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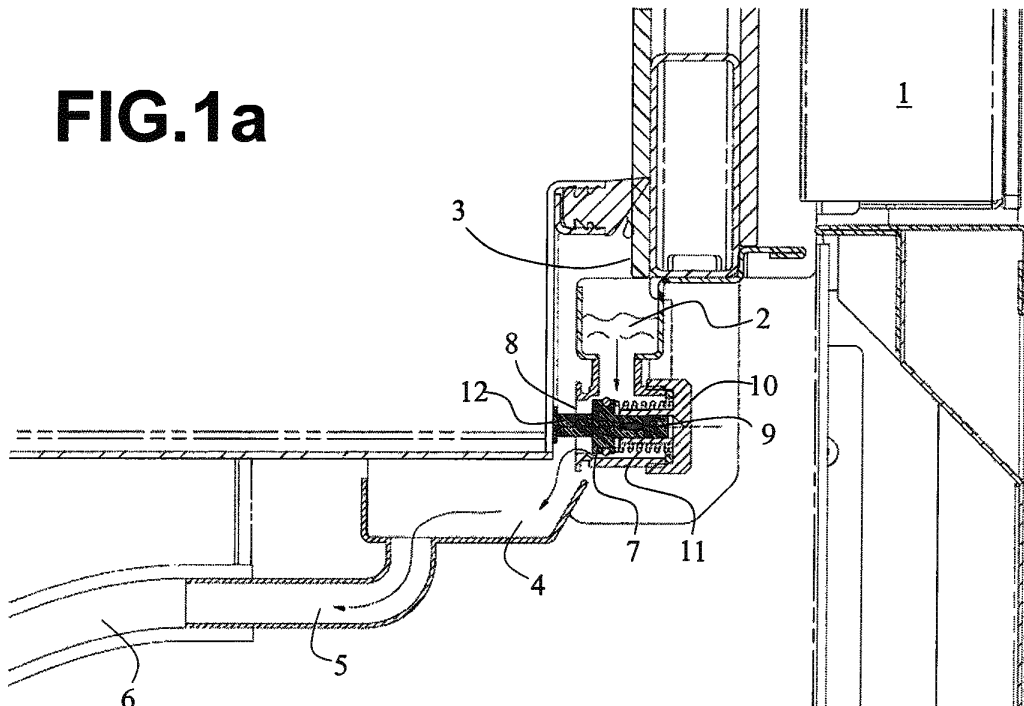
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(54) **WASHING APPARATUS WITH SLIDING DOOR PROVIDED WITH A DEVICE FOR COLLECTING AND DRAINING WATER DRIPPING FROM THE DOOR**

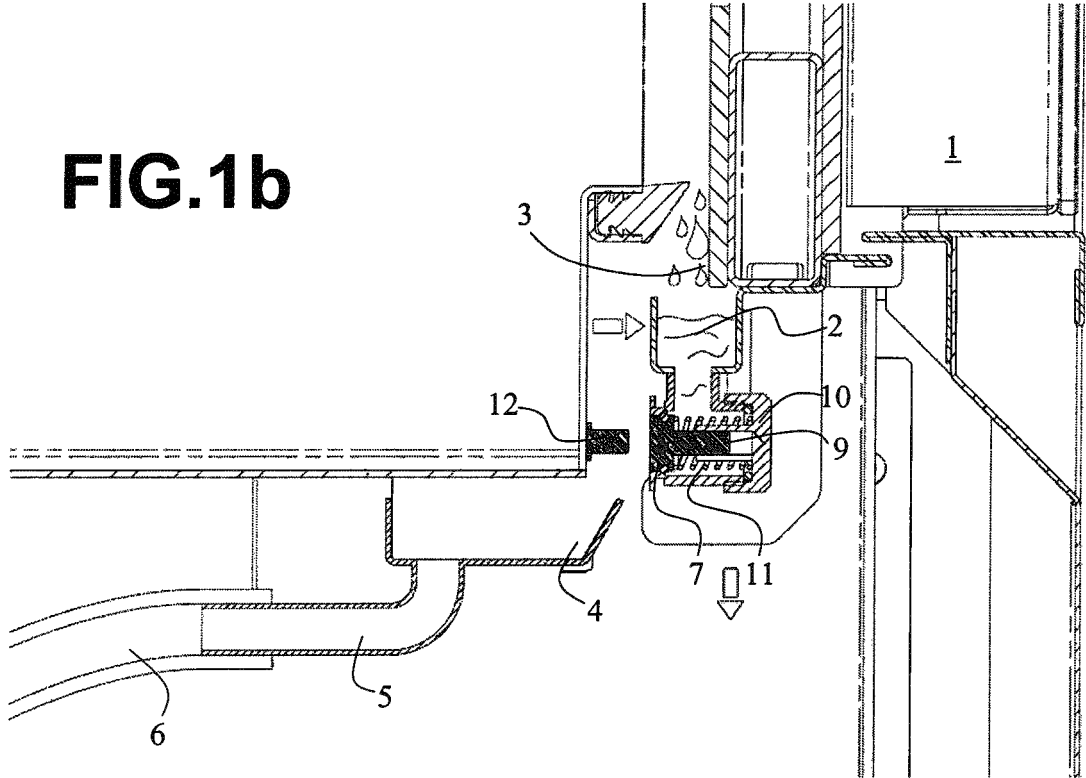
(57) A washing apparatus with a sliding door (1) is provided with a collecting and draining device that prevents water dripping from the internal surface (3) of the door (1) from falling to the ground. This collecting and draining device comprises a collection tank (2) located below the internal surface (3) of the door (1), a drain mechanism (7, 9) which causes the drainage of water from the collection tank (2) when the door (1) is closed and does not cause the drainage of water when the door (1) is open, elastic means (11) biasing the drain mechanism to take said second configuration and activation means (12) capable to overcome the action of said elastic means (11) so as to force the drain mechanism to take said first configuration.

