



US 20020088502A1

(19) **United States**

(12) **Patent Application Publication**

Van Rompuy et al.

(10) **Pub. No.: US 2002/0088502 A1**

(43) **Pub. Date: Jul. 11, 2002**

(54) **SMART DOSING DEVICE**

(22) Filed: **Oct. 3, 2001**

(76) Inventors: **Tanya Cecile Corneel Van Rompuy**,
Surrey (BE); **Chris Van Den Wouwer**,
Borgerhout (BE); **Grover David**
Owens, Fairfield, OH (US); **Pedro**
Vincent Vandecappelle,
Izegem/West-Vlaanderen (BE);
Jean-Luc Andre Patrick Varlet,
Bruxelles (BE)

(30) **Foreign Application Priority Data**

Oct. 4, 2000 (US)..... PCT/US00/27322

Publication Classification

(51) **Int. Cl.⁷** **B65B 3/04; B65B 1/04**
(52) **U.S. Cl.** **141/1**

Correspondence Address:

THE PROCTER & GAMBLE COMPANY
INTELLECTUAL PROPERTY DIVISION
WINTON HILL TECHNICAL CENTER - BOX
161
6110 CENTER HILL AVENUE
CINCINNATI, OH 45224 (US)

(57) **ABSTRACT**

The present invention is directed to a portable, self-contained, device for dosing and/or dispensing at least one product into an appliance for treating laundry or dishes, said device comprising a housing with at least one openable compartment for containing said at least one product, said device comprising at least one means for storing energy and releasing it, such that said product is released at one or more predetermined point(s) in time during the wash cycle.

