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(54) **Detergent dispenser for a clothes washing machine**

(57) A detergent dispenser for a clothes washing machine having a tub for holding clothes to be washed, comprises a base mounted in the washing machine with a cup-shaped portion adapted to hold and dispense a pow-

der detergent, and a detergent cup (16) removably mounted in the cup-shaped portion (A'') of the base (12) to hold and dispense a liquid detergent. The base comprises an auxiliary portion (A') adapted to hold the detergent cup (16) when not in use.

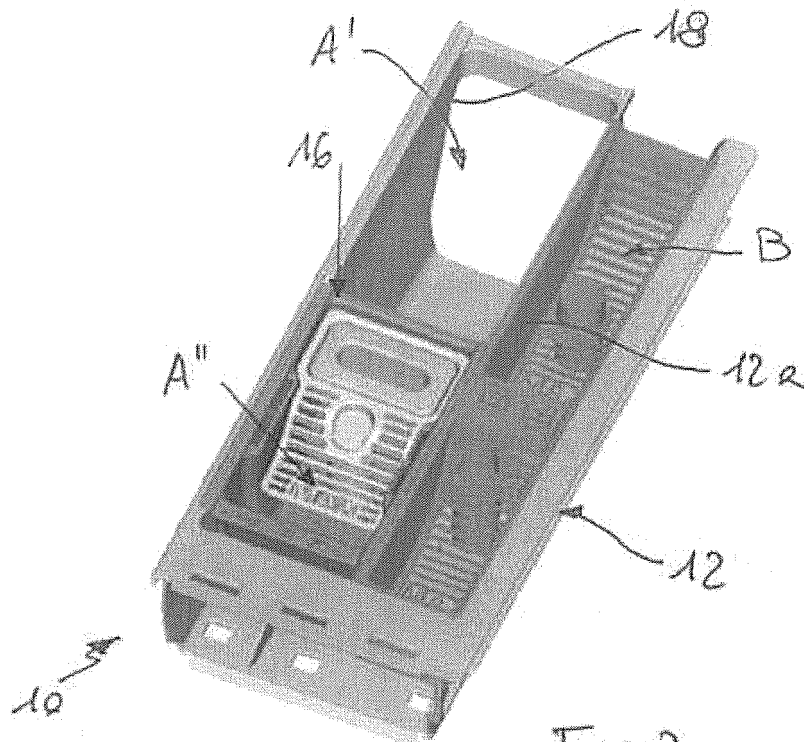


Fig. 2

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Description

[0001] The present invention relates to a detergent dispenser for a clothes washing machine having a tub for holding clothes to be washed. More particularly, the present invention relates to a washing machine comprising a base mounted in the washing machine with a cup-shaped portion adapted to hold and dispense a powder detergent, and a detergent cup removably mounted in the cup-shaped of the base to hold and dispense a liquid detergent.

[0002] A detergent dispenser of the above type is disclosed by US 2003/0145633 A1, where the cup-shaped portion for the powder detergent can be either a removable cup or integral with the base. A main drawback of this known technical solution is that the user has to remove completely from the detergent dispenser, and therefore from the washing machine, the liquid detergent cup when he wants to use a powder detergent. This can lead to lose such component, since it is well known that all the removable components of domestic appliances have high chances of being lost when removed. Another drawback is the difficulty for the user to understand immediately how the detergent dispenser works without the need of reading the instructions for use. As a matter of fact it is difficult for the user to understand that the washing machine according to the above document has a liquid detergent cup which can be removed. Therefore he may think that such cup is fixed to the washing machine and therefore he can also assume that such cup can be used either for a liquid detergent or for a powder one.

[0003] A main object of the present invention is to provide a detergent dispenser that does not present the above drawbacks and it is very easy to be mass-produced at low cost.

[0004] According to the invention, such main object is obtained in view of the fact that the base of the detergent dispenser comprises an auxiliary cup-shaped portion adapted to hold the detergent cup when not in use.