**FIG.1a**



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**FIG.1b**



## Description

**[0001]** The present invention relates to a washing apparatus having a sliding door whose movement includes a shift in a direction orthogonal to the sliding plane, typically a washing and disinfecting apparatus, said apparatus comprising a device for collecting and draining water dripping from the door. In the following, reference will be made to a washing and disinfecting apparatus, typically of items used in the medical field, but it is clear that the same type of device can be applied to other washing apparatuses such as dishwashers, sterilizers, etc.

**[0002]** It is known that a washing and disinfecting apparatus usually comprises a wash tank provided with a front opening surrounded by a sealing gasket and closed by a door sliding vertically upwards to allow access to the tank. The sliding motion is provided to the door by a drive device which also provides the orthogonal shift necessary to compress the peripheral gasket of the opening. A sliding door of this type is for example described in EP 3075934, in the name of the same applicant, to which reference is made for more details on the drive device.

**[0003]** A drawback associated with the use of washing apparatuses with sliding doors is that, since there is no continuity between the door and the tank as is usually the case with doors hinged along their bottom side, when the door is opened at the end of a wash cycle the internal surface of the door (internal/external being defined with respect to the wash tank) is wet and water drips from its lower edge falling to the ground. The same may occur, to a lesser extent, during washing when high water temperature and steam pressure forming inside the wash tank can cause small leaks from the sealing gasket.

**[0004]** The purpose of the present invention is therefore to provide a washing apparatus which is free from this drawback. Said object is achieved by means of a washing apparatus provided with a device for collecting and draining drip water comprising a collection tank located below the internal surface of the door to collect the water dripping from its lower edge, and a drain mechanism that causes the water to drain from the collection tank when the sliding door is closed and does not cause water to drain when the door is open.

**[0005]** A first important advantage of the present apparatus is to avoid wetting the floor of the room where it is installed when the apparatus door is opened.

**[0006]** Another remarkable advantage of this apparatus is that the collecting and draining device operates automatically and therefore does not require additional work from the operator to empty the collection tank, nor is there a risk of water overflowing from the latter (if properly dimensioned).

**[0007]** A further significant advantage of the above-mentioned collecting and draining device of this washing apparatus results from its simplicity of construction, which makes it economical, robust and reliable.

**[0008]** Further advantages and features of the apparatus according to the present invention will be apparent

to those skilled in the art from the following detailed description of some embodiments thereof with reference to the accompanying drawings in which:

5 Figs. 1a and 1b are schematic side views showing a partial vertical section of an apparatus provided with a sliding door and a collecting and draining device according to a first embodiment of the invention, respectively in the drainage and collection configuration;

10 Figs. 2a and 2b are views similar to the preceding ones of a second embodiment of the invention; and Figs. 3a and 3b are views similar to the preceding ones of a third embodiment of the invention.