(21) Appl. No.: **09/969,709**

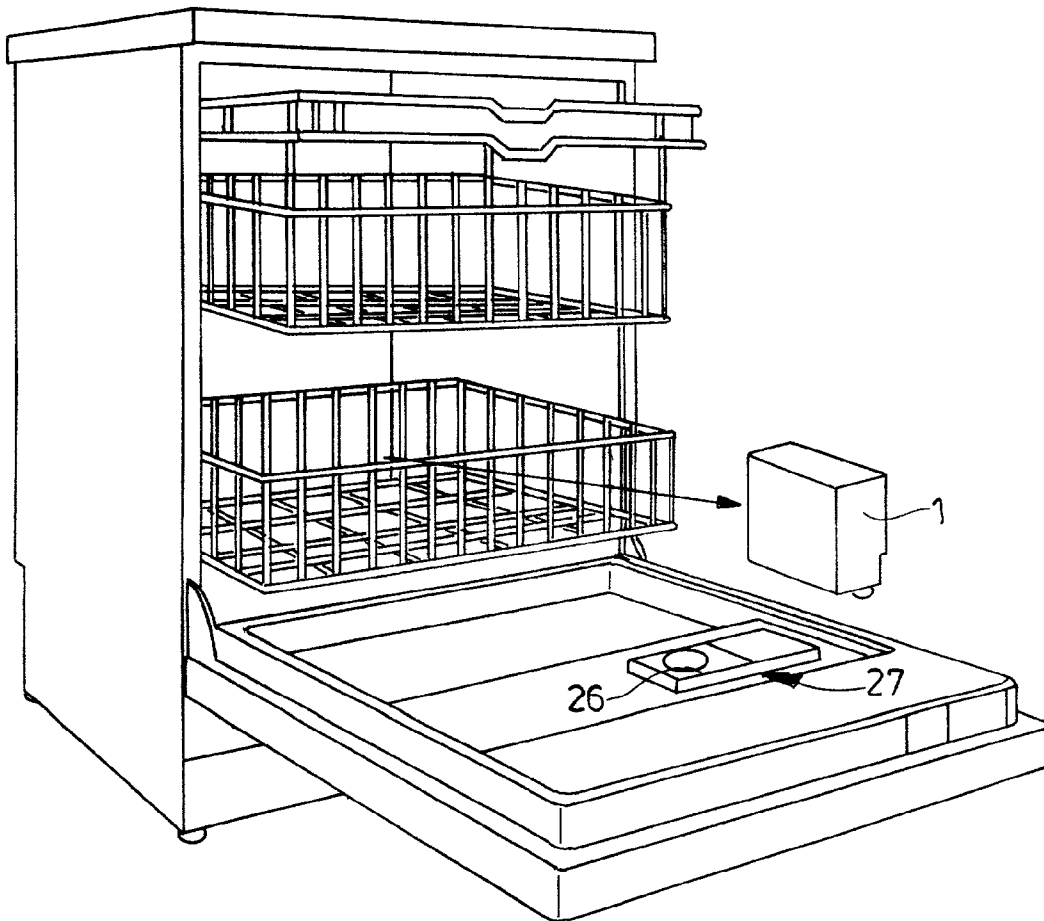


Fig. 1

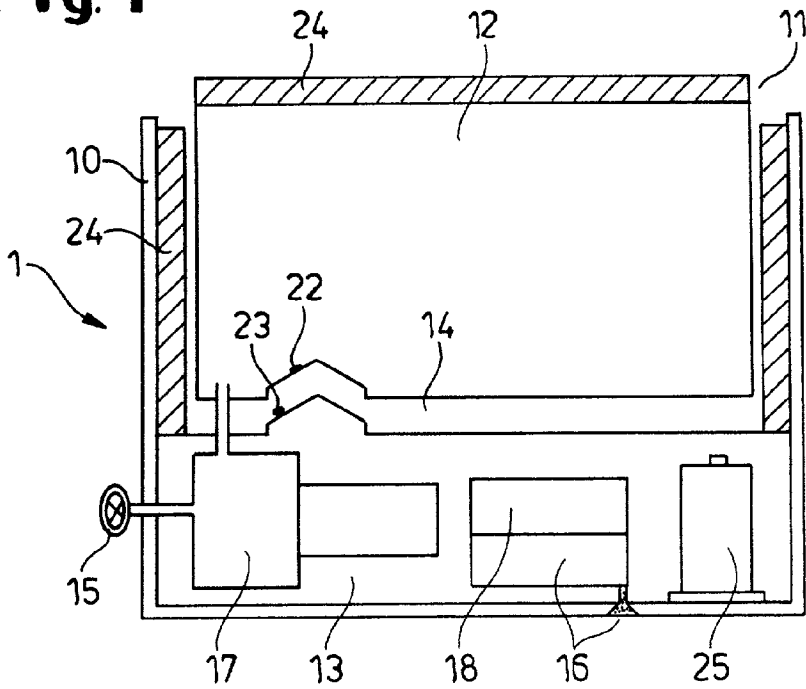


Fig. 2

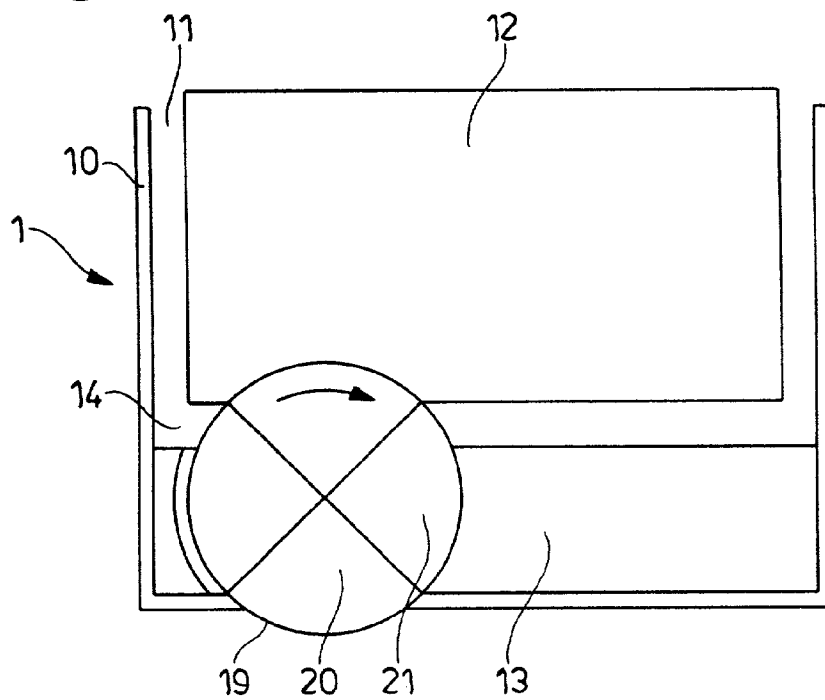
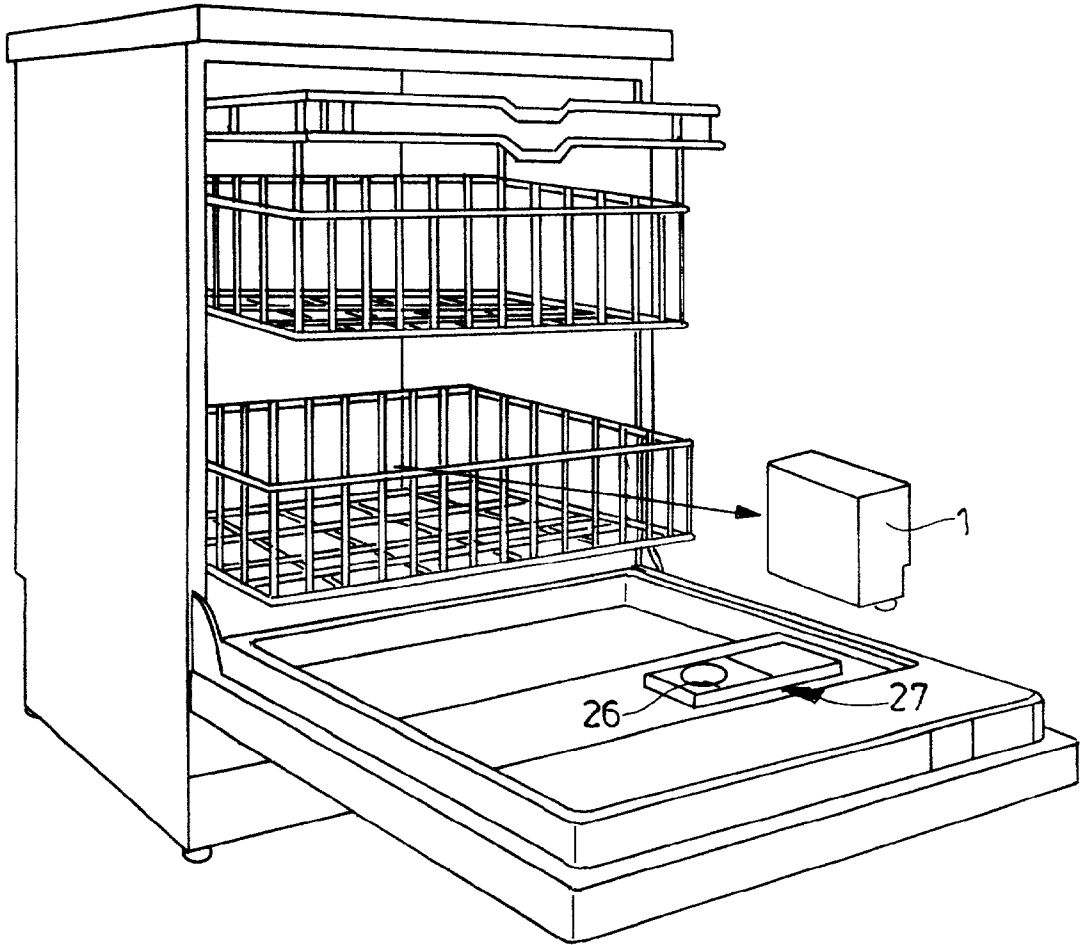


Fig. 3



SMART DOSING DEVICE

FIELD OF THE INVENTION

[0001] The present invention relates to devices for dosing treatment compositions to be released into a medium, in particular those required for use in fabric and home care.

