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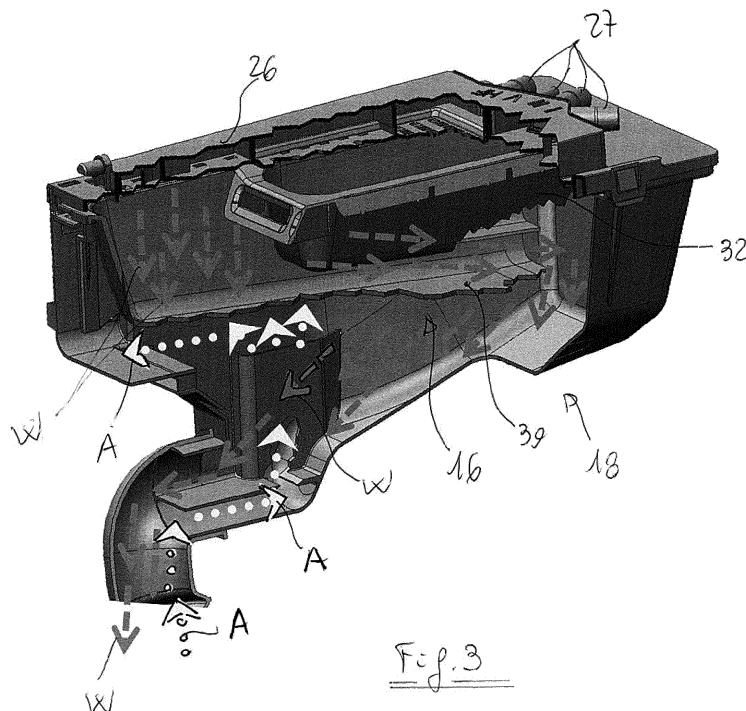
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(54) Washing machine with detergent dispensing system

(57) A washing machine has a detergent dispensing system comprising a drawer (16) with detergent chambers (B,C,D) and movable within a housing (18) mounted on the washing machine and further having a piping system (24) for hydraulically connecting the housing (18) with a tub (12) of the washing machine. The housing (18)

presents an overflow opening (18b) for preventing a possible water overflow from the tub (12) to reach an upper level of the housing (18), wherein the housing (18) is box-shaped and said overflow opening (18b) is provided on a front side of the housing (18) below a second opening (18a) for the passage of the detergent drawer (16).

Fig. 3**EP 3 026 165 A1**

Description

[0001] The present invention relates to a washing machine having a detergent dispensing system comprising a drawer with detergent chambers and moveable within a stationary housing and further having a piping system for hydraulically linking the housing with a tub of the washing machine.

[0002] Such detergent dispensing systems are well known in the art of the washing machines, and they are widely used either in front loading or top loading washing machines. In the following with the term "detergent" we mean every kind of solid or liquid detergent and washing aid like softeners, bleaching agents etc.

[0003] One of the problem of washing machines is a proper ventilation of the tub when it is filled with water or during the washing and rinsing stages of the laundry washing process. Known washing machines are provided with dedicated ventilation hoses which connect the tub with the outside environment; this increases the complexity of the overall construction of the appliance. Other washing machines rely on the ventilation from the housing of the detergent drawer. If this may be considered acceptable for big drawers where there is a considerable space for loading detergents, it is not the case where a big amount of detergent has to be loaded in a relatively small detergent drawer. In this case a possible water overflow from the tub may flood the housing of the detergent drawer and create leakage on the front panel of the washing machine.

[0004] It is therefore an object of the present invention to provide a washing machine which does not present the above drawbacks and which is simple to be manufactured.

[0005] According to the invention, the above object is reached thanks to the technical features listed in the appended claims.

[0006] According to the invention, the housing of the detergent drawer presents a side opening which prevents a possible water overflow from the tub to reach the upper level of the housing, by allowing such overflow to be discharged inside the body of the washing machine and therefore reducing problems to the user in case of technical malfunction. As a matter of fact any overflow internal to the body of the washer is usually collected within a bottom plate of the washing machine, where is usually mounted a device for detecting water leakage within the washing machine. If the above overflow is of a certain amount, the detecting system will inform the user that something is wrong in the function of the machine, therefore avoiding further water overflow.