15 **[0009]** The attached figures show in detail three embodiments of a drip water collecting and draining device installed on a washing apparatus according to the invention, which may be, for example, an apparatus with door 1 opening downwards, as indicated by the arrows in figures 1b, 2b and 3b.

20 **[0010]** The various embodiments of the washing apparatus according to the invention have in common a collecting device comprising a collection tank 2, located below the lower edge of the internal surface 3 of door 1, cooperating with an underlying drain tank 4 for conveying the collected water to a drain system (not shown) by means of a duct 5, as well as a drain mechanism, activation means and elastic means (illustrated in greater detail in the following) cooperating to automatically empty the collection tank 2 when door 1 is closed and to maintain the collection tank 2 in the drip water collection configuration when door 1 is open.

25 **[0011]** The drain mechanism can take a first configuration (Figs. 1a, 2a, 3a) where it causes the drainage of water from the collection tank 2 when door 1 is closed, and a second configuration (Figs. 1b, 2b, 3b) in which the collection tank 2 retains the water that drips therein and which is taken under the action of the elastic means when door 1 is open. The first configuration is taken, thanks to the activation means which overcome the action of the elastic means, when door 1 is closed and its internal surface 3 is pressed onto a peripheral sealing gasket 6, while the second configuration is taken when door 1 is open and tank 2 must collect the water dripping from the lower edge of the internal surface 3.

30 **[0012]** The operation of a drip water collecting and draining device according to a first embodiment is illustrated in figures 1a and 1b. This device includes a drain mechanism which is essentially a horizontal axis valve comprising a shutter 7 suitable for closing a drain hole 8 of the collection tank 2 and carried by a stem 9 coupled in a sliding manner with a support structure 10 fixed to door 1. In this embodiment, the elastic means consist of a spring 11 mounted on stem 9, between shutter 7 and the support structure 10, and the activation means consist of a counter pin 12.

35 **[0013]** When door 1 is closed, as shown in Fig. 1a, the

counter pin 12 pushes the valve longitudinally by sliding stem 9 into the support structure 10, overcoming the action of spring 11, thereby moving shutter 7 and thus opening the drain hole 8. The water contained in the collection tank 2 flows out by gravity into the underlying drain tank 4, located below the washing compartment of the apparatus, and from there into the drain system through duct 5. Obviously, the counter pin 12 will have a section such as to enter hole 8 without plugging it.

**[0014]** When door 1 is opened with a movement orthogonal to its sliding plane (Fig.1b), the counter pin 12 is no longer in abutment on the valve whereby spring 1 can slide stem 9 longitudinally in the opposite direction until when hole 8 is closed by shutter 7. The water dripping from the lower edge 3 is completely captured in the collection tank 2 and remains there until, by closing door 1 again, the collection tank 2 is not drained in the manner described above.

**[0015]** As it will immediately be apparent to a person skilled in the art, it is not necessary for the counter pin 12 to be installed on the apparatus frame because it can also be installed on shutter 7 and even be an integral part thereof. When closing the apparatus door, the counter pin 12 will abut against the apparatus frame and slide stem 9, compressing spring 11 and opening hole 8.

**[0016]** With the above-described system there will be no dripping of water on the floor when the apparatus door 1 is opened, obviously provided that the collection tank 2 has enough capacity to contain all the dripping water.

**[0017]** Figures 2a and 2b show a portion of a washing apparatus incorporating a drip water collecting and draining device according to a second embodiment, wherein the elements corresponding to those shown in figures 1a and 1b are indicated with the same reference numerals.

**[0018]** In particular, in this case the drain hole 8 is formed in the bottom side of the collection tank 2 rather than at the base of its internal side as in the first embodiment, whereby the valve will have a movement parallel to the sliding plane of door 1 instead of orthogonal thereto as illustrated above. Furthermore, spring 11 is fixed between the support structure 10 and an intermediate plate of stem 9, exerting a pulling force rather than a pushing force as in the previous case, but it could also be arranged between the support structure 10 and shutter 7 exerting a pushing force.