BACKGROUND OF THE INVENTION

[0002] Dosing devices for dosing treatment compositions in a dish or laundry washing machine are representative of the various dosing devices to which the present invention can apply. Typically, such dosing devices comprise at least one compartment which is filled with product by the consumer, and at least one opening which is such that said product is mixed with wash water during a wash cycle. Such dosing devices are interesting because the compartment is usually designed such that it contains substantially the amount of product necessary for one wash cycle. So the dosing device allows for dosing and direct release of the product onto the items to be treated. Such dosing devices are usually re-usable.

[0003] A lot of improvements have been brought to dosing devices through the years, all directed to a better dosing and/or release of the product during the wash. Especially, it was seen as an important feature that the release of the product may be delayed, for example till the last phase of the wash cycle.

[0004] Some dosing devices comprise more than one compartment. Typically this type of devices are used for products that are incompatible, but which must be added in the same wash water, for example in EP.0.236136 A1 to Unilever.

[0005] Some other devices comprise a means for releasing their contents progressively during the wash cycle, or even at some point in time during the wash, for example at the spin drying phase or during the last rinse. In case the release needs to be progressive, the device comprises for example vents shaped as restricted openings, for example in U.S. Pat. No. 4,703,872 to Procter and Gamble. In case the release needs to be delayed in the wash cycle, the device comprises mechanical means, for example it uses temperature of the wash water, and the difference of retraction properties of its constitutive materials: for example U.S. Pat. No. 5,768,918 discloses a device comprising a main compartment and a cover to releasably close said compartment, both made out of two different materials. Before the wash, the user fills the device and closes the compartment with the cover. During the wash, at the time the temperature of the wash water changes, typically during the last rinse, the retraction of the cover is more important than the retraction of the compartment's material, such that said cover slides open from said compartment, thereby releasing the contents. Another means used for release product at one point in time during the wash is the use of the centrifugal force at the time of the spin drying, in the case of laundry machines. Devices using a compartment releasably closed with a cover that is closed by the user before the wash and then opened by the centrifugal force is for example disclosed in U.S. Pat. No. 3,888,391 to Procter and Gamble.

[0006] Other embodiments were found to improve the release of the product at one point in time during the wash, for example the use of porous membranes, for example as disclosed in EP.0.236136 A1.

[0007] The dosing devices which can be found in the art solve some issues. However, it appears that in some cases, the conditions in the wash water change from one wash cycle to another, when using the same washing machine. Such conditions depend on the amount of items to be washed, the nature and amount of product that is used, the water hardness, and other parameters. So one main disadvantage is that release of the product cannot be pre-determined, but depends only on wash water characteristics, which are likely to vary from one wash cycle to another.

[0008] In addition, it has been found that it can be fastidious to refill a dosing device at each new wash cycle, so there is a need for a device that contains several doses and so which is meant to be used along several wash cycles without the need for external intervention, for instance to refill it. In such dosing devices containing several doses, it is important however that the product contained therein is not contaminated by the wash liquor or any other type of media during storage, but also while the product is being released.

[0009] It is therefore one main object of the present invention to provide with a dosing and dispensing device for detergent compositions which is portable and self contained, so that it can be used for in-house applications, which comprises a means to release the device's contents at a predetermined moment of the wash cycle. In addition, it is an object of the present invention to provide a device that allows to release products that could not be released by a washing machine.

[0010] It is another object of the present invention to provide a dosing and dispensing device for detergent compositions, which prevents contamination of the product stored inside by any type of outside media, especially while said product is being released.

[0011] It is yet another object of the present invention to provide a self-contained dosing device that comprises at least one compartment for containing several doses of product(s) to be dispensed during a wash cycle, and said device further comprises a means to warn the user that time has come to refill said device with product.

SUMMARY OF THE INVENTION

[0012] The present invention is directed to a portable, self-contained, device for dosing and/or dispensing at least one product into an appliance for treating laundry or dishes, said device comprising a housing with at least one openable compartment for containing said at least one product, said device comprising at least one means for storing energy and releasing it, such that said product is released at one or more predetermined point(s) in time during the wash cycle.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] The invention will now be explained in detail with reference to the accompanying drawings, in which:

[0014] **FIG. 1** is a schematic side view showing the components of a dosing device according to the invention.

[0015] **FIG. 2** is a schematic side view showing the embodiment of a device of the invention where the one-way dispensing of product is achieved by a rotating wheel.

[0016] FIG. 3 is a schematic perspective view showing the embodiment of a dosing device that is placed into a dishwasher, and is activated by a remote relay device that is placed onto the detergent compartment door of the dishwasher.

DETAILED DESCRIPTION OF THE INVENTION

[0017] As per FIGS. 1, 2 and 3, a dosing device (1) is provided. While the device (1) of the present invention can be used with various types of automatic washing machines, it is primarily and preferably intended for use in automatic dishwashers.

[0018] Said device (1) comprises a housing (10) with at least one refill opening (11). It is an essential feature of the device according to the present invention that it cannot be contaminated by an outside medium (liquid or solid), especially at the time its contents is released inside the washing machine.

[0019] While the dosing device (1) can have any suitable shape, in one embodiment it comprises a parallelepipedic housing (10) divided into at least two different compartments, one being a product compartment (14) for containing at least one product to be released, or alternatively, to place a product refill container, and the other compartment being an electromechanical compartment (13) containing the power supply, at least one sensor (16), a pump system (17), and a microchip (18) for driving a logic control program.