[0007] According to another technical feature of the invention, the detergent chambers of the detergent drawer are provided with a front upper rim which is inclined and which is provided with one or more openings which act as an indicator for maximum fill level of detergent. This is also designed for preventing a possible water overflow deriving from the obstruction of the water pas-

sage in the drawer caused by consolidated detergent powder blocks which, without the above openings, could flood the drawer and cause leakage on the front panel of the washing machine.

[0008] According to another technical feature of the invention, the front wall of the washing machine is provided with a movable flap for accessing the detergent drawer, such flap being made of acoustically insulating material. Thanks to this further feature the overall noise of the working washing machine as perceived by the user is reduced.

[0009] Further advantages and features according to the present invention will become clear from the detailed description, provided as a non limiting example, with reference to the attached drawings in which:

- Figure 1 is a side section view of a portion of a washing machine according to the invention;
- Figure 2 is a front view of a component shown in figure 1;
- Figure 3 is a perspective and partially sectioned view of a detergent dispensing system used in the washing machine of figure 1;
- Figure 4 is a perspective partially sectioned view of the detergent drawer used in the detergent dispensing system of figure 3,
- Figure 5 is a top view of the detergent drawer of figure 4; and
- Figures 6A and 6B are side sectioned views of the detergent drawer of figures 4 and 5 in a normal working condition and in an overflow condition respectively.

[0010] With reference to the drawings, a horizontal axis washing machine comprises a cabinet 10 in which a tub 12 is elastically suspended. On a front face 10a of the cabinet, the washing machine presents a front opening 14 which is closed by a wall 16a which is fastened to or integral with a detergent drawer 16 which is slidably mounted in a fixed housing 18. The wall 16a is, in its closed configuration shown in figure 1, substantially flush with the adjacent front and upper face of the cabinet 10 and it is provided with a rotating flap 20 which is maintained in its vertical position by a spring (not shown). The flap 20 can be moved by the user's finger when he/she has to open the detergent drawer 16. The rotating flap 20 is preferably made of acoustical insulating material, as well as the wall 16a of the drawer 16 in order to minimize the noise that can be generated by the machine during its working.

[0011] The housing 18 presents a box-like shape and have a front wall with an upper opening 18a which allows passage of the drawer 16. Below the opening 18a, the housing 18 presents an overflow opening 18b whose function will be clear in the following description. A bottom wall 18c of the housing 18 has portions inclined towards a collector 22 which is connected to a rubber pipe 24 connected to the tub 12 for delivery water and detergent

to the tub itself. The water is fed by a spray system 26 placed, in a known way, at the top of the housing 18 and connected to a water delivery system by means of pipe fittings 27 (figure 3).

[0012] When during the washing cycle of the washing machine, for whatever reason, water reaches a level indicated with reference L in figure 1, it spills out from the overflow opening 18b without any spillage on the front wall 10a of the cabinet 10. Such accidental spillage is collected on the bottom plate (not shown) provided at the bottom of the cabinet 10 (such plate being also used for reducing noise emission from the machine).

[0013] With reference to figure 3, with arrows W it is indicated how water is delivered from the spray system 26 to the tub 12, and with arrows A how the air coming out from the tub 12 (during filling operation thereof) is vented out from the housing 18. This system, without any additional hoses for air venting, allows storage of a big amount of detergents or rinsing/bleaching additives in a quite reduced space, allowing internal water overflow and air ventilation during water filling without an ad-hoc exhaust hose.

[0014] In figures 4 and 5 some details of the detergent drawer 16 are shown (where the front wall 16a has been removed therefrom for sake of clarity), where compartments B and C are for powder detergent and compartment D for liquid detergent or rinse aid. The detergent drawer 16 is composed by a base tank portion 30 on which an upper auxiliary tank portion 32 is removably mounted. By removing the auxiliary tank portion 32 the compartment B can be easily cleaned by the user. Both the base tank portion 30 and the upper auxiliary tank portion 32 have open rear wall for water passage. In the compartment D an usual siphon is placed (not shown), which allow the automatic discharge of water plus detergent when a predetermined water level is reached. As an example of volumes of detergent, chamber B may store around 300 cm³ of detergent, while chambers C and D can store around 80 and 150 cm³ respectively. Dimensions of the drawer 16 can vary in a wide range, and as an example a length about 180 mm, a height around 40 mm and a width around 90 mm have been used by the applicant.