[0005] There are therefore two positions of the movable compartment formed by the detergent cup, and the user has just to move such detergent cup forwards and backwards depending on what kind of detergent has to be used (liquid or powder).

[0006] Thanks to the auxiliary cup-shaped portion, the movable liquid detergent cup can be easily stored there without any risk to lose it. Moreover, since the cup-shaped portion for the powder detergent and the liquid detergent cup are both visible, the user can understand immediately how the detergent dispenser works, without any need to read the instructions for use.

[0007] Preferably the base of the detergent dispenser is a drawer that is slidably mounted in the washing machine. More preferably, a single longitudinal channel of the drawer defines the cup-shaped portion and the auxiliary cup-shaped portion. Such channel has an opening on its back wall in order to discharge the detergent into the tub.

[0008] According to another feature of the present invention, the detergent cup comprises a siphon and a bottom discharge opening adapted to be closed by a floating plug, said plug being adapted to open the discharge opening when water in the detergent cup reaches a first predetermined level which is lower than a second predetermined level at which the siphon is activated. Thanks to such features, it is possible to discharge the liquid detergent in a very short time, despite the high viscosity of the liquid detergent. This allows reducing the overall cycle time of the washing machine.

[0009] According to a further feature of the present invention, the detergent cup comprises a removable horizontal grid adapted to indicate to the user the optimal filling level of the detergent cup. Thanks to this feature the user will understand more easily how to dose the liquid detergent compared to the current solutions.

[0010] Further advantages and features of the present invention will now be more particularly described by way of example with reference to the accompanying drawings in which:

- Figure 1 is a perspective view of a detergent dispenser according to the invention, in a first configuration thereof where a powder detergent is used for the main wash;
- Figure 2 is a perspective view of the detergent dispenser of figure 1 in a second configuration thereof, where a liquid detergent is used for the main wash;
- Figure 3 is a perspective exploded and enlarged view of a removable part of the detergent dispenser of figures 1 and 2;
- Figure 4 is a perspective view of a component of the removable part of figure 3, from a different point of view; and
- Figure 5 is a longitudinal cross section of the part shown in figure 3.

[0011] With reference to the drawings, with 10 it is indicated a drawer of a detergent dispenser, which is slidably mounted in housing usually provided in the front panel of a washing machine (not shown). Of course the detergent dispenser 10 can be also of the type closed by a lid. The detergent dispenser 10 comprises a U shaped elongated body 12 which has a longitudinal wall 12a dividing the body in a first channel-shaped portion A and in a second narrower portion B for fabric softener or other auxiliary chemicals.

[0012] Referring to figure 1, the portion A contains a liquid detergent cup 16 positioned in a back area A' of such portion. In the front area A" main wash powder detergent can be placed, where the back area A' is used as a parking area in the rear of the drawer 10. When the user wants to use a liquid detergent for the main wash, he moves the liquid detergent cup 16 from the back area A' to the front one A" (figure 2), so that he can easily fill the liquid detergent in the cup 16. In figure 2 it is also shown that the back wall of the drawer 10 is open in 18

so that the detergent and water can be discharged to the tub.

[0013] The liquid detergent cup 16 is shown more in detail in figure 3. It comprises a body 16a having a peripheral rim 17 and a siphon S made of a central tube 20 and a cap 22 integral with a grid 24. The central tube presents on its bottom (adjacent the bottom part of the body 16a), longitudinal fins 20a that avoid rattling noises and have a centering function of the cap 22 of the siphon S. The grid 24 has a perimetral edge which corresponds to the internal walls of the body 16a, and present a first portion 24a having a mark indicating the correct level of the liquid detergent, and a second portion 24b having an open frame 26 whose function will be clear from the following description. The first portion 24a of the grid 24, once positioned on the body 16a of the cup 16, is at a lower level than the second portion 24b, such portions being radiused by an inclined part. The first portion 24a of the grid 24 presents a mark "MAX" for indicating the optimal level of the liquid detergent in the cup 16.