[0020] In a first and highly preferred embodiment of the device (1) of the present invention, in addition to the one-way opening system (15), preferably achieved by a one-way valve (15), the device (1) also comprises a pump system. The pump system can comprise one or several pumps, which can be of any suitable type, such as gear pumps, piston pumps, peristaltic pumps and the like. In a second embodiment of a device according to the present invention, the one-way dispensing is achieved by a rotary wheel (19) with compartments, as shown in FIG. 2. The wheel (19) is divided into compartments, each capable of containing a dose of product. Walls delimit each compartment. In its normal position, the wheel is oriented such that the walls of the open compartment (20) (i.e. the compartment that is oriented towards the outside of the device) sealingly close the device (the seal between the device's walls and the wheel's walls can be achieved by any suitable means, for example rubber lips), such that the interior of the device is protected against any water, or other fluid, splashes. At any time, the compartment (21) preceding the open compartment (20) is filled with a dose of product. When the device is activated and is to release a dose of product contained therein, the wheel rotates, to place the compartment (21) in front of the device's opening, such that the dose of product contained therein is released.

[0021] The dosing device (1) according to the present invention is primarily suitable for dosing any type of product that is used for treatment of items. Preferably it is for dosing products for use in fabric or dish care, more preferably detergent compositions, for example for use in dish care. Products suitable for use with the dosing device (1) of the present invention include but are not limited to: laundry detergents and additives, bleach-based products, hypochlorite-based products, dishwashing compositions, perfumes,

malodor removal compositions, fabric softeners, disinfectant, easy ironing, detergent boosters (enzymes) The dosing device (1) of the present invention can have various uses that require release of treatment product into a medium, at one time or sequentially. Such uses include but are not limited to: dish-washing, hot air drying of fabrics or the like, release of body care products in a bathtub, release of shower gel or shampoo, release of light duty liquids in the sink for assisting hand dish washing, release of cleaning or perfuming products in the tank of toilets, etc In the following description, and for the sake of clarity, the example will be given of application of the dosing device (1) for treatment of cutlery or dishes in an automatic dishwashing machine.

[0022] By dosing device (1), it is meant a device with which it is possible to measure the right amount of product to be released during a wash cycle, depending on the wash conditions, including but not limited to the amount of items to be washed, the composition of the washing environment (for instance the wash water), the nature of the product which is used for the wash.

[0023] In a first embodiment, where the device's compartment(s) is/are refillable, the dosing is made by the user her/himself. This is done by using the size of the device's compartment to measure the right amount of product to be released in the wash. In this case, the device comprises a means, for example dosing line-up marks, that will help the user chose the right amount of product to fill in.

[0024] In a second and preferred embodiment, the user introduces a cartridge (12) of product into the compartment (14) of the dosing device (1), said cartridge (12) containing a predetermined amount of product, e.g. for one or several wash(es). In such an embodiment, the housing of the device comprises at least one portion (23) with a protrusion or a recess, that is to match at least one corresponding recess or protrusion (22) of the refill container—or cartridge—. Such a system ensures that the refill container cannot be wrongly inserted into the housing of the device. The dosing is done by the device itself, which is constructed so that one dose of product is measured, pumped, and released by the device during a wash cycle, depending on certain wash conditions. In this case, the compartment does not comprise line-up marks. During the wash, the dosing device (1) first pumps and releases a given amount of product, then senses when the concentration of product is sufficient and stops pumping to prevent over-dosing of the product. In this case, the concentration sensing is done by checking one component that is a characteristic of the product to be released, for example, the level of chlorine bleach can be sensed, in case the product to be released is bleach. The skilled person will be able to determine which compound must be sensed, depending on which product is released. Of course, a corresponding and suitable sensor (16) must be integrated to the dosing device (1) in this case, and the control logic program must be adapted accordingly.

[0025] When closed, the dosing device (1) can be of any suitable shape, for example cubic or spherical, or with a plate-like shape that can fit in the bottom rack of a dishwasher, and preferably it is designed such that once closed and ready to be placed in a washing machine, its overall surface is as smooth as possible, so that no sharp protrusion can damage the items that are being treated. In a preferred embodiment, the electronic components of the dosing device

(1), which are the heaviest part of said device are located in the bottom portion of said device, so that when the device is put on a flat surface, it always stays in the upright position, or at least so that its stability is increased.

[0026] The materials used for the housing (10) might be of any type, and said housing may be made out of one single or several materials. Preferred materials for the housing (10) are synthetic materials, for example plastic or rubber, so as to resist to liquids and/or to temperature variations.

[0027] It is an essential feature of the device of the present invention that, once closed, it be liquid-tight—by liquid tight, it is meant that no external medium can contaminate the inside of the device—. Of course, all materials constitutive of the dosing device (1) will be chosen such that they resist to the conditions of use. Preferably, they are heat resistant so as to be used in the tumble of a clothes hot air dryer without damage, or into a dishwashing machine. Example of hard materials include but are not limited to polypropylene (PP), polycarbonate (PC), copolymers of butadiene and styrene, and the like. Also the device (1) is heat insulated, so that any composition contained therein, that comprises heat-sensitive ingredients such as enzymes, is not damaged, for example by hot wash water, or by the drying step at the end of a dishwasher cycle.

[0028] The housing (10) is preferably made by injection molding. In case it is made out of more than one material, co-injection molding process will be preferred, where applicable, since it is less expensive than molding several insert portions separately and then assemble them. For instance, co-injection molding can be used for the housing (10), to make it out of hard plastic, with some portions out of a non-slipping rubber material. It is preferred that at least some portions of the dosing device's outer surface are made out of a rubber like material, which will help to prevent noise from tumbling and knocking with other items in the dishwasher. Alternatively, in one embodiment of this invention, the dosing device (1) can be secured to the walls of the washing machine's drum, for example by means of a magnet. In this way, the noise due to the tumbling of said dosing device (1) inside the drum during the wash is canceled, or at least substantially reduced.

[0029] Alternatively, a rubber sleeve is fitted around the device's main body.