[0015] As shown in figures 4 and 6, the auxiliary tank portion 32 presents, on its front edge, an inclined surface 34 which extends for a certain length into the compartment B, and which has two openings 36. In figures 6A and 6B it is shown what is the purpose of such openings 36. In figure 6A is it shown the normal behavior of the detergent drawer 16 when water is fed through the spray system 26. In the configuration where such system delivers water to compartment B, water and detergent flow along the bottom of the drawer and then are collected in the housing 18 and delivered to the tub 12.

[0016] When, as in figure 6B, a lump of solid detergent K stops the normal route of water, the presence of the openings 36 allows (as shown by arrows in figure 6B) water to pass around the lump of solid detergent without

the risk of being spilled outside the drawer 16. According to a further feature of the invention, between the housing 18 and the detergent drawer 16 there are interposed plastic clamps fastened to or integral with an upper cover of the housing 18 in order to reduce wobbling effect when drawer is opened or closed. Such clamps can be fastened to the spray system 26 on the housing 18.

[0017] Even if the above description was made with reference to an horizontal axis washing machine, it is clear that the same detergent system can be used in a vertical axis washing machine, independently on how the washing machine drum is loaded with clothes (the invention applies to front loaders and to top loaders as well).

Claims

1. Washing machine having a detergent dispensing system comprising a drawer (16) with detergent chambers (B, C, D) and movable within a housing (18) mounted on the washing machine and further having a piping system (24) for hydraulically connecting the housing (18) with a tub (12) of the washing machine, **characterized in that** the housing (18) presents an opening (18b) for allowing water overflow from the tub (12).
2. Washing machine according to claim 1, wherein the housing (18) is box-shaped, said opening (18b) being provided on a front side of said housing (18) below a second opening (18a) for the passage of the detergent drawer (16).
3. Washing machine according to claim 2, wherein the box-shaped housing (18) presents a bottom wall (18c) with inclined surfaces, such overflow opening (18b) being provided adjacent one of such inclined surfaces.
4. Washing machine according to any of the preceding claims, wherein said overflow opening (18b) is positioned far from a front panel (10a) of the washing machine.
5. Washing machine according to any of the preceding claims, wherein the detergent chambers (B, C, D) comprise a first front chamber (B) placed in a front zone of the drawer (16) and having a width corresponding substantially to the entire width of the drawer (16), at least two rear chambers (C, D) placed in a rear zone of the drawer, such rear chambers (C, D) having a front upper edge which a rim (34) provided with at least one water overflow hole (36).
6. Washing machine according to claim 5, wherein the two rear chambers (C, D) are formed in an auxiliary tank device (32) removably installed in the drawer

(16, 30).

7. Washing machine according to claim 5 or 6, wherein a first rear chamber (C) is configured to dispense powder detergent and a second rear chamber (D) is configured to dispense liquid detergent or liquid washing/rinsing aid. 5
8. Washing machine according to any of claims 5-7, wherein the rim (34) is inclined in order to decrease chances of being obstructed by lump of solid detergent. 10
9. Washing machine according to any of the preceding claims, wherein the detergent dispensing system presents a front wall (16a) which is acoustically insulated and is provided with a movable flap (20) for allowing handling of the drawer (16) and which is maintained substantially flush with a front surface (10a) of the washing machine. 15 20
10. Washing machine according to any of the preceding claims, wherein between the housing (18) and the drawer (16) there are interposed clamps fastened to or integral with an upper cover of the housing (18) in order to reduce wobbling effect when drawer is moved. 25

