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(71) Applicant: **Bonferraro S.p.A.**
37060 Bonferraro (VR) (IT)

(72) Inventor: **Gobbi, Ezio**
46037 Roncoferraro MN (IT)

(74) Representative: **Concone, Emanuele et al**
Società Italiana Brevetti S.p.A.
Via Carducci 8
20123 Milano (IT)

(54) Multidose detergent dispenser for dishwasher

(57) In a detergent dispenser for dishwasher consisting of a body (1) in which there is formed a load bay (4) that can be closed by a spring-loaded lid (6), a protective shell (5) and a dosing member (2) divided into a plurality of compartments by dividing plates (3) provided with relevant peripheral gaskets (3'), the dosing member (2) is movable between the bay (4) and the shell (5) by means of a pair of threaded bars (7) engaging corresponding internally threaded tubes (7') and controlled by an electric motor (9) through reduction gears (8). The present multidose dispenser is extremely reliable, in that even if the detergent lumps the dispensing mechanism remains unaffected and the sprinkler can wash the detergent away into the washing liquid, it can be used with any type of detergent (powdered, liquid or in tablets) and thanks to its compact size it can be arranged in the dishwasher door same as the conventional basin dispenser.

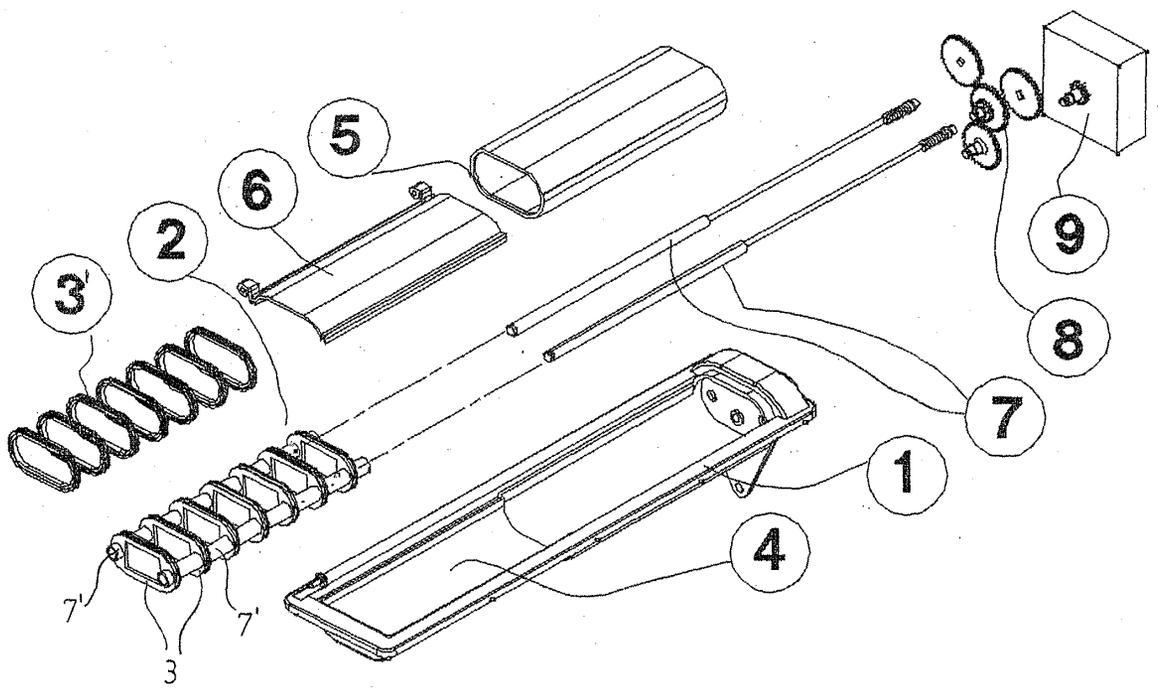

Fig.1

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Description

[0001] The present invention relates to dishwashing machines, and in particular to a multidose dispenser suitable to dispense detergent in a plurality of washing cycles.

[0002] It is well known that a dishwasher includes inside the door a dispenser substantially consisting of a basin that, when the door is open in the horizontal position, is loaded by the user with the detergent required for the washing cycle and then closed by a lid hinged thereto which is engaged by a latch, said lid being biased open by a spring. In this way it is possible to close the dishwasher door without the detergent falling out of the basin, which will then be opened at the right moment in the cycle by releasing the lid latch.