[0030] In a preferred embodiment of the device according to the present invention, and especially in case the device is to contain and dispense heat-sensitive products, the housing—or at least said product compartment—is heat-insulated. Indeed, the use of a dispensing device that contains several doses of product to be dispensed over several wash cycles can expose the contents to degradation due primarily to the high temperatures produced inside the washing machine, which can reach 70° C. This is especially true for products that are exposed several times to the high temperatures, and also degradation can occur to products that contain heat-sensitive ingredients, such as enzymes, surfactants, bleach, solvents, etc. . . . The heat protection (24) can be built in the device's compartment, or compartment holder (in case the device is to contain refills), by means of a double wall where insulation material (24) is placed between inside and outside walls. The insulation material can be EPS (expanded polystyrene), phase change materials that use the characteristic of constant temperature during a physical

phase change—solid to liquid or liquid to gas phase change—and the heat required to change phase as an insulation material, heat pumps, or any other insulation material known in the art. The skilled person will be able to calculate the right amount and location of insulation, depending on what is to be placed into the device. For example, in case the device is to release enzyme-containing composition, the temperature inside the product compartment should always stay below 25° C. Depending on the configuration of the dispensing device, the entire device housing can be insulated, or alternatively, only the device's compartment can be insulated, or merely the product refill (in case the device is recharged in product via refill cartridges) can be insulated.

[0031] It is an essential feature of the dosing device (1) of the present invention that it comprises at least one means for storing energy (25) and releasing it, such that the contents of said dosing device (1) is released at a given predetermined time during a wash cycle. It is highly preferred that the dosing device (1) also comprises at least one sensor (16) which is linked to the means, to determine when the environment, for example the wash water, requires that the product be pumped within the device and released. Finally, the dosing device (1) further comprises a microchip (18) that monitors the data received from the sensors (16), and gives a signal to the actuator (17) to release said product at the right time during the wash cycle.

[0032] It is also an essential feature of the dosing device (1) of the present invention that it be portable, that is to say that it is not too bulky and heavy and can easily be handheld and manipulated by a user for in-house usage. Its dimensions must be such that it can be put into the drum of an automatic washing machine, or clothes hot air dryer, or into a dishwasher. Preferably, its greatest outer dimension does not exceed 30 cm. Also preferably, its overall weight does not exceed 5 kg when empty, more preferably, it does not exceed 2.5 kg when empty, even more preferably its weight is not more than 1 kg when empty.

[0033] Finally, it is an essential feature of the dosing device (1) of the present invention that it be self-contained. By self-contained, it is meant that the dosing device (1), once filled with product and closed, can work independently from any other device. Particularly, it comprises its own power source, and all means necessary for it to determine properly the right time its contents needs to be released, only by sensing its external environment. In one alternative, the power is transmitted via a coil transmitter, which receives electricity via a remote generator.

[0034] Dosing devices according to the present invention need to be activated at the start of a wash cycle, so that they can detect the wash conditions into the washing machine, then dose their contents and release it into the wash liquor at the right time, and in the right amount. In a first embodiment, the device is manually activated by the user at the start of each wash cycle. In this case, the device comprises a on/off button that is activated by the user, prior to closing the washing machine's door. In another embodiment of the present invention, the device is activated by the washing machine at the start of the washing cycle. In this case, the washing machine, and the device are linked via two RF transmitter-receivers. At the time the washing machine is activated, the dosing device contained therein is also activated. At the time the washing machine stops, the device is

deactivated. In another embodiment, the device is self-activated. In this case, said device comprises a means to use the change of at least one parameter into the washing machine to activate said device. For example, when the temperature inside the washing machine is raised, a bi-metal spring of the device bends and acts as a switch to activate the device. In another example, the device is switched on by the presence of water inside the washing machine. As soon as water contacts two metallic plots of the device, said device is switched on.

[0035] Yet, in another embodiment, especially in case the device of the present invention is to be used into a dishwasher the device is activated by a using the signal produced by the dishwasher solenoid that activates the opening of the detergent door. Such a system advantageously activates the device, independent of the dishwasher type, manufacturer, or even independent of the wash cycle type that was selected by the user. As shown in FIG. 3, a small relay device is fastened to the dishwasher detergent compartment—for example by means of fastening clips—, said small device comprising a copper coil, a relay, and a light source. When the electromagnet in the solenoid of the dishwasher compartment is activated to open the door of said dishwasher compartment, the electric signal is picked up by the copper coil, and then transmitted to the relay, and a light is emitted. The dispensing device which has previously been placed somewhere in the dishwasher comprises an optical sensor that triggers activation of the pump, or wheel motor, in order to dispense a dose of product. As an alternative to the light transmission of the activation signal, the relay device and the dispensing device can use radio frequency.

[0036] Means for storing energy

[0037] It is an essential feature of the dosing device (1) of the present invention that it comprises at least one means for storing energy (25) and releasing it, such that the contents of said dosing device (1) is released at a predetermined point in time during the wash. Preferably, said means is stored in the electromechanical compartment (13) of the dosing device (1).

[0038] In a preferred embodiment, said means is a throw-away battery, or rechargeable battery. More preferably, the battery is not rechargeable, but contains sufficient energy for lasting at least 6 months, preferably one year in normal conditions of use. By normal conditions of use, it is meant an average of 1 to 5 uses per week. For example, one or more AA rechargeable or disposable batteries can be used, the batteries being housed in the device. The voltage output of the battery is typically between 1.5 and 12 Volts, with a preferred output between 3 and 6V, for example one DL223A 6 volt battery. A good alternative is lithium batteries which are smaller and last longer.

[0039] In the case the device comprises rechargeable batteries, the housing (10) can comprise a plug recess, in order for the user to plug the dosing device (1) on the main electricity to recharge it, or via a wireless connection.

[0040] In an alternative embodiment of this invention, the means for storing energy (25) is a kinetic battery. The kinetic battery comprises a rechargeable battery coupled to a mechanical movement which transforms any movement of said battery into electricity that can be stored. Such kinetic batteries are known, for example in the watch industry, and

the type of kinetic battery suitable for use with the dosing device (1) according to the present invention will be appropriately chosen by the person skilled in the art.