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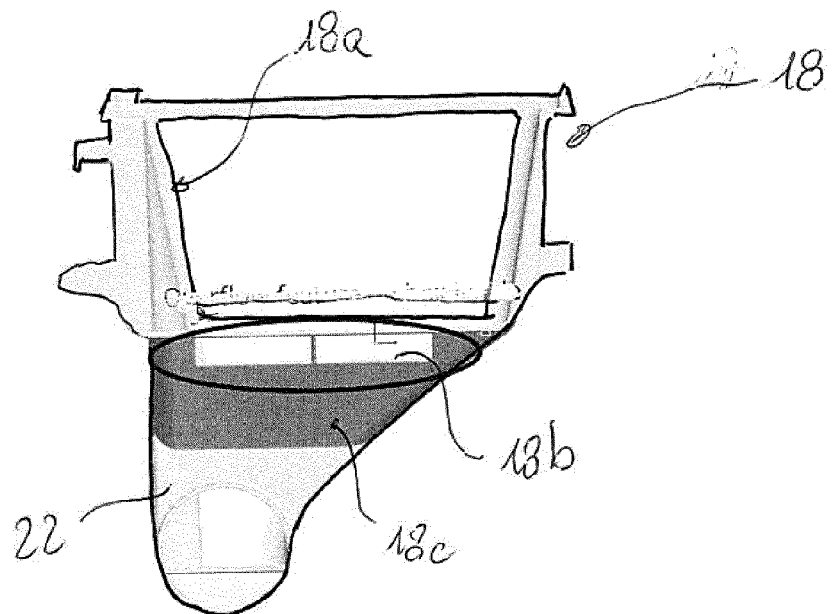
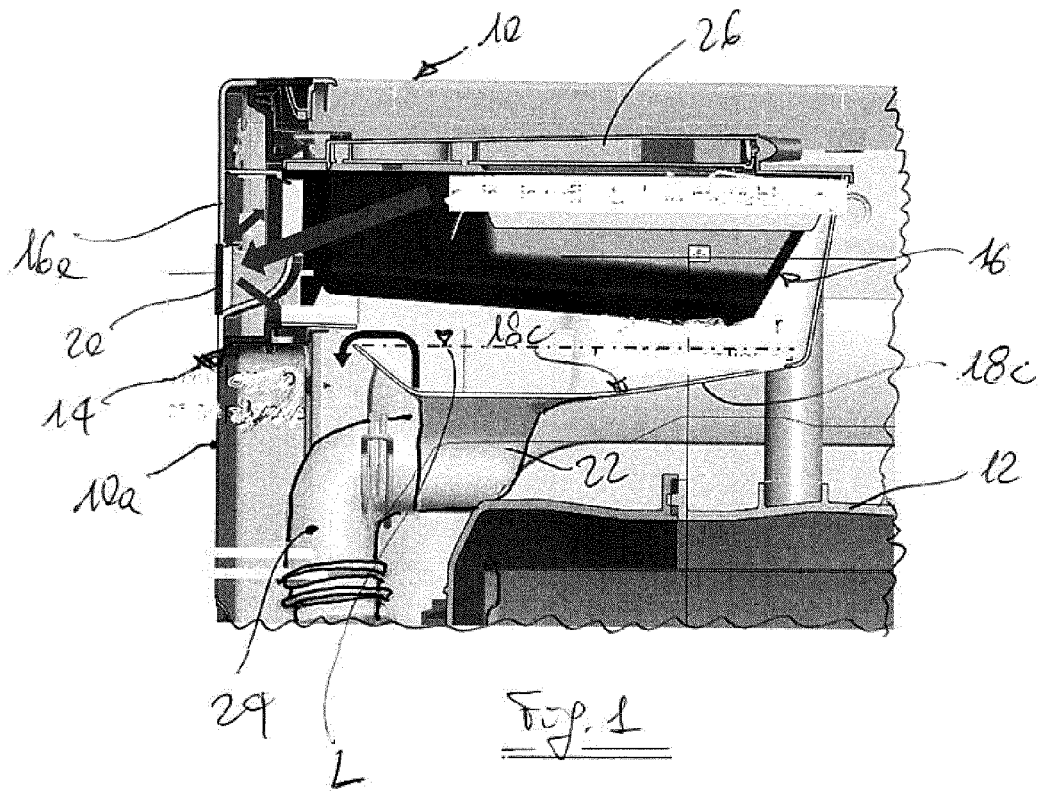
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