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(54) **AUTOMATIC DISPENSING SYSTEM**

(75) Inventors: **Peter William Appel**, Vlaardingen (NL); **Paul Johan Birker**, Vlaardingen (NL); **Ian Charles Callaghan**, Vlaardingen (NL); **Roy Van Heesen**, Vlaardingen (NL); **Cornelis Gerhard Van Kralingen**, Vlaardingen (NL); **Rahul Dominic Vas-Bhat**, Vlaardingen (NL); **Marinus Maria Warmoeskerken**, Vlaardingen (NL)

Correspondence Address:
UNILEVER
PATENT DEPARTMENT
45 RIVER ROAD
EDGEWATER, NJ 07020 (US)

(73) Assignee: **Unilever Home & Personal Care USA, Division of Conopco, Inc.**

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(57) **ABSTRACT**

The invention provides a non-intrusive automatic dosing system for use with existing fabric- and dishwashing machines. The system contains a container house with one ore more containers which can contain a fabric- or dishwashing product or ingredient, said container(s) being connected with a pump, said pump being connected with the water inlet conduit of the machine. The container house also contains means for receiving and transmitting signals. Signals are received from at least one sensor, capable of reading at least one parameter of the washing process or machine when in operation, and cause the transmission of a signal to activate the pump to cause the delivery of the product or ingredient to the water inlet conduit of the machine.

The system enables the user to adapt the dosing of the product or ingredient to the machine according to his wishes without having to invade the machine to change or adapt programmes of the machine.

AUTOMATIC DISPENSING SYSTEM

FIELD OF THE INVENTION

[0001] The present invention relates to an automatic dispensing system. More particularly, it relates to an automatic dispensing system that can be fitted to fabric washing machines, dishwashing machines and the like for dispensing ingredients into the machines, required for the laundering or dishwashing process. It relates especially to an automatic dispensing system that can be fitted to the above-mentioned machines by the user of the machines without having to invade the machine housing in any way. For brevity's sake the system of the present invention will hereinafter be referred to as the non-invasive system.

PRIOR ART

[0002] Current commercial machines of the above type are only to a limited extent controllable or programmable by the user as regards the dosing of ingredients into the machines. They are usually equipped with a dosing chamber for certain types of products such as a pre-wash detergent product, or a main wash product, or a softening product. The machines are usually preprogrammed by the machine manufacturer, and the user can only select certain fixed programs by a control system, fitted into the machine by the manufacturer. Once the user has selected a certain program, the machine runs according to the program, and the user cannot dose particular ingredients anymore at particular points in time according to his needs. This is undesirable, because the user may wish to use particular ingredients (or leave out particular ingredients) for special purposes, or dose them at particular points in time, or treat special substrates in a particular way according to his/her needs or desire.

[0003] Furthermore, such controllable dosing may make the washing operations more efficient, since the dosing may be effected at the right time and under the right conditions during the washing operation. This efficiency improvement need not be limited to the washing operation itself but to the entire process of clothes cleaning and care, and could include, amongst others, improvements in ease of ironing, quicker drying of fabric etc.

[0004] There have already been prior proposals in the art for delivering ingredients in a controllable way to machines of the above type. Thus, in U.S. Pat. No. 3,982,666 and U.S. Pat. No. 3,881,328 a dispensing system for sequentially and automatically dispensing detergents, fabric conditioners and other cleaning products into laundry washing machines has been described. This system contains a signaling device, synchronized with the washing machine cycle, and actuates and deactuates solenoid-operated valves positioned upstream of venturi-aspirators assigned to each ingredient line. Predetermined quantities of each ingredient can thereby be delivered at any desired point in the machine cycle.

[0005] According to U.S. Pat. No. 4,103,520 an injector having a plurality of liquid additive reservoirs and associated time control valves can inject selectively liquid additives into the machine. An adapter, connected to both the machine and injector controls sequencing during the operating cycle of the machine. This adapter establishes sequential program signals to the injector where the machine does not have a built-in programmer. U.S. Pat. No. 2,834,364 describes a dishwasher, fitted with sensors to activate addition of cleaning ingredients. The machine has a hot water feed pipe to which is connected a pressure switch. A drop in water pressure causes the switch to open an electric valve, which allows a quantity of cleaning ingredient to flow into the machine.

[0006] All these prior proposals require the invasion of the machine housing to connect these systems with the programmer, which causes problems of installation difficulty, equipment compatibility, and machine warranties.

[0007] Non-invasive or non-intrusive dosing systems have also already been proposed in the art. Thus, in U.S. Pat. No. 4,932,227 a fabric washing machine with a non-intrusive dosing system has been described. The system comprises a plurality of pumps, connected to a plurality of ingredient supply containers which are connected with an inlet conduit to the machine. In the hot and cold water inlet conduits sensors are placed, which sense the flow of water in the conduits and convert a flow signal therefrom into an electronic impulse to sense each stage of the washing sequence. These impulses are sent to a control head and activate a program in the control, whereby one or more pumps are activated through the program, delivering an ingredient to the machine.

