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(54) **Title**: DRAINAGE SYSTEM APPLIED TO A RESERVOIR OF WASHING ADDITIVES

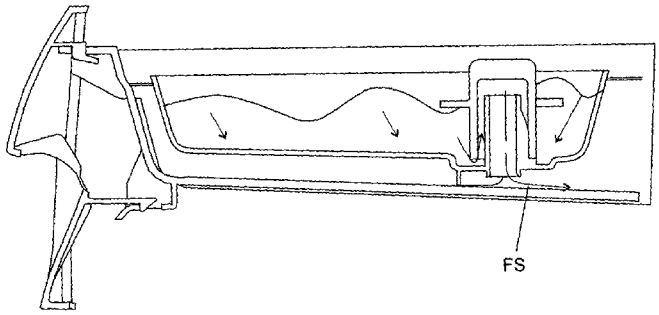

FIG. 6A

(57) **Abstract**: The present invention refers to a drainage system applied to a reservoir of washing additives, and it is preferably disposed at automatic washers. The present drainage system provides for the coexistence of at least one siphon drainage means and at least one super volume "overflowing" drainage means, wherein a spacer (4) is defined, which acts as a (FF) front "overflowing" flow/(SF) siphon drainage flow barrier. The present drainage system further provides for at least a modular reservoir (1) located inside a main reservoir (4), wherein said siphon drainage means is defined by a vertical (duct) disposed at the bottom of said modular reservoir (1) and a siphon cap (3), and said "overflowing" drainage means is defined by a super volume relative to the volume of said modular reservoir (1).

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DRAINAGE SYSTEM APPLIED TO A RESERVOIR OF WASHING ADDITIVES

Field of the Invention

The present application refers to a drainage system applied to a reservoir of washing inputs, and, it is preferably disposed in automatic washers (for laundry machines and/or dishwashers).

More specifically, a drainage system intended to optimize flow/drainage of (diluted or undiluted) liquid inputs existing in washer reservoirs is disclosed.

Background of the Invention

It is widely known that most washing processes are carried out with the aid of washing inputs. Within this context, a washing input can be defined as a natural or synthetic chemical capable of triggering a chemical reaction when in contact with water. Hence, washing inputs optimize removal of polluting particles impregnated in articles being washed. It is also widely known that washing inputs can be solid, liquid or creamy. Furthermore, said washing inputs can also be diluted prior and/or during a washing process.

Among other applications, it can be noted that washing inputs are especially used in automatic (or semiautomatic) washing processes, more specifically, processes conducted in automatic washers, such as, for example, laundry machines and dishwashers.

In this application, washing inputs are conventionally stored in a reservoir particularly designed for this purpose. Generally, this reservoir is part of a system for washing input delivery, which is intended to liquefy and deliver such washing inputs to a washing chamber and/or tank. Washing inputs stored in a reservoir are usually concentrated, therefore, the current systems for delivery of washing inputs also have the function of diluting said inputs.

In this regard, and in accordance with constructions and configurations pertaining to the present state of the art, it can be observed that liquefaction, delivery and dilution of washing inputs stored in a reservoir rely on the "overflowing" concept, where water (or washing liquid) of an inlet pipe is directed towards the reservoir of inputs such that said reservoir of inputs is entirely filled. By doing so, those washing inputs are diluted and tend to "overflow" outwardly the reservoir. Liquid inputs are commonly directed to a washing chamber and/or tank.

A wide range of reservoir models relying on the functional principle described above is known in the art. However, such functional principle presents a drawback that is directly related to the capacity of draining liquid inputs. In this sense, one may note that the functional "overflowing" concept is only capable of draining the amount of liquid inputs which exceeds the volumetric reservoir capacity, that is, once entry of water flow stops, drainage flow of liquid inputs tends to discontinue. Such conditions ends up keeping the reservoir always full with no "overflowed" liquid inputs and/or water, which may or may not be reused

in a further washing process.

In any case, the present state of the art also provides solutions for the above-mentioned problem.

A drainage system comprising at least a siphon "cup" assembly, which is essentially composed of two overlaid tubes is one of the solutions most known by those skilled in the art. A "cup"-type siphon is capable of draining all the liquid from a chamber or reservoir provided that its outlet duct is located at the level (or below) the bottom of said chamber or reservoir.

