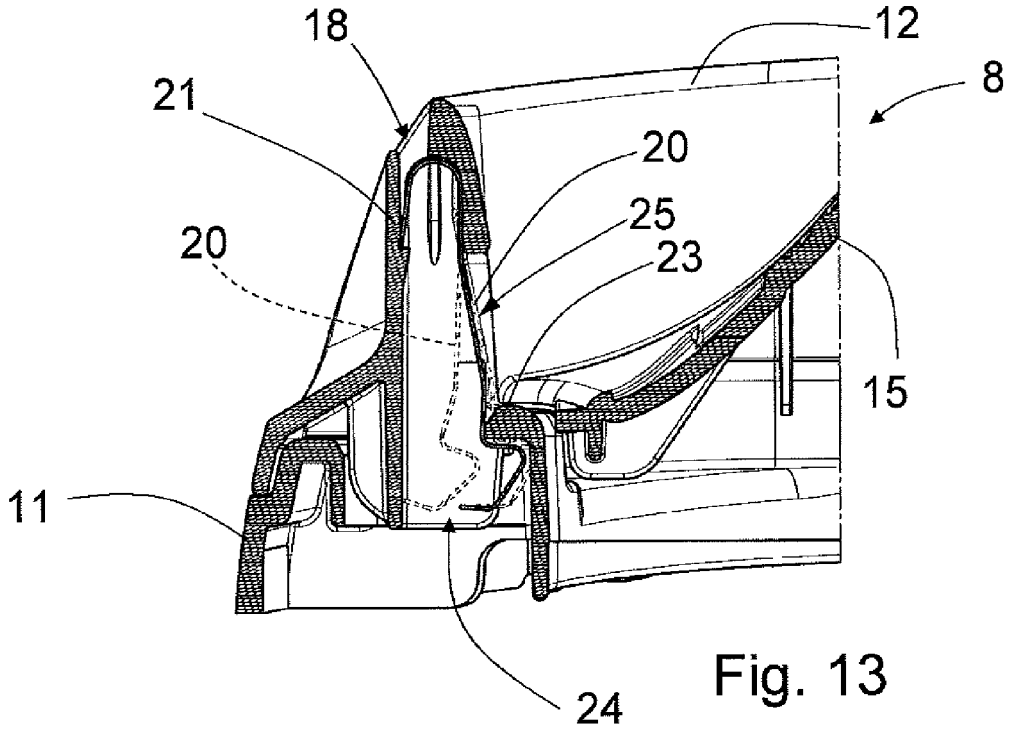

Fig. 13

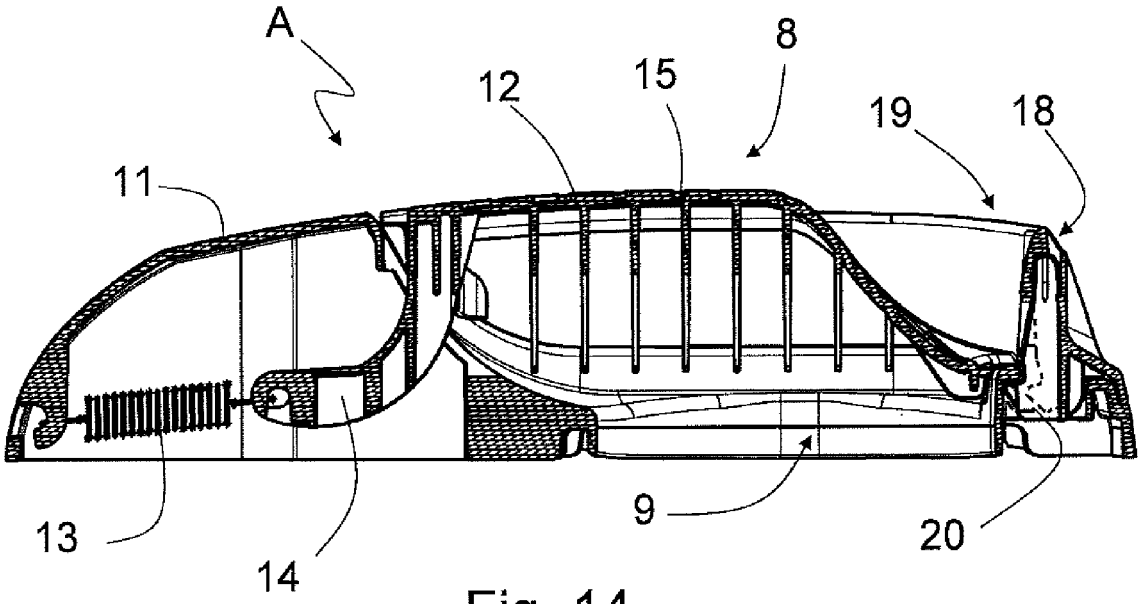

Fig. 14

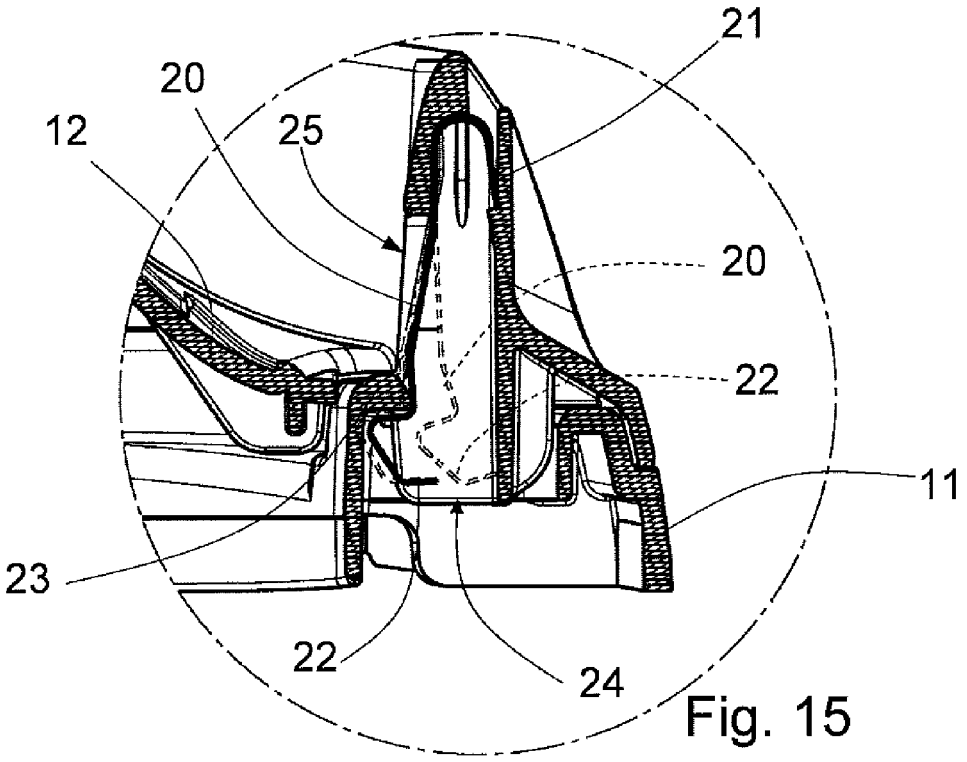

Fig. 15

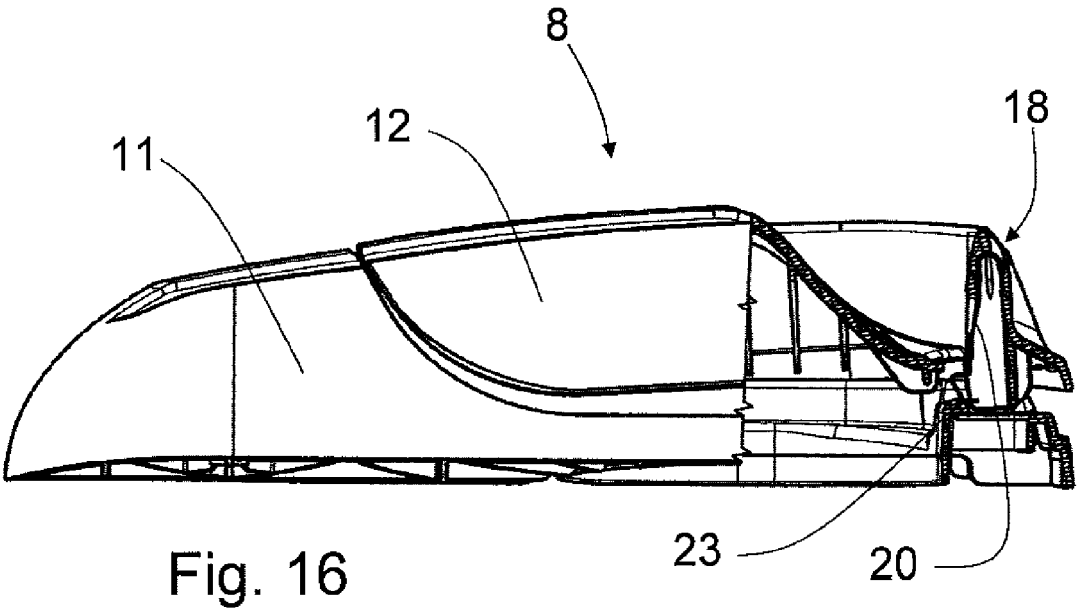

Fig. 16

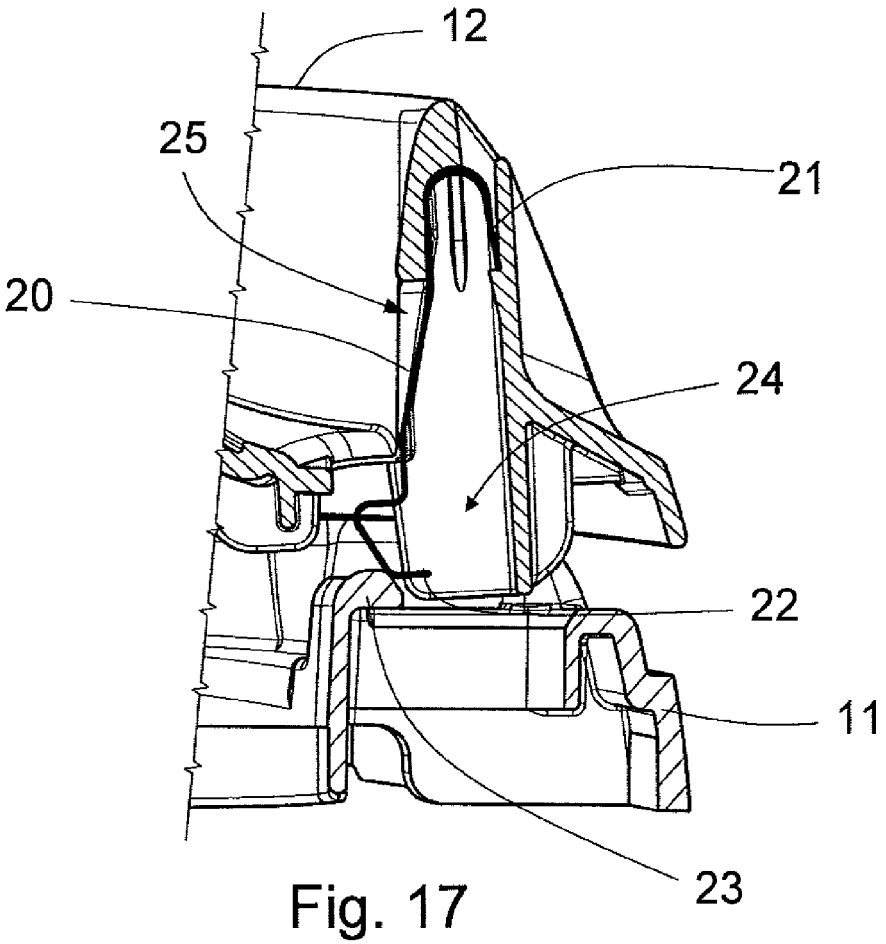

Fig. 17

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 10 16 1908

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X A	EP 0 127 768 A2 (ZANUSSI A SPA INDUSTRIE [IT]) 12 December 1984 (1984-12-12) * page 6, line 26 - page 7, line 10; figures 1, 3 * -----	1 2-6,8-15	INV. D06F39/10
A,D	FR 2 190 966 A1 (CHALECTRO [FR]) 1 February 1974 (1974-02-01) * page 2, line 14 - line 26; figure 3 * -----	1-15	
			TECHNICAL FIELDS SEARCHED (IPC) D06F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	3 December 2010	Westermayer, Wilhelm

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

2

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 10 16 1908

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

03-12-2010

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0127768 A2	12-12-1984	DE 3474047 D1	20-10-1988
		ES 287852 U	16-12-1985
		IT 1195594 B	19-10-1988
		US 4566970 A	28-01-1986
FR 2190966 A1	01-02-1974	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- EP 1849904 A1 **[0008]**
- GB 1197919 A **[0009]**
- FR 2190966 **[0010]**
- EP 1849910 A1 **[0011]**