[0041] In a last and preferred embodiment of the present invention, the battery is combined with a product recharge (or refill), whatever the form of the product refill (sachet, pouch, bottle, tank . . . etc.). The product recharge comprises electrical contacts and pipe connections or similar, and when it is inserted into the device (1), a connection is made, first for delivery of cleaning composition through the pipe connections, and second, for the power delivery through the electrical contacts.

[0042] Sensor technology

[0043] It is an essential feature of the dosing device (1) of the present invention, that it comprises at least one sensor (16), as shown in FIGS. 1 and 2. By sensor it is meant a chip or similar electronic device which detects a stimulus in the dosing device's environment, for example in the wash water. Preferably, the sensor (16) is directly coupled to a microchip (18) that transforms the stimulus into an electric impulsion that is sent to the pumping means (17) to release the product into the wash medium in the washing machine. The sensor (16) is housed in the electromechanical compartment (13) of the device and secured for example with brackets and screws. The microchip (18) which is preferably integrated to the sensor (16) itself is an electronic circuit that runs a basic program, so called logic control program. The logic control program integrates different parameters of the wash which are sensed in the medium (e.g. the wash water), and also integrates the type of product that needs to be released, in order to calculate at what time(s) during the wash, said products must be released. The specific construction of the electronic circuit of the microchip (18) will be appropriately chosen by a person skilled in the art.

[0044] The sensor (16) structure and construction shall be adapted to the stimulus to be detected, and the choice of the appropriate sensor (16) construction will be easily determined by a person skilled in the art. The dosing device (1) of the present invention comprises at least one sensor (16), such that it can react to at least one stimulus present in its environment. It will be appreciated that the more stimuli said device detects, the more accurate the product dosing and/or release will be. In the following embodiments of the present invention, wash water in the drum of a laundry washing machine is taken as one example of the dosing device (1) environment, but this example shall not be meant to restrict the scope of applications of the dosing device (1).

[0045] In a first embodiment of the present invention, the sensor (16) reacts to pH level into the wash water. In this case, a preferred sensor (16) is a pH sensitive electrode for delicate measurement in the drum of the washing machine. The pH of the wash water essentially depends on the amount and composition of the detergent. During a wash cycle, the pH varies between the main wash and the last rinse, typically between 8.2 and 7.2 for a liquid detergent, and between 12 and 7 for a powder detergent, of course, these figures depend on the water hardness.

[0046] In a second embodiment, the sensor (16) reacts to the variation of temperature in the wash water. Typically, the wash water temperature varies from 12° C. up to 95° C., depending on the type of wash program that is selected. The

temperature also varies during a same wash cycle. For example, some temperature profiles show a constant temperature for a while in the main wash, whereas with some other washing machines, the temperature increases, shows a peak and then decreases during the main wash. A common denominator is the decrease of temperature at the end of the main wash. This drop of temperature at the end of the main wash is a common feature of all brands, types, and programs of washing machines. This drop is due to the dilution by adding cold water and/or the purge of the main wash water (except for cold wash programs), followed by an addition of cold water for the first rinse. This drop can be easily identified by using a sensor (16) that detects a variation of temperature, or the speed of variation of temperature over a period of time. This drop of temperature at the end of the main wash can be used for releasing for example bleach, in the first rinse.

[0047] In a third embodiment of the dosing device (1) according to the present invention, the sensor (16) is a conductivity analyzer. Such a sensor analyses the concentration of detergent or another ionic liquid solution. Such a sensor can be achieved for example by a four contact capacitive measurement device. This enables to coat the contacts themselves with a thin layer of non-conductive protective material thereby removing the risk of contact degradation through electrochemical action. It should be noted that any measurement of ionic conductivity, such as this, should be preferably performed using alternating signals (AC) to prevent ion migration opposing an applied dc field. The measurement with such a four contact sensor is done by passing an AC current, which is measured (A), through the liquid via the two outer contacts, and measuring the voltage (V) developed across the two inner contacts. The conductivity of the liquid is proportional to A/V , irrespective of the contamination between the contacts and the liquid (such a contamination is usually due to accumulation of compounds on the surface of the electrodes).

[0048] In another embodiment of this invention, the dosing device (1) is coupled to a sensor (16) which is secured into the washing machine, for example into the powder or additive drawer of the machine, or alternatively into the pipes of the dishwasher. Said sensor (16) is a conductivity analyzer that determines when there is addition of water. Said conductivity sensor (16) is coupled to the dosing device (1) by radio-frequency link. This allows determining addition of water to the wash, even when there is already water inside the dishwasher, and thus, it allows the dosing device (1) to detect a new addition of water while it is already immersed during a wash cycle. This improves the accuracy of the dosing device (1) in determining the different steps of a wash cycle, and thus improve the determination of the right time to release its contents.

[0049] Yet, in another embodiment, as previously described in more detail above, the device (1) can be activated by a relay device (26) placed onto the dishwasher detergent compartment door (27), that is linked to the main dispensing device by a light or RF (radio frequency) transmission.

[0050] All the above parameters can be detected one by one, but the device preferably combines at least two, more preferably at least three different sensors (16), so that it can better determine the right time for releasing its contents.

Indeed, one parameter, for example temperature may vary from a washing machine to another, and from one program to another. It has been found that, by combining several parameters to be detected, the determination of the steps of a wash cycle is more accurate.

[0051] The sensors (16) as described above are used for determining the wash conditions, and more particularly in two distinct situations: (a) learning what are the main steps of a wash cycle, in case the dosing device comprises a learning memory, and/or (b) determining the wash conditions, once the dosing device knows what are the characteristics of the wash cycles that can be selected, so that by sensing, said dosing device detects what phase of the wash cycle is running.

[0052] Dispensing opening of the device

[0053] It is an essential feature of the device (1) of the present invention, that it comprises at least one dispensing opening (11) such that the interior of said device, and especially its at least one compartment, cannot be contaminated by an outside medium (liquid or solid), especially at the time the contents is released inside the washing machine.