A schematic example of a siphon-based drainage system (pertaining to the present state of the art) is illustrated in Fig. 1. From said Figure, is can been seen that a G-drawer type reservoir comprises a chamber opened on the top and provided with a DS vertical duct. Said DS vertical duct refers to a single inlet duct of G-type reservoir. Said G-drawer type reservoir also includes a puller P.

Said DS vertical duct is closed on the top by a TS siphon cap, which comprises a cylindrical body having an inner diameter slightly greater than the outer diameter of said DS vertical duct.

In this design, liquid inputs start being drained when their level surpasses the height of DT vertical duct, and a "siphon effect" causes these liquid inputs to be entirely drained. It should also be pointed out that all the liquid inputs are entirely drained through a single AS outlet area.

Another example of this type of solution is described in document EP 1760187, which refers to a drawer-type reservoir comprising three compartmented recesses independently from one another. In this case, each of said compartmented recesses houses a sub-reservoir for a specific type of washing inputs. At least two of these compartments comprise a drainage system constituted by a "cup"-type siphon. Generally speaking, the novelty provided by this EP document resides in the fact that the top tubes (of both siphons) are made of a single body, where it is possible to "mount" two distinct siphons with a single part.

However, these two examples of drainage system relying on a siphon assembly are not able to ensure high efficiency and do not provide any kind of mechanisms to prevent from eventual leakages to occur due to excess of liquid inputs.

That is, in the event that the siphon flow rate is lower than the flow rate of inlet water (or washing liquid), liquid inputs tend to flood the reservoir (or sub-reservoirs) until leakage thereof occurs. This drawback is increased when "sub-reservoirs" (divisions of one same reservoir) are provided for different inputs which will be used in different phases of the washing process since leakage of inputs also tends to contaminate other types of inputs, thereby impairing the washing process as a whole.

Furthermore, it should also be noted that the known drainage systems comprising

siphons, more particularly when used in reservoirs for washing inputs, present a problem relative to their functional efficiency since they are susceptible to malfunction due to turbulences caused by the flow of liquid inputs. This mainly stems from the fact that liquid inputs (more particularly, washing inputs) tend, under stirring or subjected to water pressure from the inlet water pipe, to create air bubbles, which are capable of cutting off the flow of liquid inputs, which is drained by a siphon.

In view of the explanation above, it is clear that there is a need to develop a drainage system applied to a reservoir of washing inputs, which will overcome the drawbacks cited above.

Objects of the Invention

Hence, one object of the present invention is to provide a drainage system (applied to a reservoir of washing inputs) capable of reducing the possibility of malfunction of at least one siphon used for draining (diluted or undiluted) liquid washing inputs.

Another object of the present invention is to provide a drainage system (applied to a reservoir of washing inputs) containing means to prevent eventual leakages caused by excess of liquid inputs. Within this context, an object of the present invention is to provide said drainage system (applied to a reservoir of washing inputs) equipped with at least two drainage types.

Further another object of the present invention is to provide a drainage system (applied to a reservoir of washing inputs), whose drainage means does not affect the other drainage means.

Therefore, an additional object of the present invention is to provide a drainage system (applied to a reservoir of washing inputs) which is capable of preventing leakages caused by malfunction and/or insufficiency of drainage flows.

Summary of the Invention

These and other objects of the present invention are entirely achieved means of the presently disclosed drainage system applied to a reservoir of washing inputs.

This system is capable of draining liquid inputs for a washing chamber and/or tank and comprises the unexpected coexistence of at least a siphon drainage means and at least a super volume "overflowing" drainage means. Said system further comprises at least means for preventing the super volume "overflowing" drainage from influencing said siphon drainage and at least a modular reservoir disposed inside the main reservoir. According to the concepts of the present invention, the modular reservoir bottom is vertically spaced from the main reservoir bottom by means of at least one spacer.

Siphon drainage means is defined by a vertical duct located at the modular reservoir bottom and a siphon cap.

"Overflowing" drainage means is defined by super volume relative to modular reservoir volume and it is also defined by a front "overflowing" flow and at least a rear "overflowing" flow.