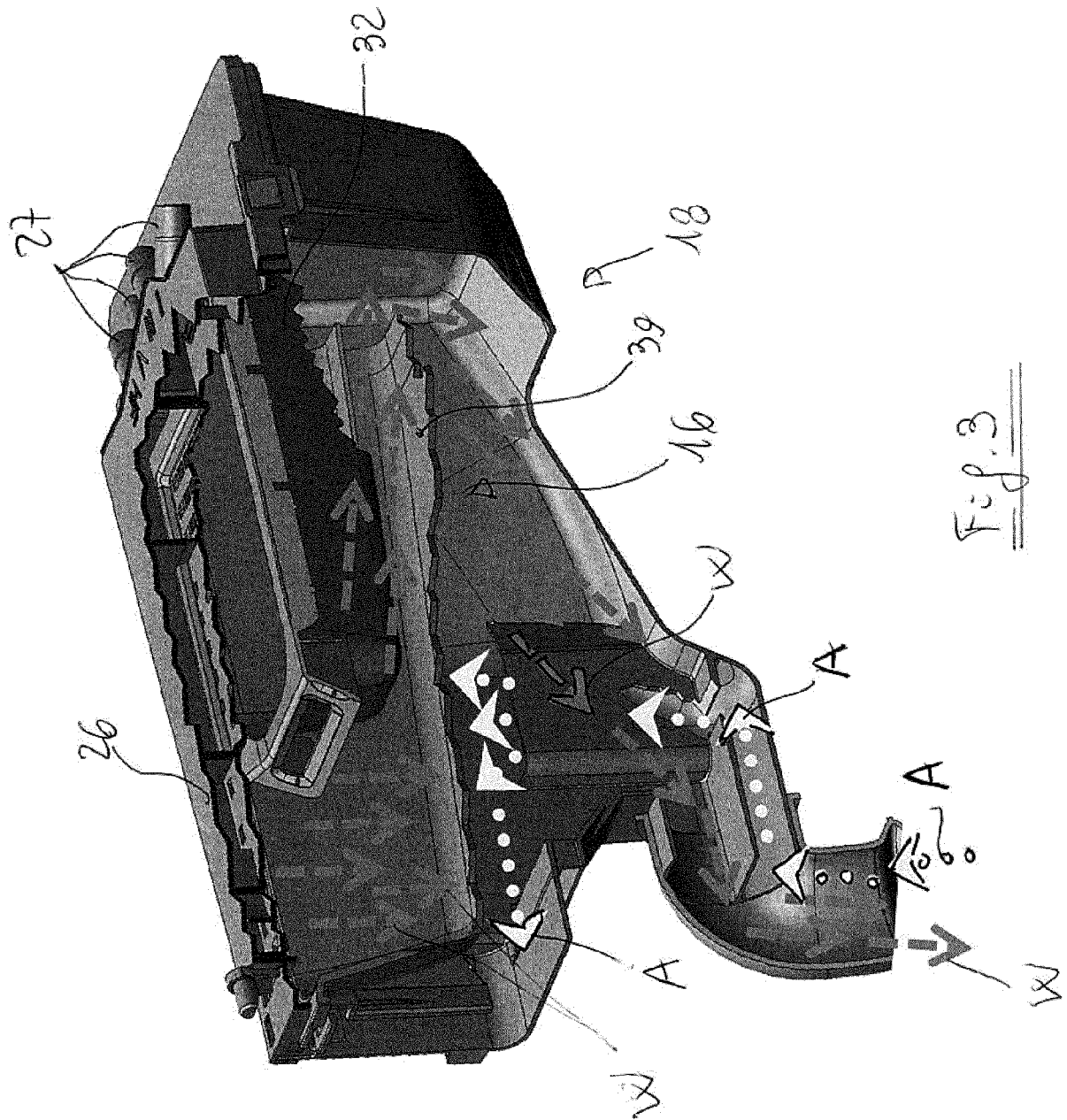
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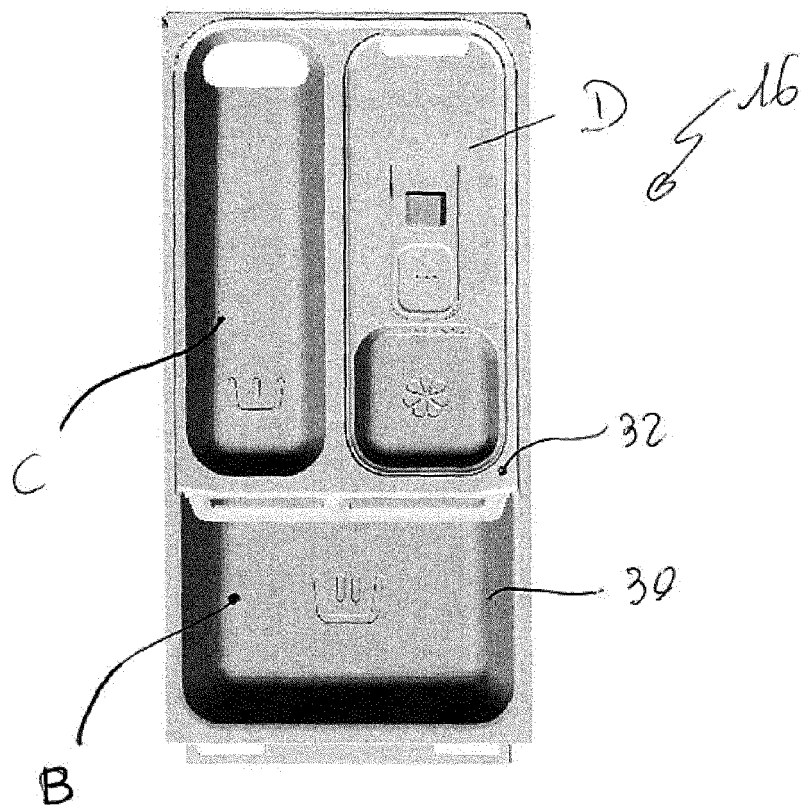
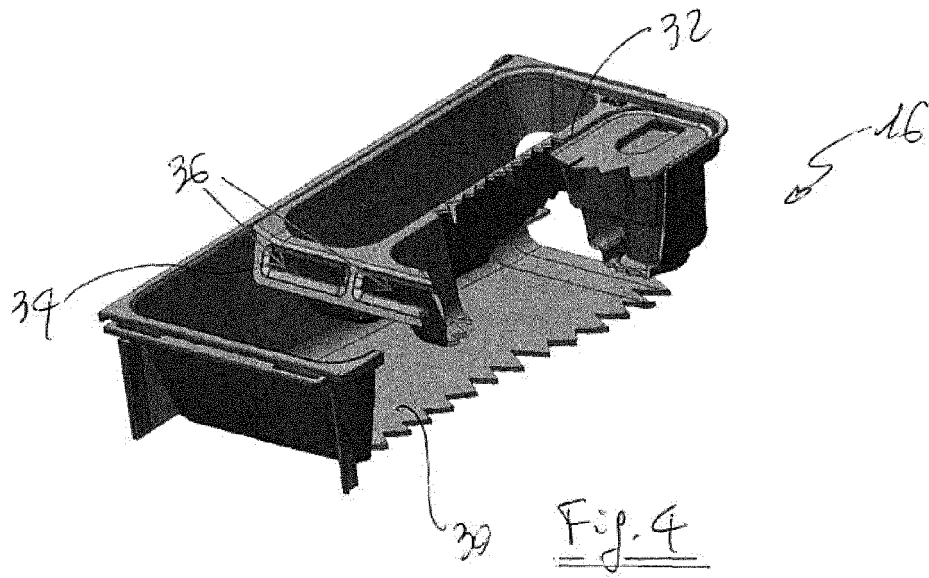