[0014] At a certain distance from the central tube 20, the body 16a of the cup 16 present a discharge opening 28 on which some integral vertical struts 30 are placed. The discharge opening 28 is an elongated one, and presents an annular seat 28a with sealing function (figure 5) for a corresponding lower edge 32a of a floating plug 32. Such plug 32 present an hollow portion 32b adapted to slide on the vertical struts 30 and an upper portion 32c adapted to slide inside the open frame 26 of the grid 24 and having a floating annular chamber 34 (figure 4) for allowing the floating of the plug 32 when the liquid in the body 16a reaches a predetermined level L1 (figure 5). Of course the floating chamber 34 (shown in figure 4 as obtained by an injection moulding process) can be made in a different way, or it can be added to the hollow portion 32b of the floating plug 32. The function of the detergent cup 16, when it is placed in the front area A" of the drawer 10, is as follows.

[0015] Once the drawer 10 is fed with water (through an usual water distribution system connected to the water network and driven by the timer or by the central process unit of the washing machine) the water level in the body 16a of the liquid detergent cup 16 (previously filled with liquid detergent up to a level LD of the mark "MAX" in the grid 24) starts to increase. When water level reaches level L1, the floating plug 32 will be lifted upwards and opens the discharge opening 28 in the bottom of the body 16a. Since the body 16a rests upon the upper peripheral rim 17 on the drawer 10, its bottom wall is spaced above the bottom wall of the drawer 10, so that the liquid (mixture of liquid detergent and water) can flow from the opening 28 in the channel A and be discharged through back opening 18 in the tub of the washing machine. This will empty most of the liquid detergent. This is necessary because of the high viscosity of the liquid detergent. With traditional rain shower system it is not possible to mix the liquid detergent with the water in a way that it flows fast enough through the siphon S. In the worst case, depend-

ing on the liquid detergent that is used, two separate layers of liquids may be present, i.e. the detergent on the bottom and the water on top of it. Therefore the use of the floating plug 32 is necessary to open the bottom of the liquid detergent cup 16 almost at the beginning of the water filling process in order to get rid of as much as possible liquid detergent. Once the water level reaches a level L2 (figure 5) higher than level L1, the siphon S starts to empty the cup 16. While doing this the floating plug 32 will go down and close the bottom of the cup 16. In this phase only a small amount liquid detergent is left so that the siphon S is now able to empty the compartment fast enough. Tests performed by the applicant have shown that the function to empty the container will also work only by the siphon S, but it takes a longer time until the cup 16 is empty, which cannot be acceptable from a complete wash cycle time point of view.

[0016] If the user wants to use a powder detergent, he has only to move the liquid detergent cup 16 from the area A" (figure 2) to the area A' (figure 1). In this way the whole area A" can be used for loading powder detergent.

Claims

1. Detergent dispenser for a clothes washing machine having a tub for holding clothes to be washed, comprising a base (12) mounted in the washing machine with a cup-shaped portion (A") adapted to hold and dispense a powder detergent, and a detergent cup (16) removably mounted in the cup-shaped portion (A") of the base (12) to hold and dispense a liquid detergent, **characterised in that** the base (12) comprises an auxiliary portion (A') adapted to hold the detergent cup (16) when not in use.
2. Detergent dispenser according to claim 1, **characterised in that** the base (12) is a drawer (10) slidably mounted in the washing machine.
3. Detergent dispenser according to claim 2, **characterised in that** the cup-shaped portion (A") and the auxiliary portion (A') are defined by a single longitudinal channel of the drawer (10).
4. Detergent dispenser according to any of the preceding claims, **characterised in that** the detergent cup (16) comprises a siphon (S) and a bottom discharge opening (28) adapted to be closed by a floating plug (32), said plug (32) being adapted to open the discharge opening (28) when water in the detergent cup (16) reaches a first predetermined level (L1) which is lower than a second predetermined level (L2) at which the siphon (S) is activated.
5. Detergent dispenser according to any of the preceding claims, **characterised in that** the detergent cup (16) comprises a removable substantially horizontal

grid (24) adapted to indicate to the user the optimal filling level (LD) of the cup.