[0054] In a preferred embodiment of the present invention, a one-way valve closes said opening, such that no external medium (solid or liquid) can contaminate the inside of the device (1). Obviously, in case the pumping means is a peristaltic pump, there is no need for additional pumps since the pump is already acting as a valve. Said one-way valve opens only at the time the device's contents is to be released. Preferably, the one-way valve is a natural or synthetic elastomeric slit valve, for example a silicon valve, whose surface is preferably concave, with the dome directed towards the interior of the device. The portion of the slit valve's membrane that comprises the dome is cut with at least one very fine slit, or two very fine slits perpendicular to each other and intersecting in each other's middle. At rest, the slit-valve is closed and maintains a leak-tight barrier between the interior and the exterior of the device's compartment. When a pressure is exerted inside the device's compartment, for example by means of a pumping means, the membrane of the slit valve is pushed outwards, and a deformation applies to the surface of said membrane, that opens the slits. Then, the product can flow outside of said device. As soon as the pressure inside the device is released, said membrane automatically comes back to its rest position, due to the resilience of its constitutive material, and the slits close. Furthermore, due to the concavity of the membrane, limited pressure exerted from outside the device cannot open the slits. Thus, the slit-valve is a one-way slit-valve.

[0055] Typically, the person skilled in the art will chose the appropriate shape or concavity for the membrane, to ensure that a pressure exerted for example by a water jets inside a dishwasher, cannot open the slit-valve and contaminate the interior of the device. To further enhance this protective effect achieved by the concavity of the slit valve, it is preferred that said slit valve be positioned into a recess of the device. This will for example ensure that water jets inside a dishwasher cannot contact the membrane of the slit-valve directly. Another means to reinforce the one-way effect of the membrane is to limit the number and length of the slits. Such slit valves are well know in the art, and the skilled person will be able to appropriately chose the right

configuration for the valve, depending on the wash conditions (temperature, viscosity of the product contained inside the device, etc . . .).

[0056] Compartment(s)

[0057] The main housing (10) comprises at least one product compartment (14) for storing at least one product. Preferably, the global containment volume is 100 ml to 31, with a 20% overflow capacity. Preferably, all the moving parts and openings into the compartments (for example the connections to the pumping means, or to the exhaust pipe) are made leak-tight by means of Teflon™ seals.

[0058] In addition, in case the battery is contained inside the device itself, the housing (10) preferably also comprises a battery door that is located at the bottom, or on a side of the dosing device (1). This provides an access for the user to replace the batteries in case those are not rechargeable. Said battery door is sealed by a thermoplastic elastomer gasket, preferably a soft SANTOPRENE™ elastomer gasket. Most preferably, there is no door and the battery is sealed inside the device. While this prevents changing the battery it gives an added level of security against humidity. Obviously, in such a case, either the battery must have a very long life duration, or it must be rechargeable without directly accessing it. For example, it can be a NiCad battery that is recharged via an induction process (similarly to electric toothbrushes), using an electrical socket, which transmits an ac current via an induction coiled wire, through the surface of the device, into the rechargeable battery. Finally, another type of battery that does not need to be directly accessible to be recharged, is batteries that comprise a kinetic system—the battery is recharged each time the device is moved, by transforming the mechanical movements into electric energy—.

[0059] In case the dosing device (1) comprises several compartments, these compartments can each comprise a dispensing opening with one-way dispensing valve, or alternatively, they can be all linked to a single dispensing system via conducting pipes that converge to the same dispensing opening—in this way, the contents of the compartments is mixed just before being released into the wash liquor.

[0060] Refill Indicator

[0061] Still in another preferred embodiment of the present invention, the user is warned that product needs to be added into the device, by a refill indicator. In a first embodiment, the refill indicator is visual. It can be achieved by a transparent window in the device's housing and in the refill container (if there is one), that allows the user to see what's inside the device's compartment. Using this system, the user can visualize at any time what amount of product is left in the device, and add some more when necessary. The visual indicator can also be achieved by a LED that blinks when the device runs out of product. In this version, the device can be programmed such that the LED starts blinking when there are at least 2 doses left in the device. This will give more time to the user to go and purchase product refills, and in this way, the device can never run out of product completely.

[0062] In a second embodiment, the refill indicator is a sound indicator that emits a sound at the start or the end of a device's working cycle, to warn the consumer needs to be added. As for the visual indicator, the sound signal can be given at any time when the device starts running out of product (for example when there are still 2 or 3 doses left in the device).

[0063] In both cases of visual or sound refill warning, if the warning is triggered by a sensor, said sensor can detect different parameters. For example the sensor can react to the weight of the device's compartment. Alternatively, said sensor can detect the presence or absence of an ingredient, and thus the level of product inside the device's compartment, by sensing the conductivity inside the device's compartment (like an electronic nose).

[0064] In a particularly beneficial embodiment of the present invention, the two above described sound and visual refilling indicators are combined.

[0065] Additional features

[0066] In one embodiment of this invention, the dosing device (1) is equipped with a scanner which can read a bar-code onto the label of a bottle. This allows the user to use the same dosing device (1) to dose and dispense different types of products, which should be released at different times during a wash cycle. In this embodiment, the at least one sensor (16) of the dosing device (1) contains several programs, each of which is linked to one type of product, for instance, one program for bleach, another one for softeners. Before the wash, the user scans the bottle, so that the dosing device's sensor (16) recognizes the type of products and switches to the right program of detection. Several types of scanners can be used, for example a barcode scanner or a RFID scanner (radiofrequency identification scanner).

[0067] In another embodiment, the dosing device (1) comprises at least one LED which works as an electronic guardian battery load monitor. For example, the LED blinks when the system has proper voltage, and it is steady when the voltage is low. The LED is mounted in the electromechanical compartment (13), and yet, is visible on the outside of the device through a plastic light pipe. In one embodiment, the LED gives a signal, for example by blinking, at the end of the wash to warn the consumer that the release of product worked well. Alternatively, the signal can be given by a sound.