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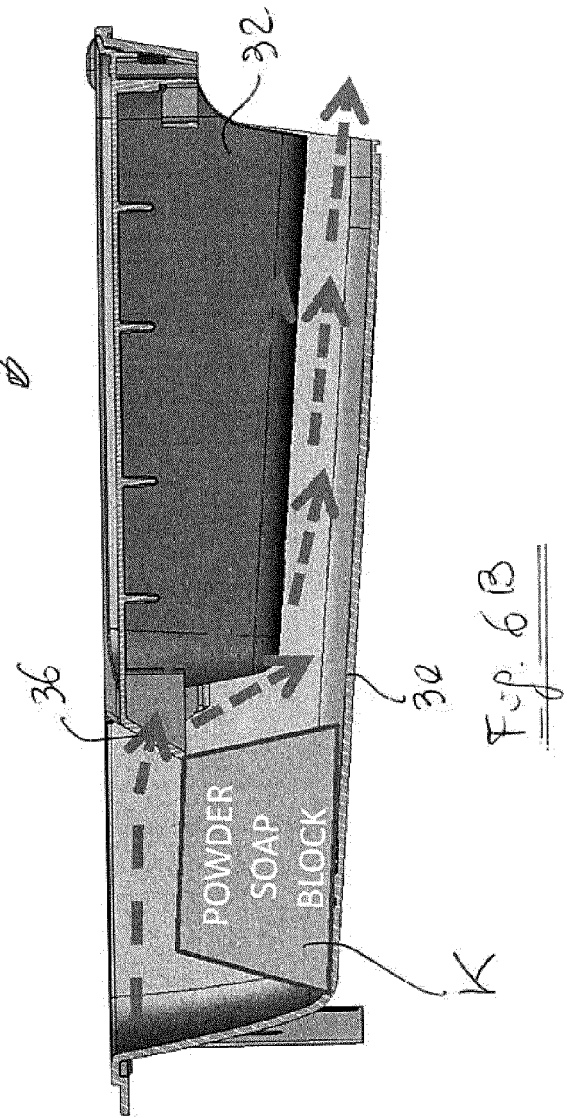
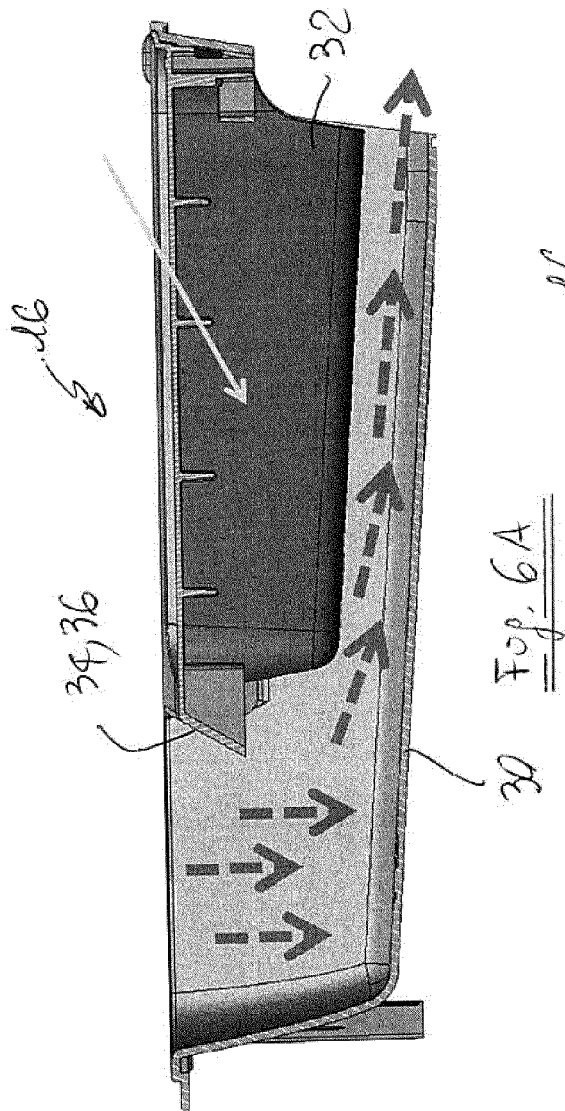
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EUROPEAN SEARCH REPORT