Preferably, said spacer comprises a rib disposed between said modular reservoir bottom and the main reservoir bottom, and it can project from the lower surface of the modular reservoir bottom or from the upper surface of the main reservoir bottom. Further, the space can preferably comprise a rib having a concentrically defined semicircular contour in relation to the vertical duct located at the modular reservoir bottom.

In accordance with the concepts and objects of the present invention, said spacer acts as a barrier between the front "overflowing" flow and the siphon drainage flow.

Brief Description of the Drawings

The present invention will be described in detail on the basis of figures listed below, which:

Fig. 1 illustrates a schematic cut view of a drainage system (applied to a reservoir of washing inputs) pertaining to the state of the art;

Fig. 2 illustrates a superior perspective view of a drainage system applied to a reservoir of washing inputs;

Fig. 3 illustrates a lower perspective view of a drainage system applied to a reservoir of washing inputs;

Fig. 4 illustrates an exploded perspective view of a drainage system applied to a reservoir of washing inputs;

Fig. 5 illustrates a schematic cut view of a drainage system applied to a reservoir of washing inputs; and

Fig. 6A also illustrates a schematic view of a first example of fluid flows predicted by the drainage system applied to a reservoir of washing inputs; and

Fig. 6B further illustrates a schematic view of a second example of fluid flows predicted by the drainage system applied to a reservoir of washing inputs.

Detailed Description of the Invention

In accordance with concepts and objects of the present application, a drainage system (applied to a reservoir of washing inputs) comprising at least one siphon drainage means and at least one super volume "overflowing" drainage means is disclosed.

Such coexistence allow for the two drainage means to act in a complementary form to one another, in addition to acting as "safety mechanism" against leakages (in cases where one of such means presents malfunction). Besides that, the present drainage system also comprises means capable of preventing said super volume "overflowing" drainage from influencing said siphon drainage.

To this effect, and unlike the state of the art, the present drainage system comprises

at least a modular reservoir located inside the main (drawer-type) reservoir. In this regard, it should be emphasized that the siphon drainage means consists of a vertical duct (disposed at the modular reservoir bottom) and a siphon cap, whereas the "overflowing" drainage means is defined by a super volume relative to the modular reservoir volume.

Hence, so that both means are functional, it is required that the tubular reservoir bottom is disposed vertically spaced from the main reservoir bottom, and said spacing is made of at least one spacer.

Figs. 2 to 5 illustrate the preferred embodiment of the invention.

Figs. 2 and 3 specifically illustrate a siphon drainage means. Hence, a modular reservoir 1 and siphon cap 3 can be observed.

Said modular reservoir 1 comprises a body defined by surrounding walls and a bottom. Preferably, said surrounding walls and said bottom of the modular reservoir 1 are integral and define a monoblock preferably made of polymer alloy.

Said modular reservoir 1 also predicts a circular recess 11 disposed on the superior surface of its bottom. Consequently, said circular recess 11 also defines a recess when seen from the bottom lower surface of said modular reservoir 1.

Although not shown in Figs. 2 and 3 (but seen from Fig.4), modular reservoir 1 further comprises a vertical duct 2. Preferably, said vertical duct 2 projects from the bottom upper surface of said modular reservoir 1, especially from the area defined by the circular recess 11. In this regard, one may note that the height of said vertical duct 2 is slightly lower than the height of the surrounding walls which form said modular reservoir 1.

Siphon cap 3 comprises a substantially cylindrical body, whose height and diameter are slightly higher than the height and diameter of vertical duct 2. Siphon 3 (with its end facing "upwardly") arranged on said vertical duct 2 defines a siphon "cup" assembly.

The great difference between the present siphon (defined by said vertical duct 2 and siphon cap 3) and those conventional siphons used in analogous applications resides in their disposition. That is, the present siphon (defined by vertical duct 2 and siphon cap 3) is located at the bottom of the modular reservoir 1 while those conventional siphons used in analogous applications are directly located at the bottoms of conventional "drawer"-type reservoirs.

Such difference permits that the present siphon (defined by vertical duct 2 and siphon cap 3) has its outlet facing the bottom lower surface of a main reservoir 5. The great advantage presented by this difference will be explained below.