**[0019]** Unlike the embodiment illustrated above, the apparatus of figures 2a and 2b has activation means that comprise a wedge 13 attached to the apparatus frame and defining an inclined plane 14. The stem 9 is configured to slide into the support structure 10 following the inclined plane 14 and this can be achieved, for example, by mounting at the free end of stem 9 a roller 15 configured to roll in contact with the inclined plane 14, as shown in figures 2a and 2b, or by installing a runner instead of roller 15 to run with little friction along the inclined plane 14 (solution not shown in the drawings).

**[0020]** When door 1 is open (Fig.2b), spring 11 in its rest position maintains shutter 7 closing hole 8, so that

the collection tank 2 retains the water dripping from the lower edge of the internal surface 3. When door 1 is closed (Fig.2a), roller 15 rolls along the upward profile of the inclined plane 14 so that stem 9 is forced to slide longitudinally in the support structure 10, overcoming the action of spring 11. As a result, shutter 7 is raised thus opening the drain hole 8 so that the water contained in the collection tank 2 flows out by gravity into the drain tank 4 and hence in the drain pipe (not shown, for simplicity).

**[0021]** Conveniently, for both the illustrated embodiments, stem 9 is preferably supported by a support structure 10 mounted on door 1 in a removable manner so that the valve and spring 11 can be removed for cleaning or maintenance purposes.

**[0022]** A washing apparatus with a collecting and draining device according to a third embodiment is shown in figures 3a and 3b. Unlike the embodiments described above, in this case there is no valve because the collection tank 2 does not have a drain hole, and the drain mechanism consists of a pivoting system 16 of the collection tank 2 on door 1. The pivoting system 16 is configured so that the collection tank 2 can rotate inwardly around a horizontal axis so as to drain the water contained therein into the drain tank 4 when door 1 is closed (Fig.3a), and return to a collection position pulled back by spring 11, located externally between the collection tank 2 and door 1, when door 1 is open (Fig.3b).

**[0023]** In this case, the activation means consist of a pin 17 secured to the collection tank 2 and configured to slide downwardly along the inclined plane 14' of a wedge 13' fixed to the apparatus frame. When door 1 is closed (Fig.3a), pin 17 abutting against the inclined plane 14' maintains the collection tank 2 in such a position as to pour the water contained therein into the drain tank 4, overcoming the action of the return spring 11. When door 1 is opened (Fig.3b), pin 17 slides along the inclined plane 14' and spring 11 returns to its rest position bringing back the collection tank 2 to a configuration such that it will contain the water dripping from the lower edge of the internal surface 3.

**[0024]** It is therefore clear that the above-described and illustrated embodiments of the device according to the invention described are only examples susceptible of various modifications, in addition to those already mentioned above. For example, the sliding direction of stem 9 may be defined so as to be also at an angle other than the direction orthogonal or parallel to the sliding plane of door 1, the activation means being obviously adapted to that different angle. Moreover, the activation means can be configured to act in a direction parallel to the sliding direction of stem 9 rather than coinciding with it as illustrated above, for example if the inclined plane 14 acts on a roller 15 arranged at the end of a horizontal arm extending from stem 9.

## Claims

1. Washing apparatus provided with a door (1) sliding on the frame of said apparatus between an open position and a closed position in which it seals an opening of a compartment of the apparatus, said door (1) being driven by a driving device which allow it also a shift in the direction orthogonal to its sliding plane between an outer position normally maintained during its sliding movement between said open and closed positions and an inner position in which the door (1) presses on a sealing gasket (6) arranged around the opening of said compartment, said washing apparatus being **characterized in that** it includes a device for collecting and draining water dripping from the internal surface (3) of the door (1) which comprises:

a collection tank (2) located below said internal surface (3) of the door (1) to collect the water dripping from its lower edge;

a drain mechanism operatively coupled to said collection tank (2) and configured to take a first configuration in which it causes the drainage of water from the collection tank (2) when the door (1) is closed and to take a second configuration in which it does not cause the drainage of water from the collection tank (2) when the door (1) is open;

elastic means (11) biasing said drain mechanism to take said second configuration;

actuation means arranged on the apparatus frame and/or on the door (1) and capable of overcoming the action of said elastic means (11) so as to force said drain mechanism to take said first configuration as a result of said shift in the orthogonal direction between the outer position and the inner position;

a drain tank (4) mounted on the apparatus frame in such a position as to receive the water drained from the collection tank (2) when the door (1) is closed; and

a drain duct (5) extending from said drain tank (4) to a drain system.