6. Detergent dispenser according to claim 4 and 5, **characterised in that** the removable grid (24) is part of the siphon (S) and comprises an annular portion (24b, 26) in which the floating plug (32) can slide vertically. 5
7. Detergent dispenser according to claim 4, **characterised in that** the floating plug (32) comprises a hollow portion (32b) and a top portion (32c) in which an annular chamber (34) is defined for floating purposes. 10
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8. Detergent dispenser according to claim 4, **characterised in that** the detergent cup (16) comprises, adjacent the bottom discharge opening (28), vertical struts (30) adapted to guide the hollow portion (32b) of the floating plug (32). 20
9. Detergent dispenser according to claim 3, **characterised in that** the drawer (10, 12) comprises a longitudinal wall (12a) separating said longitudinal channel (A) from an auxiliary channel (B) where liquid auxiliary products, such as fabric softeners and conditioners, can be loaded. 25
10. Washing machine provided with a detergent dispenser according to any of the preceding claims. 30

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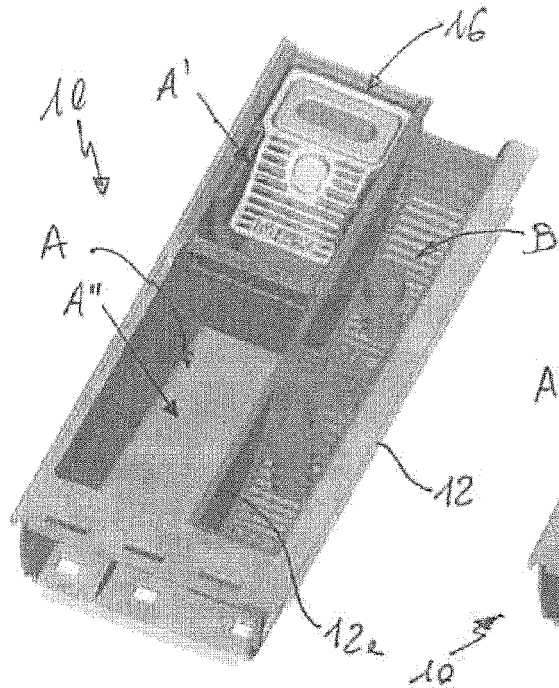