[0003] Therefore prior to each washing cycle the user has to take a detergent container, often bulky, pour a dose of detergent in the dispenser and put back the container. Moreover it may happen that the user forgets to load the dispenser, with the risk of performing a washing cycle without detergent which results in a waste of water and power. Various systems have therefore been devised in order to prevent these problems, but with little success until now.

[0004] A first simple solution proposed since some time ago is that of a dispenser provided with a reservoir suitable to contain an amount of detergent sufficient for various cycles, as well as with detergent dosing and feeding means such as a roller divided into compartments or a screw feeder. Examples of said dispensers are found in the publications WO 82/00482, EP 1228736 and EP 1236430 but they are particularly suitable for use with liquid detergents such as those used in washing machines.

[0005] In fact powdered detergents tend to lump and clog the dispenser due to the temperature and humidity conditions of their storage in the reservoir, which is necessarily close to the washing tank. On the other hand, it is not advisable to use liquid detergents in dishwashers since they have the disadvantage of not providing the same washing performance of powders, given that certain essential components cannot be liquefied and/or do not remain in suspension.

[0006] In order to prevent these clogging problems, mobile members have been provided inside the reservoir to mix the detergent and to push it toward the dosing and feeding means, as disclosed for example in EP 599110 and WO 03/23120. As an alternative, an attempt has been made at limiting lumping and facilitating feeding by providing a continuous stream of compressed air in the detergent feed duct and/or in other parts of the dispenser, as disclosed for example in WO 93/18701, EP 611843 and US 5829085. All these solutions, however, do not guarantee a smooth dispensing of the detergent and imply a bulky, complicated and expensive structure of the dispenser.

[0007] Another solution recently proposed is that of the detergents in tablets which however have an average cost 30% higher than powdered detergents due to the supplementary working that they undergo, since they are nothing more than powders additioned with binders and pressed in moulds. In addition to the higher cost, tablets also have other drawbacks since prior to use they must be removed from their moisture-resistant package, necessary to prevent the tablet crumbling due to the highly hygroscopic detergent, and moreover in short or low-temperature cycles they often do not completely dissolve but resist until the rinse phase, thus leaving detergent on the dishes.

[0008] All these drawbacks did not prevent the manufacturers from developing multidose dispensers specific for tablets, such as those disclosed in DE-A-19540958, DE-A-10058460 and WO 02/58528 which can reach a capacity of even tens of tablets. Also these dispensers, however, have never been actually used in dishwashers, since the problem remains of the tablets that due to temperature, moisture and vibrations crumble and clog the dispenser.

[0009] Therefore the object of the present invention is to provide a multidose dispenser which is free from the above-mentioned drawbacks. This object is achieved by means of a multi-compartment mobile dose-meter that is progressively extracted from a protective shell, to be exposed to the washing action of the sprinkler same as the conventional basin. Other advantageous features of the present dispenser are disclosed in the dependent claims.

[0010] A first great advantage of the present dispenser is that it is extremely reliable, in that even if the detergent lumps the dispensing mechanism remains unaffected and the sprinkler can wash the detergent away into the washing liquid.

[0011] A second significant advantage of this dispenser is that it can be used with any type of detergent, namely powdered, liquid or in tablets.

[0012] A further advantage of the above dispenser stems from its compact size which allows to arrange it in the dishwasher door same as the conventional basin dispenser. As a consequence, it is easily applicable to any model of dishwasher without requiring particular changes to the structure of the machine and/or to the arrangement of the components thereof, since the only changes are those made to the door.

[0013] Still another advantage of this dispenser is given by its very simple structure, which results therefore cheap and reliable.

[0014] Further advantages and characteristics of the dispenser according to the present invention will be clear to those skilled in the art from the following detailed description of an embodiment thereof, with reference to the annexed drawings wherein:

Fig.1 is a perspective exploded view of the components of a dispenser according to the invention;
Fig.2 is a diagrammatic view from inside of a dish-

washer door with the above-mentioned dispenser ready to be loaded with detergent; and
Fig.3 is a lateral diagrammatic view showing the dispenser loading operation.

[0015] Referring to said figures, there is seen that a multidose dispenser for dishwasher according to the invention consists of a body 1, in which there is inserted a dosing member 2 divided into a plurality of compartments (six in the illustrated example) by dividing plates 3 each of which is provided with a relevant peripheral gasket 3'. Body 1 has at one end a detergent load bay 4, closed by a relevant spring-loaded lid 6, and at the other end a protective shell 5, both these members having substantially the same length of dose-meter 2.