2. Washing apparatus according to claim 1, **characterized in that** the drain mechanism consists of a valve comprising a shutter (7) adapted to close a drain hole (8) of the collection tank (2) and carried by a stem (9) slidably coupled to a support structure (10) fixed to the door (1), the elastic means consisting of a spring (11) mounted on said stem (9).

3. Washing apparatus according to claim 2, **characterized in that** the sliding direction of the valve stem (9) is orthogonal or parallel to the sliding plane of the door (1), and the activation means act in a direction parallel or preferably coinciding with said sliding di-

rection.

4. Washing apparatus according to claim 3, **characterized in that** the activation means comprise a counter pin (12) located on the apparatus frame or on the valve and configured to push the valve by sliding it in a sliding direction orthogonal to the sliding plane of the door (1), overcoming the action of said spring (11), when the door (1) is closed.

5. Washing apparatus according to claim 3, **characterized in that** the activation means comprise a wedge (13) located on the apparatus frame and defining an inclined plane (14) configured to act on the valve by sliding it in a sliding direction parallel to the sliding plane of the door (1), overcoming the action of said spring (11), when the door (1) is closed.

6. Washing apparatus according to claim 5, **characterized in that** it comprises a roller (15) pivoted on said stem (9) and configured to roll in contact with said inclined plane (14).

7. Washing apparatus according to any of claims 2 to 6, **characterized in that** the support structure (10) which carries the stem (9) is secured to the door (1) in a removable way so as to allow the valve and the spring (11) to be removed.

8. Washing apparatus according to claim 1, wherein the drain mechanism consists of a pivoting system (16) of the collection tank (2) on the door (1), so that the collection tank (2) is configured to rotate around a horizontal axis, the elastic means consisting of a spring (11) arranged between the door (1) and the collection tank (2).

9. Washing apparatus according to claim 8, **characterized in that** the activation means comprise a wedge (13') located on the apparatus frame and defining an inclined plane (14'), and a pin (17) fixed to the collection tank (2) and configured to slide along said inclined plane (14'), overcoming the action of said spring (11), when the door (1) is closed.