[0068] Contents

[0069] The dosing device (1) according to the present invention is primarily suitable for dosing any type of product, preferably it is for dosing products for use in fabric and dish care, more preferably detergent compositions. Products suitable for use with the dosing device (1) of the present inventions include but are not limited to: laundry detergents and additives, bleach-based products, hypochlorite-based products, dishwashing compositions, perfumes, malodor removal compositions, fabric softeners

[0070] They can be used under any suitable form, including but not limited to: nano-components in a liquid or gel medium, granules, liquids, solid blocks to be grated, foams, gases, aerosols, salami to be dosed in slices, mega-pearls, etc

[0071] Control logic

[0072] Once the dosing device (1) is constructed and ready to work, it still needs to integrate two parameters: the type of product that will be used, and the type of wash cycle. The type of product will determine at which phase of the wash cycle, said product will be released. It is not a subject of the present invention to give an exhaustive list of products that can be released by using the dosing device (1), nor to explain at what time during a wash they must be released. This is within the normal knowledge of a skilled person. The determination and memorization of what product and what

wash cycle type are selected is the role of the control logic program that is driven by the dosing device's microchip (18). The control logic program allows to define the specific time to release the product.

[0073] Firstly, the dosing device (1) must memorize which product needs to be released. In one embodiment, the type of product is integrated into the dosing device (1) by programming it. This can be done by the user, for example by scanning the product container label. In this case, the label comprises a bar code that is read by the dosing device (1). In another embodiment, the dosing device (1) is constructed to be used with only one product, so the type of product to be used is memorized at the time the dosing device (1) is constructed.

[0074] Secondly, the dosing device (1) must memorize which type of wash cycle will be used, especially, what are the main phases of the wash cycle (main wash, rinses . . . etc.). It is known that typically, the consumers use 2 or 3 different wash program types, as a maximum. For each of them, the overall length of the cycle, the temperature, the number of rinses differ, but they can easily be learnt by the dosing device (1) after a few "training" washes. In this case, the dosing device (1) comprises a learning memory, as described above, which learns the 3 different types of wash types with their respective characteristics during the first washes.

[0075] Once the dosing device (1) has in memory the characteristics of the different types of wash cycles that can be used, and the type of product that needs to be released, it can release the product at the right time during a wash cycle, by using the sensors (16) who can sense and tell the dosing device (1) which type of wash cycle was selected, and what phase of the wash cycle is currently running. For example, enzymes can be sequentially released, and then inhibited by a specific inhibitor during the main wash, or a bleach can be released in the first rinse, or rinse additives such as fabric softener, easy ironing product, color care products can be released in the least rinse. This list of example is not exhaustive, and it can also apply to other types of treatments depending on the type of items to be treated (dishwashing, hot air fabric drying, etc.)

[0076] Process of using the dosing device

[0077] It is another objective of the present invention to provide a process of dosing and/or dispensing at least one product into an appliance for treating laundry or dishes, by using a device according to claims 1 to 7, the process comprising the steps of:

[0078] (i) filling said device with said at least one product, or alternatively inserting at least one product refill (or cartridge) into said device;

[0079] (ii) optionally manually closing said device;

[0080] (iii) placing said device within said appliance together with the laundry or dishes items to be treated, and start said appliance for a treatment cycle;

[0081] (iv) optionally taking said device out of said appliance together with the laundry or dishes, once they have been treated.

[0082] The appliances in which the dosing device (1) is used includes but is not limited to vertical or horizontal laundry washing machines, automatic dishwashing machines, or hot air clothes dryers.

What is claimed is:

1. A portable, self-contained, device (1) for dosing and/or dispensing at least one product, preferably a liquid product, into an appliance for treating laundry or dishes, said device (1) comprising a housing with at least one openable compartment (14) for containing said at least one product, said device comprising at least one means for storing energy (25) and releasing it, such that said product is released at one or more predetermined point(s) in time during the wash cycle, and wherein said at least one compartment (14) is reclosable in such a way that the compartment's contents is not contaminated by an external medium.

2. A device (1) according to claim 1, wherein one means (25) to store and release energy is achieved by an electrical battery (25).

3. A device (1) according to claim 2, wherein said electrical battery (25) is rechargeable.

4. A device (1) according to claim 2, wherein the battery (25) is integrated to said at least one compartment (14).

5. A device (1) according to claim 1, wherein said means to ensure that the compartment's contents is not contaminated by an external medium is achieved by a one-way valve (15) which allows products to flow outside but avoids contamination of the interior of said compartment (14) from an outside medium.

6. A device (1) according to claim 5, wherein said one-way valve (15) is an elastomeric slit valve.

7. A device (1) according to claim 1, wherein said product is released by means of a pump (17) which takes one dose of product at a time from the compartment (14), and releases it outside the device (1).

8. A device (1) according to claim 1, which comprises at least one sensor (16), so as to analyze the composition of the environment of said device and open said compartment (14) at the right time during a wash cycle.

9. A device (1) according to claim 1, which is rechargeable via a refill container (12) removable from the compartment (14).

10. A device (1) according to claim 9, wherein said refill container (12) comprises at least one dose of product

11. A device (1) according to claim 10, wherein said refill container (12) comprises at least two doses of product.

12. A device (1) according to claim 10, wherein said refill container (12) comprises at least five doses of product.

13. A device (1) according to claim 10, wherein said refill container (12) comprises at least ten doses of product.

14. A process of dosing and dispensing at least one product into an appliance for treating laundry or dishes, by using a device (1) according to claim 1, the process comprising the steps of:

(i) filling said device (1) with said at least one product, or alternatively inserting at least one product refill (or cartridge) (12) into said device;

(ii) optionally manually closing said device;

(iii) placing said device within said appliance together with the laundry or dishes items to be treated, and start said appliance for a treatment cycle;

(iv) optionally taking said device out of said appliance together with the laundry or dishes, once they have been treated.

* * * * *