Application Number
EP 14 19 4816

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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)
X	US 2012/103028 A1 (LEE YONG SOK [KR] ET AL) 3 May 2012 (2012-05-03)	1-4	INV. D06F39/02 D06F39/08 D06F39/12
Y	* paragraph [0048] - paragraph [0069];	9,10	
A	figures 3-5 *	5-8	

X	GB 1 330 798 A (BRITISH DOMESTIC APPLIANCES) 19 September 1973 (1973-09-19)	1	
A	* page 2, line 10 - line 81; figures 2, 3 *	2-8	

Y	DE 90 18 154 U1 (BOSCH SIEMENS HAUSGERAETE [DE]) 5 December 1996 (1996-12-05)	9	TECHNICAL FIELDS SEARCHED (IPC) D06F
A	* page 1, line 20 - line 29 *	1	
	* page 2, line 13 - page 3, line 23; figure 1 *		

Y	DE 200 23 633 U1 (BSH BOSCH SIEMENS HAUSGERAETE [DE]) 31 March 2005 (2005-03-31)	10	
A	* paragraph [0004] * * paragraph [0022] - paragraph [0027]; figures 2, 5, 6 *	1	

The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 28 January 2015	Examiner Sabatucci, Arianna
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			

EPO FORM 1503 03/02 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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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
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2012103028 A1	03-05-2012	CN 102454089 A	16-05-2012
		KR 20120044427 A	08-05-2012
		US 2012103028 A1	03-05-2012
GB 1330798 A	19-09-1973	NONE	
DE 9018154 U1	05-12-1996	NONE	
DE 20023633 U1	31-03-2005	NONE	

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