FIG.1a

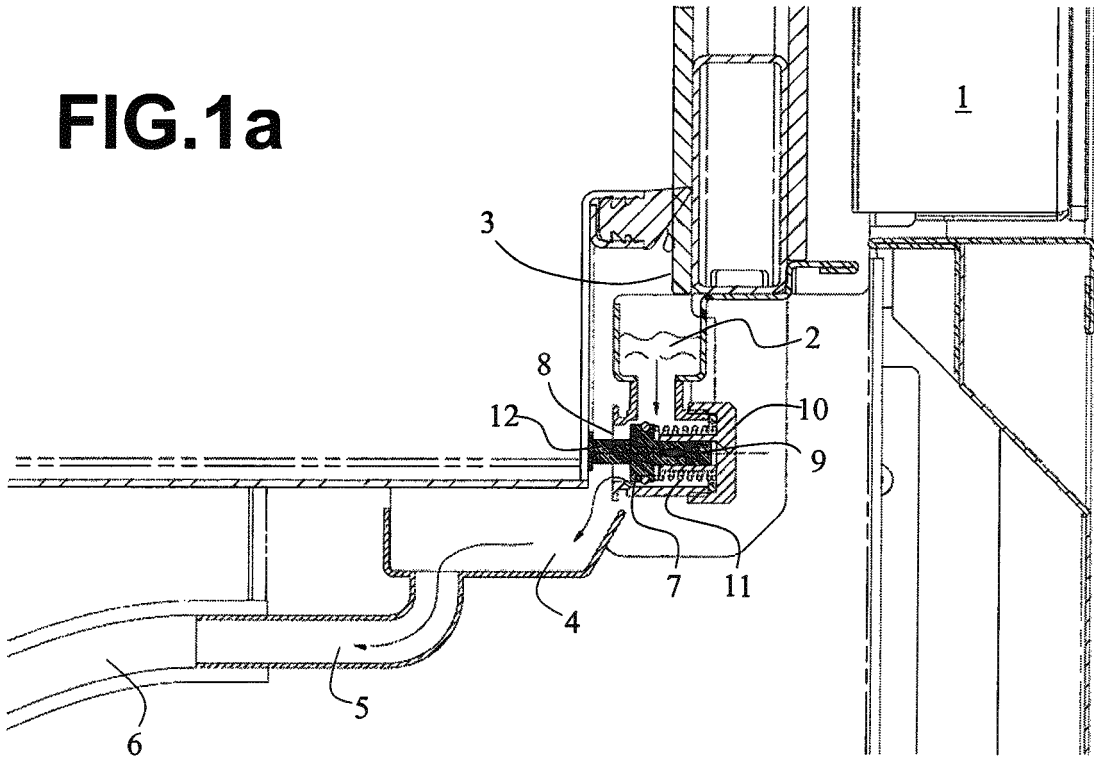
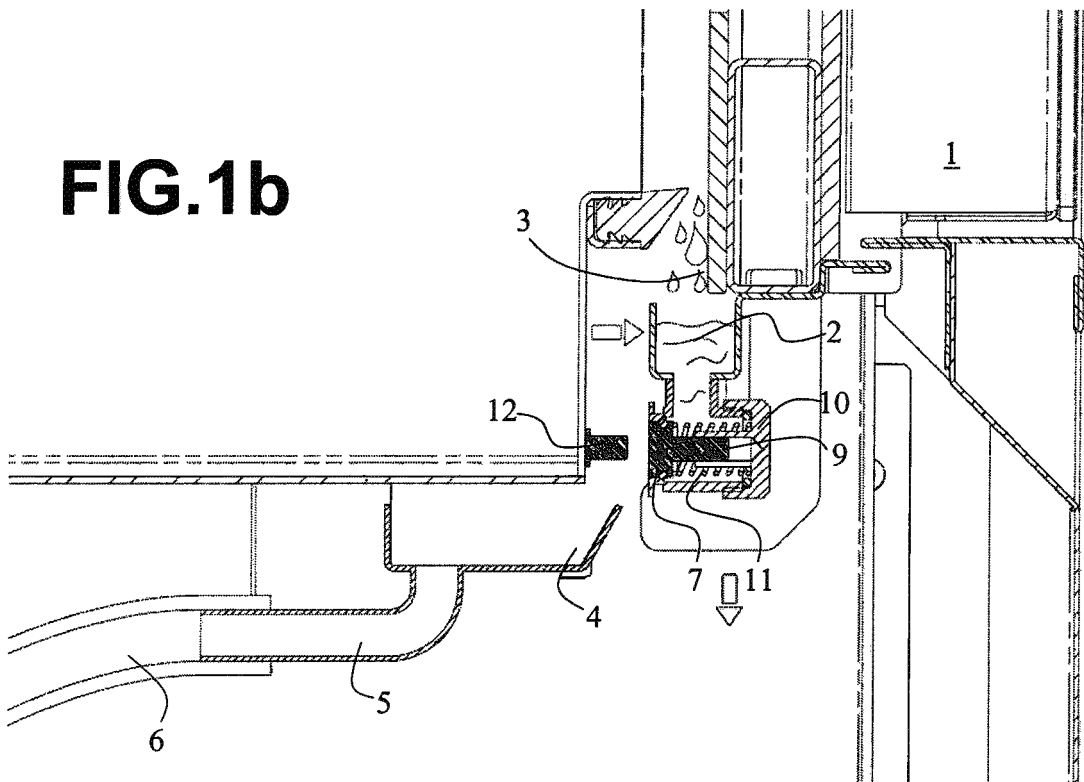