Fig. 3 further shows a rib disposed at the bottom lower surface of the modular reservoir 1. Said rib will be hereunder designated as spacer 4. Preferably, but not being limited to, said spacer 4 is disposed on the lower recess (related to circular recess 11) of the bottom lower surface of modular reservoir 1. Nevertheless, and optionally, said spacer 4

could also project from the bottom upper surface of the main reservoir 5. Further, said spacer 4 may optionally comprise an individual body. Therefore, said spacer 4 has a semicircular shape and is concentrically aligned with said vertical duct 2.

The bottom lower surface of modular reservoir 1 also comprises support structures 12.

From Figs. 4 and 5, it can be noted that modular reservoir 1 can be associated (coupled or overlaid) with a main reservoir 5, preferably a drawer-type reservoir. Preferably, a single main reservoir 5 can predict multiple modular reservoirs 1, thereby requiring that each modular reservoir 1 is coupled with a compartment 51 existing in the main reservoir 5.

As the main reservoir 5 is preferably a drawer-type reservoir, a puller 6 in association with its surface defined as front surface can also be observed.

From the arrangement of a modular reservoir 1 in a main reservoir 5, it can be noted that the bottoms of said reservoirs are spaced, that is, the bottom lower surface of the modular reservoir 1 does not contact with the bottom upper surface of the main reservoir 5. This spacing occurs mainly due to the existence of spacer 4 and also due to the existence of support structures 12.

In addition to a lower gap (between bottoms) as mentioned above, it can also be noted the existence of a "front" gap and a "rear" gap, which are defined in function of the alignment of said modular reservoir 1 relative to the inner portion of the main reservoir 5. Further, the front gap is defined by a space between the "front" wall of said reservoirs 1 and 5. Said rear gap is also defined by a space between the "rear" walls of reservoirs 1 and 5.

The existence of said gaps and spaces are responsible for the formerly mentioned "overflowing" drainage, which will be explained below.

Figs 6A and 6B illustrate examples of drainage flows provided by the present drainage system applied to a reservoir of washing inputs.

Fig. 6A only illustrates siphon drainage, where there can be observed a FS siphon drainage flow, which is directed towards the bottom of the main reservoir 5, and subsequently sent to a (not shown) washing chamber and/or tank.

Fig. 6B illustrates the occurrence of siphon drainage and the occurrence of super volume "overflowing" drainage.

With regard to siphon drainage, a FS siphon drainage flow, which is directed to the bottom of said main reservoir 5 and subsequently directed to a (not shown) washing chamber and/or tank can also be observed. In the case of super volume "overflowing" drainage, "two" flows are produced: one is a FF front "overflowing" flow and the other is a FP rear "overflowing" flow.

Said FF front "overflowing" flow refers to the flow existing in the gap defined between the "front" walls of reservoirs 1 and 5, and the FP rear "overflowing" flow refers to

the flow existing in the gap defined between the "rear" walls of reservoirs 1 and 5.

As can be seen from Fig. 6B, the FP rear "overflowing" flow is mixed with the FS siphon drainage flow, wherein such mixing occurs at the bottom of said main reservoir 5. Under this condition, mixing of flows only occurs in a bottom "region" of the main reservoir 5 away from vertical duct 2; therefore, there is no chance for said FP rear "overflowing" flow to influence the FS siphon drainage flow.

Moreover, Figure 6B shows that the FF front "overflowing" flow is partially blocked by spacer 4, and it is "diverted" from the bottom "region" of said main reservoir 5 where the FS siphon drainage flow occurs. This allows for said FF front "overflowing" flow to produce any interference with the FS siphon drainage flow and, therefore, that efficiency of the latter is ensured.

The great advantage related to the now presently disclosed drainage system is the possibility of a siphon drainage and overflowing drainage coexistence, wherein said overflowing drainage will only occur when inlet water flow rate is higher than FS drainage flow rate.

Since an example of the preferred embodiment of the subject matter of the present invention has been described, it is to be construed that same contemplates other possible variations, which are only limited by the contents of the appending claims, including possible equivalent means.