[0008]

[0009] In EP-A- 0611,159 a dosing system is described, which can be fitted to an existing washing machine. The system comprises sensors which provide signals to a control device, dependant upon the presence or absence of water at the sensor location, which provides output signals to a pump which is connected to an ingredient supply container and to an outlet to the washing machine tank. The output signal to the pump causes the pump to feed the ingredient from the container into the washing machine tank.

[0010] These prior proposals of non-intrusive dosing systems have, however, the disadvantage that they are not fully controllable by the user. Once the user has switched on the system, the system operates according to the set program, and the user cannot regulate according to his/her own wishes the dosing of particular ingredients at particular points in time during the washing operation. Moreover, these dosing systems require various pumps and inlet conduits, which make the system rather complicated. Furthermore, both systems use water as the trigger for the sensors. The use of water as the sole trigger is not a foolproof technique to distinguish between the main wash and rinse cycle. Most modern day washing machines draw in water more than once during the main wash process. This is directly related to the level of water in the drum—which in turn is related to the type of wash load. For fabric that absorbs a greater proportion of water to its weight, the machine draws in water more than once in the main wash cycle to maintain a constant height of water in the drum. In such a case, the use of solely inlet water flow as a sensor for dosing detergent ingredients will not suffice.

[0011] In U.S. Pat. No. 5,207,080 a dosing system is described which comprises a detergent supply means, connected to a detecting device which monitors the electric current, drawn by the washing machine. When the current exceeds a predetermined threshold current, the device transmits a signal to the detergent supply means, which then causes a quantity of detergent to be fed into the washing

machine. For the dispensing of multiple additives to the washing machine, multiple devices are necessary, which makes the system complicated and not easy to use by the user. In addition, the use of multiple dosing devices is expensive to manufacture and maintain. Key drawback of using only electrical current drawn by the machine as a trigger to monitor the washing cycle is that this parameter is controlled by a number of different washing processes. For example, the threshold current level could be reached due to the working of the internal heating element as it brings the water to a predetermined set point, or by the action of the motor as it rotates the drum during the spin/centrifugal cycle. This means that the pre-determined threshold current would have to be programmed for each and every washing machine model/type making it relatively complex to manufacture. However, a combination of a device monitoring electrical current with one or more sensors that monitor other washing machine parameters would overcome this limitation.

SUMMARY OF THE INVENTION

[0012] It has now been found that the above drawbacks can be overcome to a significant degree by providing an automatic, non-intrusive dosing system which is capable of dispensing a product or ingredient, suitable for the treatment of fabrics or dishware, from a container into a fabric washing machine or a dishwashing machine at appropriate points in time at the start and during the washing operation outside the machine through the water inlet of the machine, said dispensing being activated by a trigger signal obtained from at least one sensor, capable of reading at least one parameter of the washing process or machine when in operation. Consequently, in its broadest aspect the present invention relates to a non-intrusive automatic dosing system, capable of being used with an existing fabric- or dishwashing machine, said system comprising a container house which can contain at least one container for a product or ingredient suitable for use in a fabric washing or dishwashing process or stage thereof in the machine, said container being connected with a pump, said pump being connected with the water inlet conduit of the machine, said container house also containing means for receiving and transmitting signals, said means for receiving signals being capable of receiving signals from at least one sensor which is capable of reading at least one parameter of the washing process or the machine when in operation, said means for transmitting signals being capable of activating the pump to cause the delivery to the water inlet conduit of the product or ingredient from the container.

DETAILED DESCRIPTION OF THE INVENTION

[0013] The system of the invention is non-intrusive, by which is meant that the system does not require any modification of the machine, nor any invading of the machine housing to install any device. The container house can be of any suitable form or shape, and can be adapted to contain one or more suitable containers, filled or refillable with a product or ingredient, suitable for use in the fabric washing or dishwashing process. The containers can also be of any suitable form, shape or material, such as bottles, squeezeable pouches, plastic bags etc. The products or ingredients may be single ingredients such as bleaches, perfumes, color care agents, fresheners and the like, or detergent formulations such as pre-wash compositions, main wash compositions, rinse conditioners, fabric softening compositions and so on. The container house and the containers can be adapted to any particular program or need of the user. The container house also contains at least one pump; this pump can be connected via electrically (or pneumatically) operatable valves with the various containers and can be activated sequentially by means of the appropriate signals received from the means for transmitting signals to the pump in the container house.