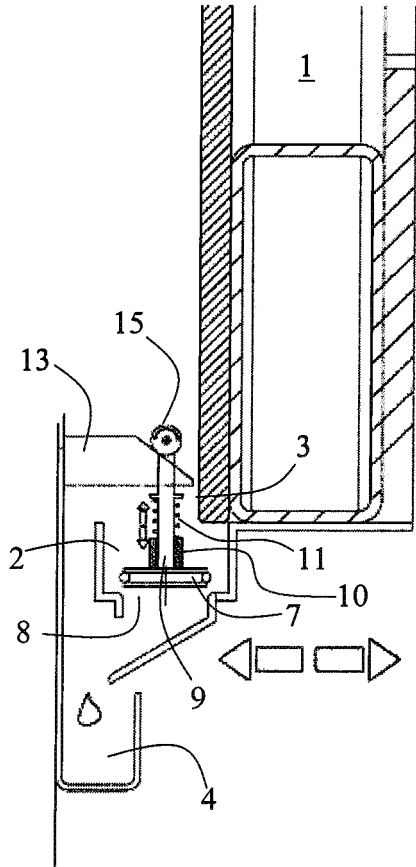
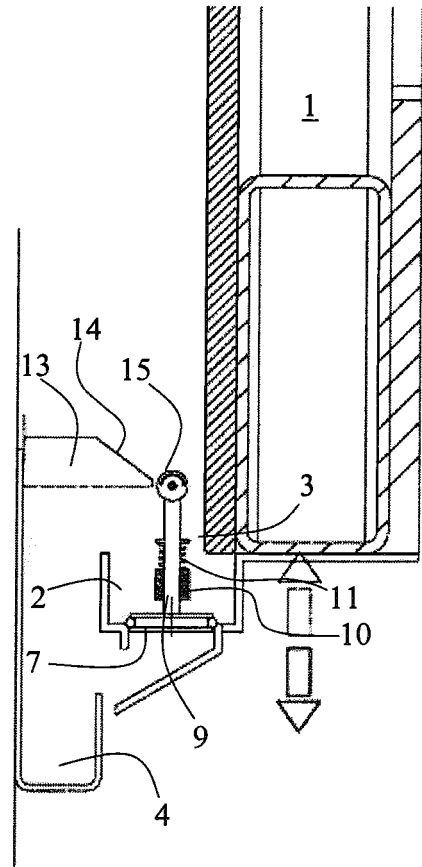