CLAIMS

1. Drainage system applied to a reservoir of washing inputs, of the type capable of draining liquid inputs to a washing chamber and/or tank, CHARACTERIZED in that it comprises:

coexistence of at least one siphon drainage means and at least one super volume "overflowing" means;

at least means for preventing the super volume "overflowing" drainage from influencing said siphon drainage means;

at least a modular reservoir (1) disposed in the inner portion of main reservoir (5);

the bottom of the modular reservoir (1) being vertically spaced from the bottom of the main reservoir (5) through at least a spacer (4);

said siphon drainage means is defined by a vertical duct (2) located at the bottom of said modular reservoir (1) and a siphon cap (3); and

the "overflowing" drainage means being defined by said super volume relative to the volume of said modular reservoir (1).

2. Drainage system, in accordance with claim 1, CHARACTERIZED in that said spacer (4) comprises a rib defined between the bottom of said modular reservoir (1) and the bottom of the main reservoir (5).

3. Drainage system, in accordance with claim 1 or 2, CHARACTERIZED in that said spacer (4) comprises a rib having a semicircular contour rib concentrically defined relative to vertical duct (2) located at the bottom of said modular reservoir (1).

4. Drainage system, in accordance with any of claims 1 to 3, CHARACTERIZED in that said spacer (4) projects from the bottom lower surface of said modular reservoir (1).

5. Drainage system, in accordance with any of claims 1 to 3, CHARACTERIZED in that said spacer (4) projects from the bottom upper surface of the main reservoir (5).

6. Drainage system, in accordance with claim 1, CHARACTERIZED in that the "overflowing" drainage means comprises:

at least a (FF) front "overflowing" flow; and

at least a (FP) rear "overflowing" flow.

7. Drainage system, in accordance with any of claims 1 to 6, CHARACTERIZED in that said spacer (4) acts as a (FF) front "overflowing" flow/(SF) siphon drainage flow barrier.

AMENDED CLAIMS
received by the International Bureau on 15 January 2013 (15.01.13)

1. Drainage system applied to a reservoir of washing inputs, of the type capable of draining liquid inputs to a washing chamber and/or tank comprising:

coexistence of at least one siphon drainage means and at least one super volume "overflowing" means;

at least a modular reservoir (1) disposed in the inner portion of main reservoir (5);

the bottom of the modular reservoir (1) being vertically spaced from the bottom of the main reservoir (5) through at least a spacer (4);

said siphon drainage means is defined by a vertical duct (2) located at the bottom of said modular reservoir (1) and a siphon cap (3);

the "overflowing" drainage means being defined by said super volume relative to the volume of said modular reservoir (1);

CHARACTERIZED in that the system further comprises means for preventing super volume "overflowing" drainage from influencing said siphon drainage means.

2. Drainage system, in accordance with claim 1, CHARACTERIZED in that said spacer (4) comprises a rib defined between the bottom of said modular reservoir (1) and the bottom of the main reservoir (5).

3. Drainage system, in accordance with claim 1 or 2, CHARACTERIZED in that said spacer (4) comprises a rib having a semicircular contour rib concentrically defined relative to vertical duct (2) located at the bottom of said modular reservoir (1).

4. Drainage system, in accordance with any of claims 1 to 3, CHARACTERIZED in that said spacer (4) projects from the bottom lower surface of said modular reservoir (1).

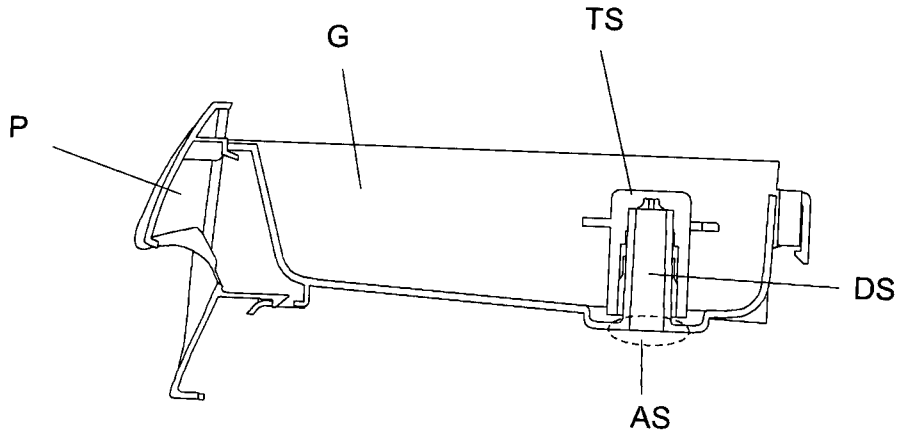
5. Drainage system, in accordance with any of claims 1 to 3, CHARACTERIZED in that said spacer (4) projects from the bottom upper surface of the main reservoir (5).