[0016] The dosing member 2 is movable between bay 4 and shell 5 by means of a pair of threaded bars 7 engaging corresponding internally threaded tubes 7', the dividing plates 3 being mounted on said tubes 7'. The rotation of bars 7 is controlled by an electric motor 9 through suitable reduction gears 8.

[0017] It should also be noted that a slot 10 is provided between body 1 and shell 5, whereby possible residues that remain inside shell 5 are expelled upon retraction of dose-meter 2.

[0018] In the light of the description above, the simple and effective operation of the present dispenser is readily understood.

[0019] When the dishwasher door is open in the horizontal position with dose-meter 2 completely empty and positioned in the load bay 4, as shown in fig.2, the user pours into the compartments of dose-meter 2 the liquid or powdered detergent (or places a package-free tablet in each compartment) and then closes lid 6, as shown in fig.3.

[0020] Once the dishwasher door is closed, the control unit of the machine activates motor 9 which drives bars 7 into motion and dose-meter 2 is drawn inside shell 5, with each compartment containing the dose of detergent poured therein. Gaskets 3' allow the use of liquid detergent in that they seal along the whole periphery, and they also guarantee that the detergent in powder or tablet is not reached by significant water or moisture.

[0021] During the washing cycle, motor 9 is activated at the defined phase to push dose-meter 2 out of shell 5 by a distance equal to the length of a compartment, so that the compartment which must be emptied is outside shell 5 and the adjacent compartment on the contrary remains completely inside shell 5.

[0022] Lid 6 is then released so as to drop in the washing tank the detergent contained in the exposed compartment. Obviously, since the dispenser is arranged on the door in the same position of the conventional dispenser, namely at the sprinkler of the upper rack, also the mechanical action of the washing jets helps to thoroughly remove from the dispenser the detergent that, in particular when powdered, tends to stick to the sides of the compartments.

[0023] In the following cycle, dose-meter 2 will be pushed out at the right moment so as to expose the second compartment, and so on for six washing cycles before the user needs to reload the dispenser. Furthermore, it is possible to provide a system to indicate to the user the need to load the dispenser prior to the cycle start or the number of remaining range cycles, as well as other possible operation problems of the dispenser such as the missed delivery of the correct dose of detergent due to lacking or incomplete loading of dose-meter 2.

[0024] It is clear that the above-described and illustrated embodiment of the dispenser according to the invention is just an example susceptible of various modifications. In particular, the number, shape and arrangement of the compartments of dose-meter 2 can be changed according to the needs, as well as the actuator means which provide the movement thereof. For example, the threaded type of coupling could be replaced by a rack system, or by a piston or other equivalent mechanism.

Claims

1. Detergent dispenser for dishwasher including a body (1) in which there is formed a load bay (4) that can be closed by a spring-loaded lid (6), **characterized in that** it further includes a protective shell (5), a dosing member (2) divided into a plurality of compartments and suitable to enter said shell (5) and said load bay (4), actuator means to move said dosing member (2) between the shell (5) and the load bay (4), as well as sealing means to make said compartments substantially watertight when they are inside the shell (5).

2. Detergent dispenser for dishwasher according to claim 1, **characterized in that** the dosing member (2) is divided into a plurality of compartments by dividing plates (3) each of which is provided with a relevant peripheral gasket (3').

3. Detergent dispenser for dishwasher according to claim 1 or 2, **characterized in that** the actuator means consist of a pair of threaded bars (7) engaging corresponding internally threaded tubes (7'), the rotation of said bars (7) being controlled by an electric motor (9) through reduction gears (8).

4. Detergent dispenser for dishwasher according to claims 2 and 3, **characterized in that** the dividing plates (3) are mounted on the tubes (7').

5. Detergent dispenser for dishwasher according to one or more of the preceding claims, **characterized in that** a slot (10) is provided between the body (1)

and the shell (5).

6. Detergent dispenser for dishwasher according to one or more of the preceding claims, **characterized in that** it further includes sensors suitable to detect the position of the dosing member (2) and means suitable to use said detection to indicate to the user the remaining range cycles.