FIG.1b



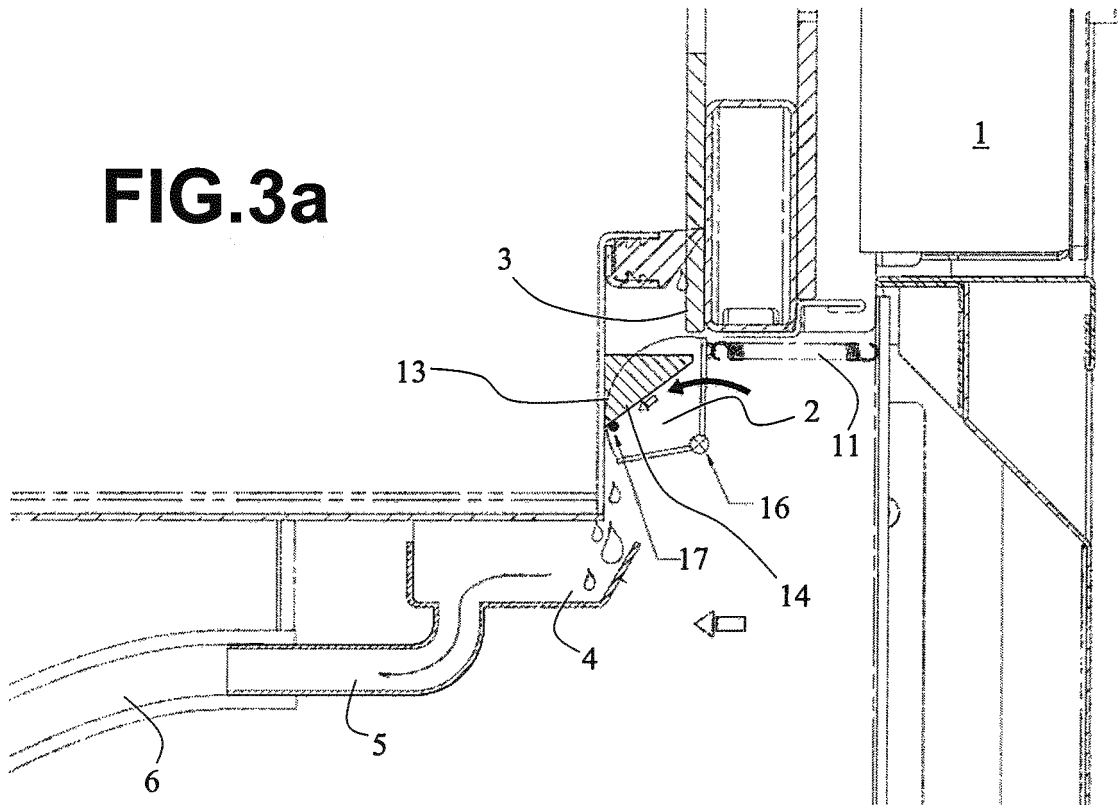


**FIG. 2a**

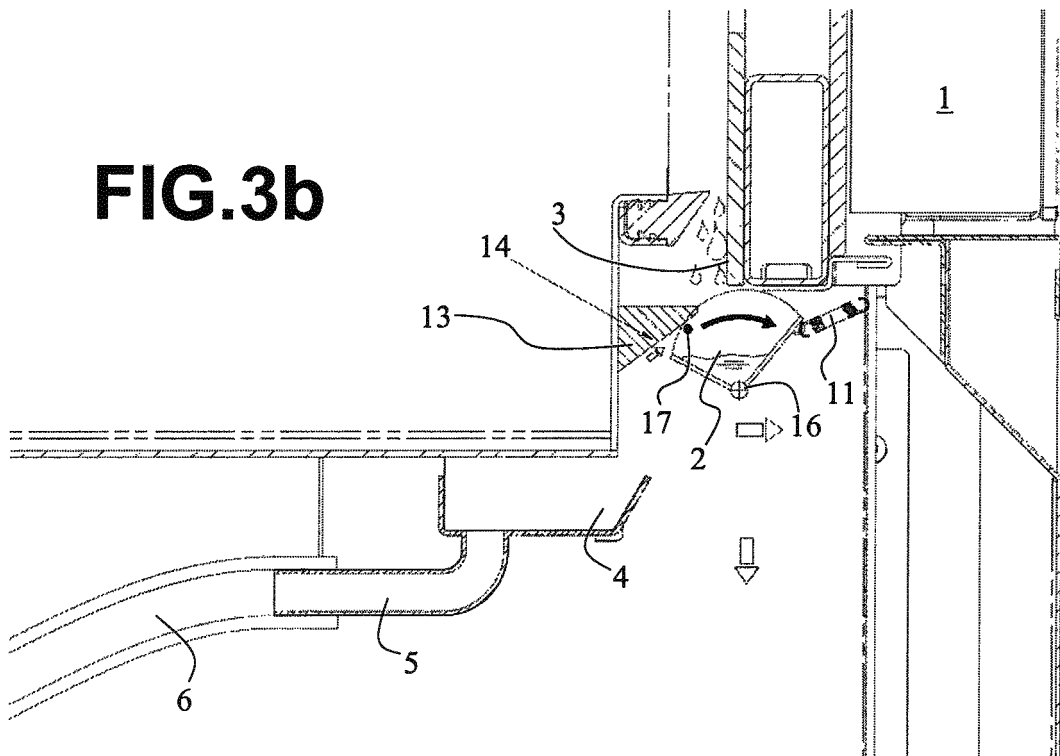


**FIG. 2b**

**FIG.3a**



**FIG.3b**







EUROPEAN SEARCH REPORT

Application Number  
EP 17 42 5057

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A,D	EP 3 075 934 A1 (BONFERRARO SPA [IT]) 5 October 2016 (2016-10-05) * the whole document *	1-9	INV. D06F39/14 A47L15/42
A	EP 1 408 150 A1 (CANDY SPA [IT]) 14 April 2004 (2004-04-14) * paragraph [0001] - paragraph [0030] * * paragraph [0036] *	1-9	
A	US 2004/093801 A1 (ROBERT MAXIME [CA] ET AL) 20 May 2004 (2004-05-20) * paragraph [0001] - paragraph [0010] * * paragraph [0029] - paragraph [0032] *	1-9	
			TECHNICAL FIELDS SEARCHED (IPC)
			D06F A47L
The present search report has been drawn up for all claims			
Place of search <b>Munich</b>		Date of completion of the search <b>8 November 2017</b>	Examiner <b>Jezierski, Krzysztof</b>
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**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 17 42 5057

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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08-11-2017

10	Patent document cited in search report	Publication date	Patent family member(s)	Publication date
	EP 3075934	A1	05-10-2016	NONE
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	EP 1408150	A1	14-04-2004	NONE
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**REFERENCES CITED IN THE DESCRIPTION**

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**Patent documents cited in the description**

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