6. Drainage system, in accordance with claim 1, CHARACTERIZED in that the "overflowing" drainage means comprises:

at least a (FF) front "overflowing" flow; and

at least a (FP) rear "overflowing" flow.

7. Drainage system, in accordance with any of claims 1 to 6, CHARACTERIZED in that said spacer (4) acts as a (FF) front "overflowing" flow/(SF) siphon drainage flow barrier.



PRIOR ART

FIG. 1

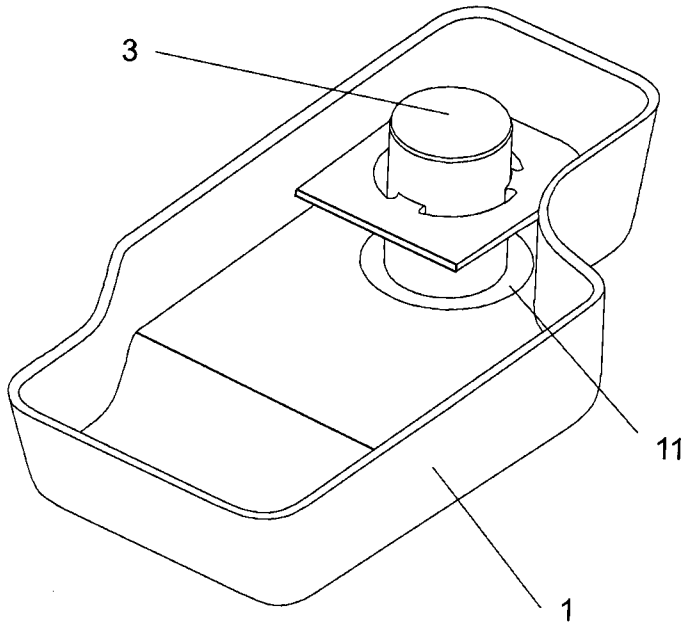


FIG. 2

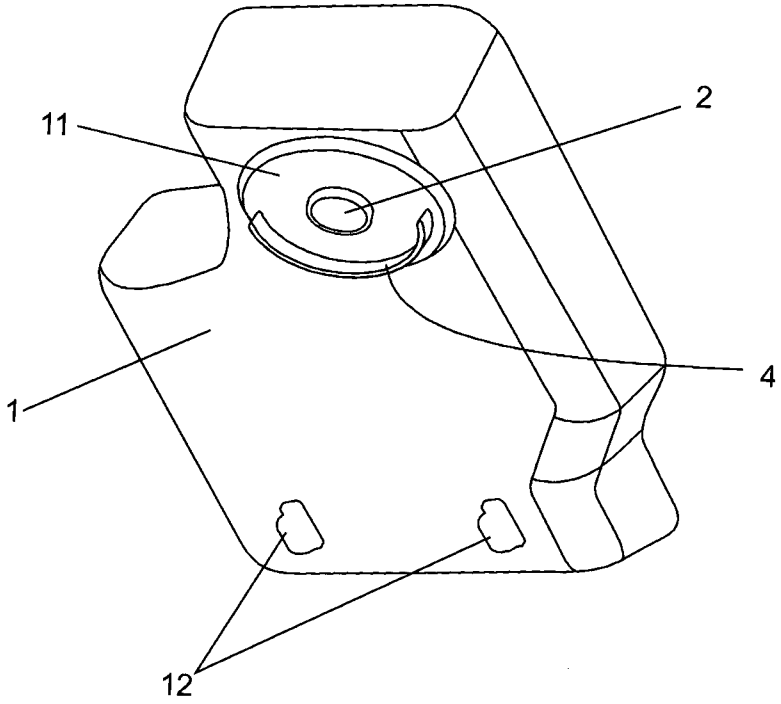


FIG. 3

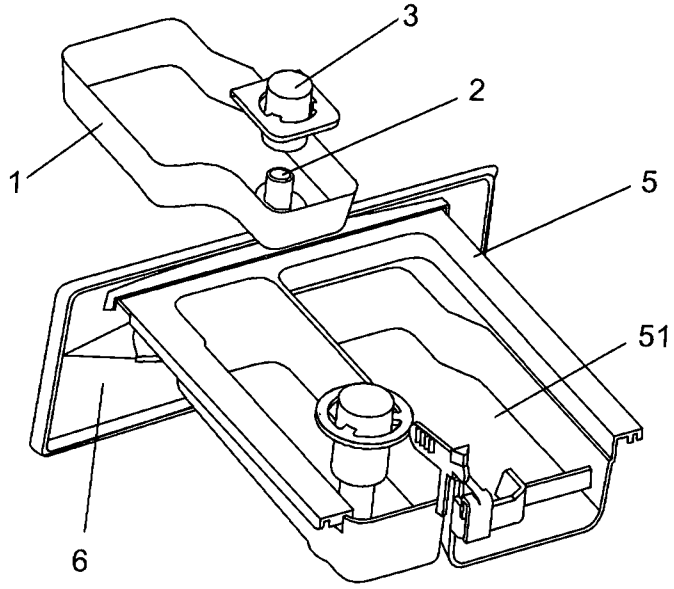


FIG. 4

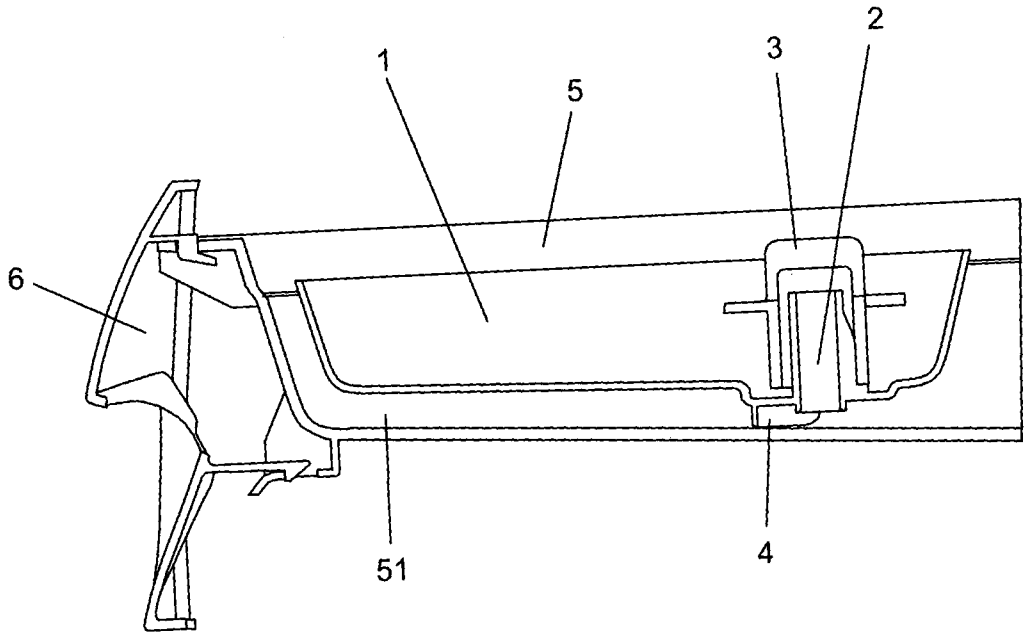