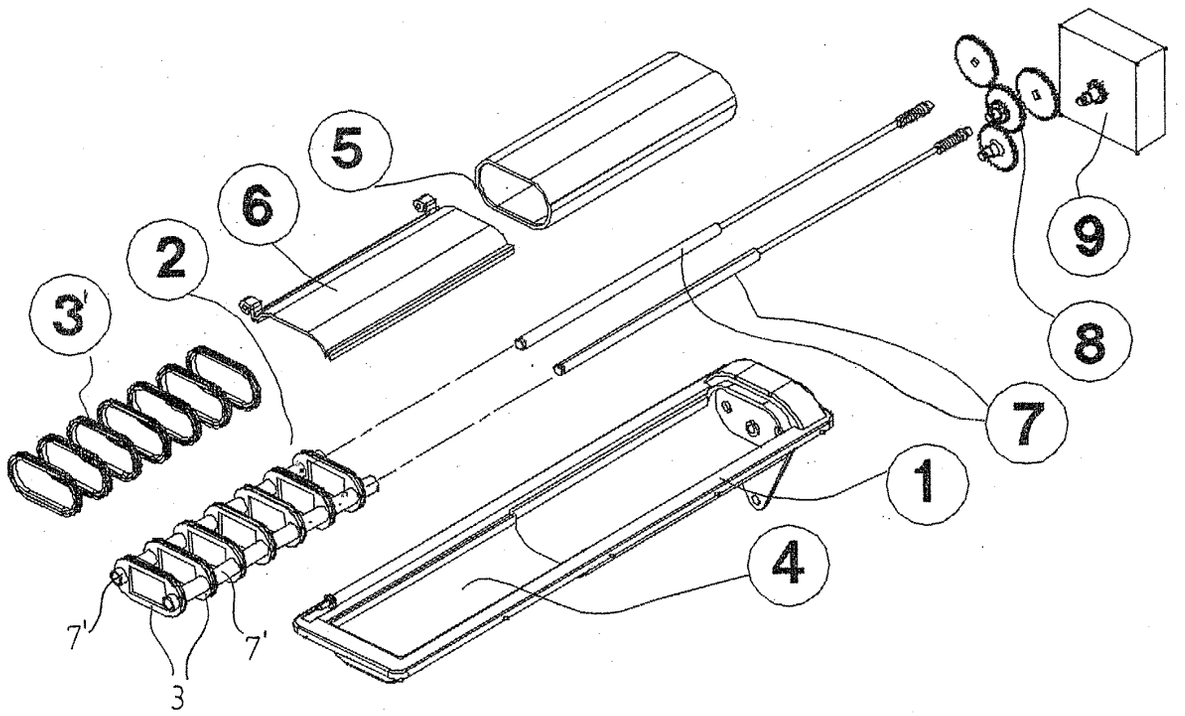

Fig.1

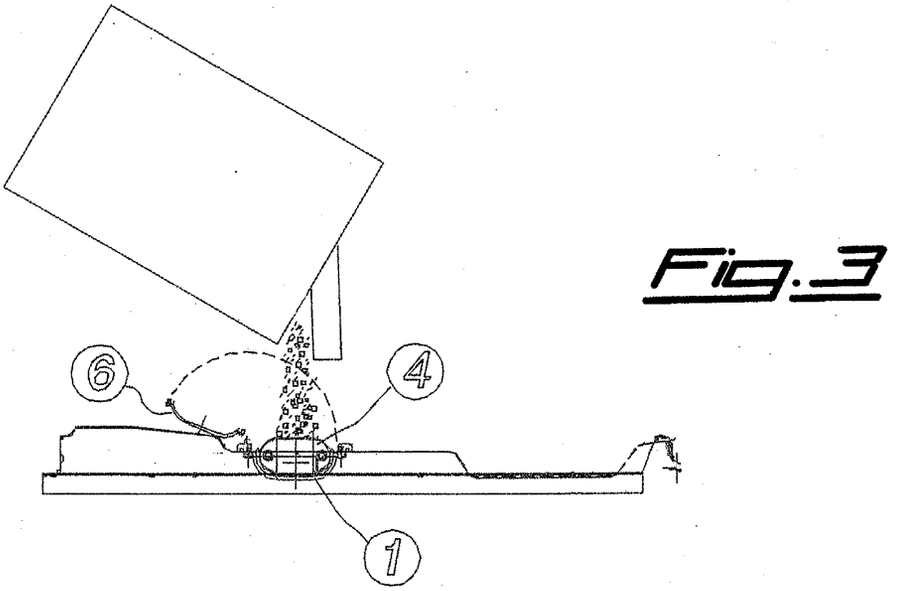

Fig.3

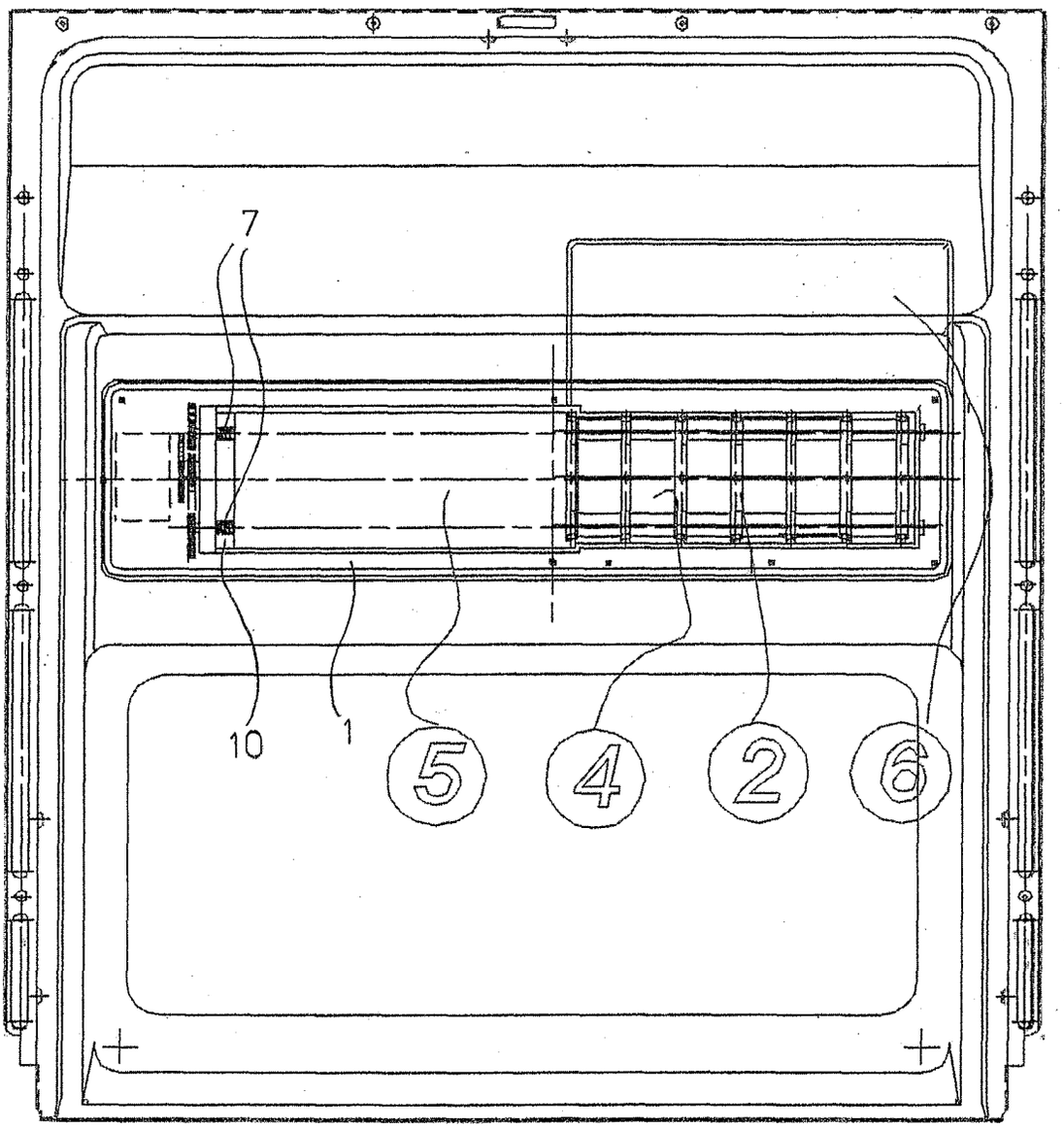

Fig.2

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 03 42 5444

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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A	* page 10, line 22 - page 13, line 4; claims 19-22,39; figures 1-3,5 *	2-4,6	

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E	GB 2 386 129 A (RECKITT BENCKISER NV) 10 September 2003 (2003-09-10) * page 6, line 12 - line 19 * * page 8, line 19 - page 11, line 27; figures 1-3 *	1-6	

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A	DE 195 40 958 A (AEG HAUSGERAETE GMBH) 7 May 1997 (1997-05-07) * column 2, line 42 - column 3, line 39; figures *	1-6	

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
MUNICH	19 December 2003	Lodato, A

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
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EPO FORM 1503 03.82 (P04C01)

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Application Number
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X : particularly relevant if taken alone
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 03 42 5444

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