Fig. 1

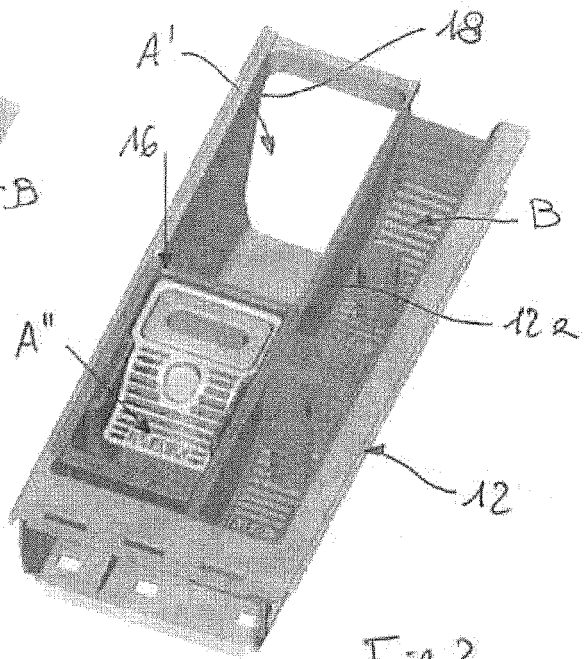


Fig. 2

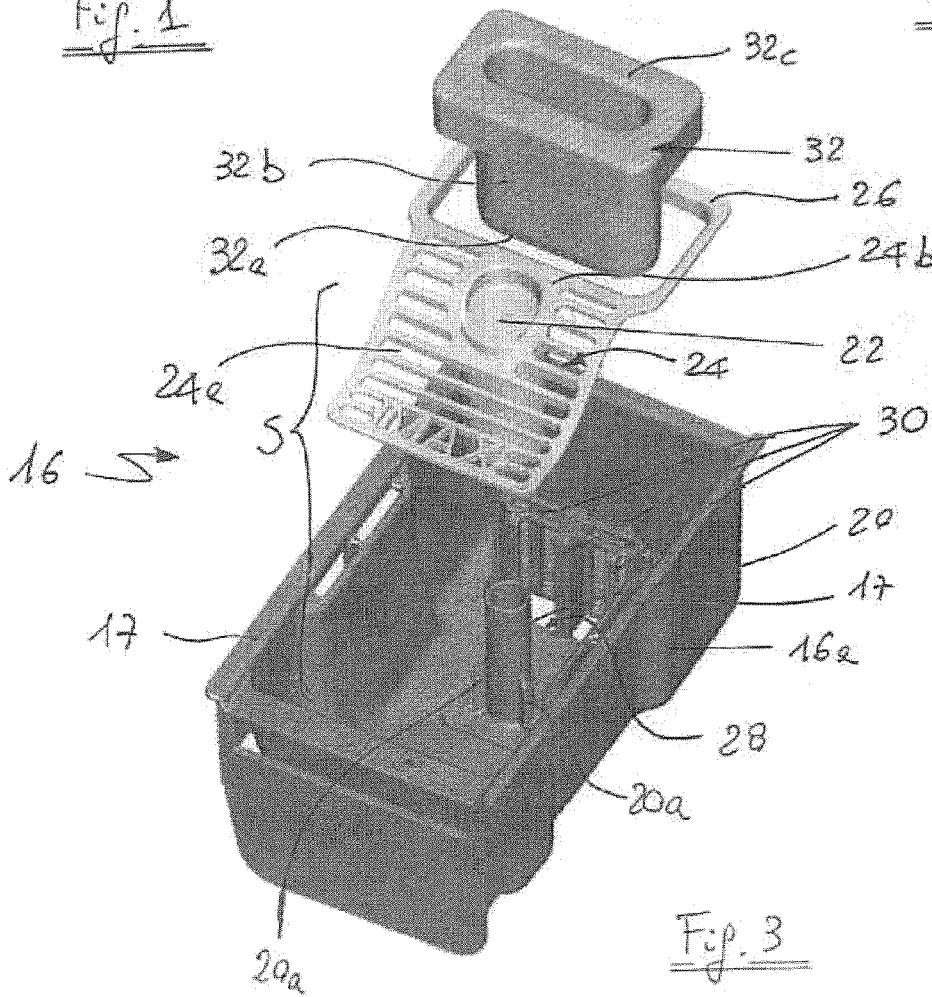


Fig. 3

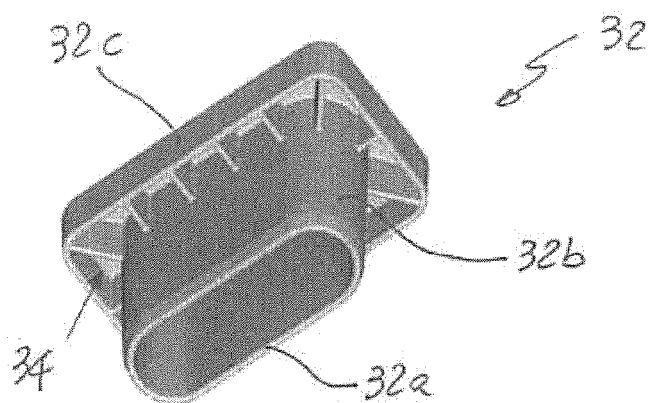


Fig. 4

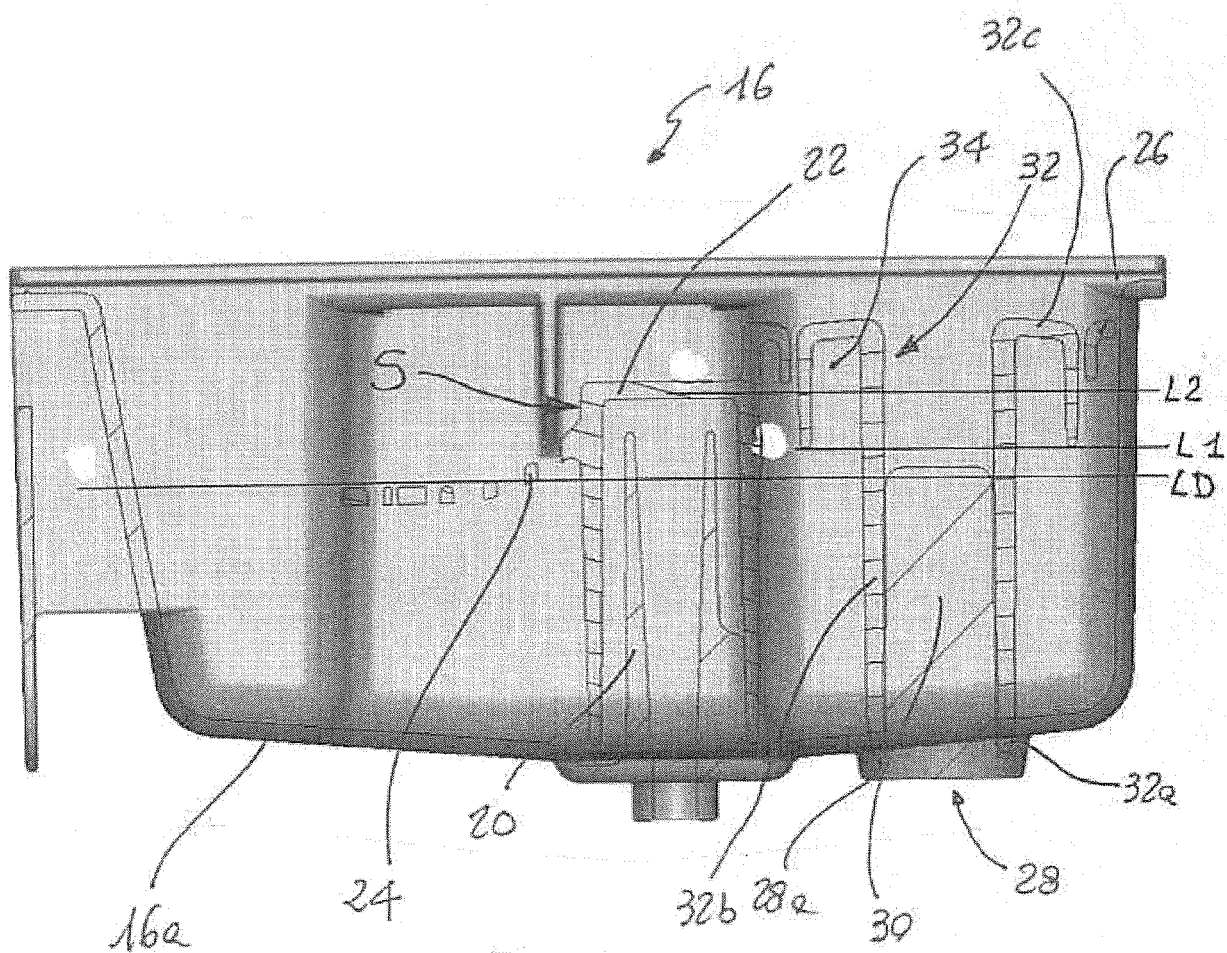


Fig. 5



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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A,D	US 2003/145633 A1 (MERKLE SCOTT A ET AL) 7 August 2003 (2003-08-07) * the whole document *	1-10	D06F39/02
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A	GB 2 165 267 A (* ZANUSSI ELETTRODOMESTICI SPA) 9 April 1986 (1986-04-09) * page 2, line 42 - page 3, line 56; figures *	1-10	TECHNICAL FIELDS SEARCHED (IPC) D06F
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 8 February 2006	Examiner Lodato, A
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			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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