FIG. 5

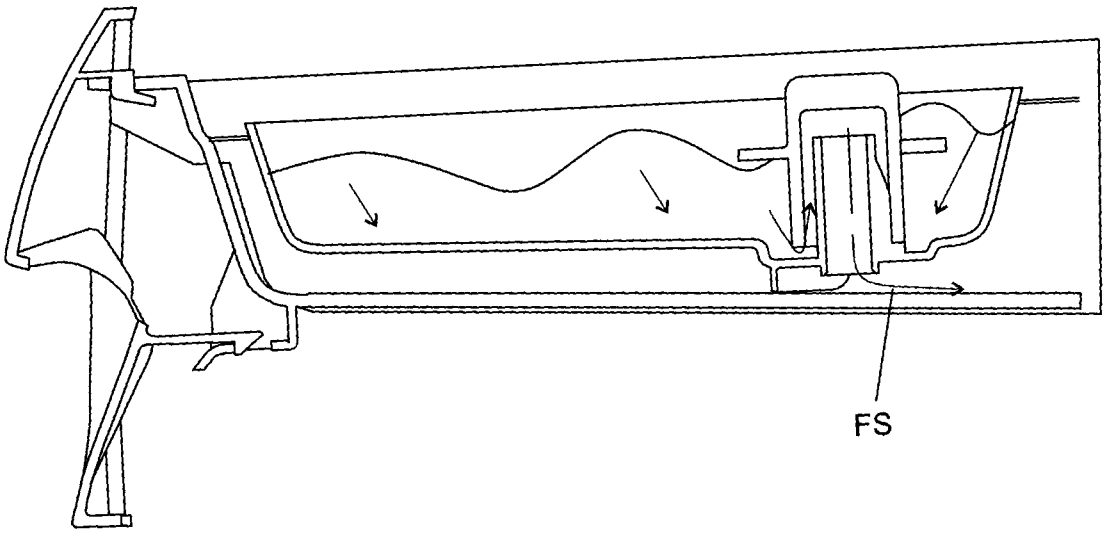


FIG. 6A

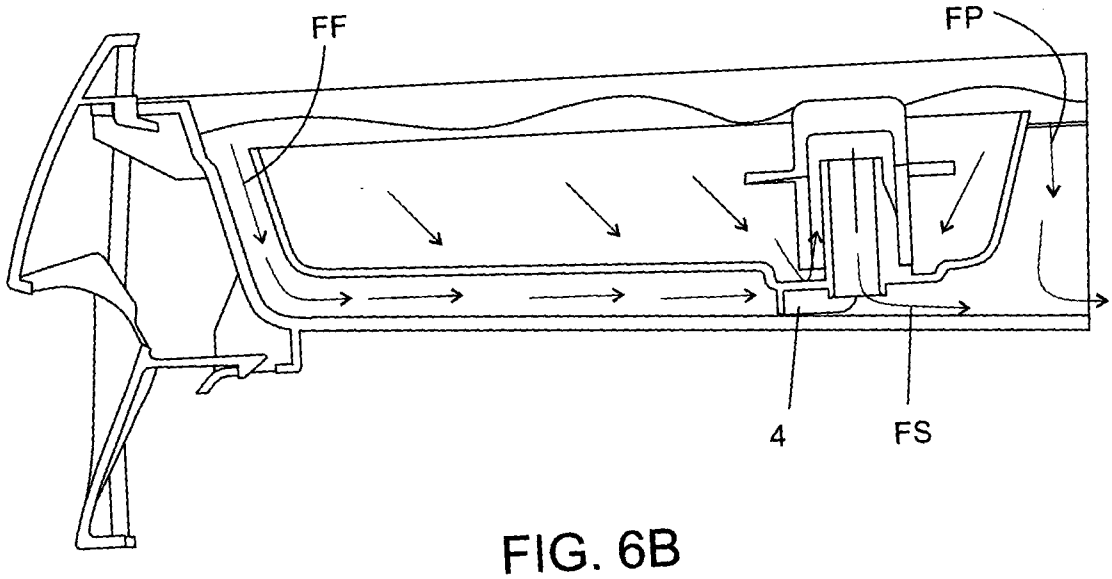


FIG. 6B

INTERNATIONAL SEARCH REPORT

International application No
PCT/BR2012/000335

A. CLASSIFICATION OF SUBJECT MATTER
INV. D06F39/02
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)
D06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 32 15 501 A1 (BOSCH SIEMENS HAUSGERAETE [DE]) 3 November 1983 (1983-11-03) the whole document	1-7
A	US 2005/229652 A1 (KIM JONG M [KR] ET AL) 20 October 2005 (2005-10-20) paragraph [0084]	1-7
A	US 2003/145633 A1 (MERKLE SCOTT A [US] ET AL) 7 August 2003 (2003-08-07) paragraph [0016]	1-7
A	US 2009/100880 A1 (HILL CHRIS H [US]) 23 April 2009 (2009-04-23) the whole document	1-7

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

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"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

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
8 November 2012	20/11/2012

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

Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/BR2012/000335

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