[0014] The sensors, used in the system of the present invention can be of any desirable type. They can be placed in the machine, e.g. in the drain or in the dispensing compartment of the machine, or in the conduit leading into the dispensing compartment, or they can be wiredly or wirelessly remotely connected with the means for receiving signals in the container house. The sensors are capable of reading at least one parameter of the washing process or machine when in operation, such as acoustic patterns, amperage drawn from mains, water inlet and outlet flow, water pressure drum speed, temperature, degree of soiling through conductivity measurement, residual detergent concentration in the rinse water and so on. Additional parameters that can be measured by the sensors are e.g. water inflow pattern, total water taken in at the start of the washing process, drum torque measured by the peak current drawn from the mains etc. By the use of the sensors signals can be obtained (and combined with one another) which monitor the wash cycle and the cycle time and provide a trigger for the dispensing system. Combinations of several sensors will provide more accurate information to the system, enabling the system to operate more effectively. The system may also comprise a computer program with a database in which the results of the various readings are stored or which can steer or reset the dispensing sequence on the basis of the readings received from the sensors. The system may also comprise means to reset the dosing system at the end of the washing or cleaning process to start a new washing or cleaning process or cycle, once the first one has been completed. Thus, for example, when using a sensor which measures the current, drawn from the mains, the system may be reset after a certain period has elapsed after the current drawn is back at its base value, e.g. through an appropriate command generated by the computer program, or activated by a timing device. This period may vary according to the type of washing and cleaning process or cycle. When using a timing device, this may also be set at a certain period after the completion of the washing or cleaning process, to reset the system back to its starting configuration. It is also possible to use one sensor according to the present invention together with a timing device, incorporated into the system. Thus, for example, a signal from one sensor may simultaneously activate the timing device which may be programmed to activate the pump again after the elapse of a set period of time, delivering the then required product or ingredient to the water inlet. The set period of time depends, of course, on the length of the washing or cleaning process or cycle, and the washing or cleaning machine, and said period, once determined, may be stored into a computer database as mentioned above.

[0015] The products or ingredients to be dispensed can be in any form, such as powders, liquids, pastes, gels, tablets, capsules, sachets and the like. When necessary, these can be

predispersed by means of part of the water from the water inlet being led to the relevant containers, from which the predispersed product can be re-fed into the water-inlet conduit.

[0016] Operation of the system can be exemplified as follows: the user switches on the dispensing system. By selecting the appropriate program, the washing process is started. The sensor or sensors then provide signals at appropriate or predetermined points in time, feeding a signal to the signal-receiving device in the container house, which then causes according to the selected program the delivery of a certain product or ingredient into the water inlet of the machine, e.g. by means of a conduit from the pump to a T-shaped insert in the water inlet tube. Subsequent signals will similarly cause other products or ingredients to be delivered to the water inlet as dictated by the selected program or as steered by the computer program m. By proper selection of the program and the choice of sensor and readings, the system can adapt the dispensing of the products or ingredients to any given wash load, type of wash, duration of the wash and so on. Thus, for example, when using a washing process using a main wash cycle, a subsequent bleaching cycle and a rinse conditioning cycle, the user of the system provides to the system, before starting the process, information about e.g. the type of wash load, e.g. white or coloured fabrics, the degree of soiling, e.g. normal or dirty, and whether a rinse conditioner is required or not. This information the user can provide to the system by means of an interface, e.g. a set of buttons on the container house of the system, or a touch screen device, connected with the system either via wire ore remote. Once he/she has done that, he/she can then start the washing or cleaning process as usual by switching on the washing or cleaning machines.

[0017] When the system of the present invention comprises at least two containers for different products or ingredients suitable for use in a fabric washing or dishwashing process, it is desirable that the effects of mistakes made by the user, such as mistakes in putting the wrong product into the wrong dispensing compartment or putting the products in a wrong sequential order into the dosing system, are corrected or prevented. Such mistakes could cause serious damage to the substrates to be washed or cleaned, or seriously impair the efficiency of the washing or cleaning process. To prevent such mistakes, the at least two containers of the washing- or cleaning compositions or the ingredients thereof are preferably provided with an encoded set of instructions affixed thereto.

[0018] In other words, for this purpose of preventing misuse or mistakes, the system of the invention is preferably an automatic dosing system for automatically and sequentially dosing different washing- or cleaning compositions or ingredients thereof, said system being adapted to contain at least two containers for said different products or ingredients, each container having an encoded set of information about its contents and its use instructions affixed to it, said system further comprising means for retrieving and, optionally, storing said information, and means for executing instructions either received directly from the retrieved information or from the stored information and dosing the compositions or ingredients thereof into the machine at the start of or during the operation of the washing or cleaning process according to the received instructions in the proper sequential order.

[0019] In this preferred embodiment, the system is adapted to comprise at least two containers for the different compositions or ingredients. This can be achieved e.g. by providing a housing with at least two slots into which the containers can be placed. There may even be more than two containers, depending on the number of products to be used in the washing or cleaning process. As mentioned above, the containers present in this preferred embodiment are provided with an encoded set of information about their contents and their use instructions, said set being affixed in any suitable manner to the containers. This may be in the form of a bar code, magnetic strip, a microchip or any other suitable machine-readable attachment.

[0020] This preferred system further comprises means for reading the encoded set of information and storing the read information, e.g. a scanning device for reading the encoded set of information and a transmission device for transmitting the signals, received by the scanning device to a storing device which may be a computer data bank storing the read information. From the storing device the information may then be transmitted through an appropriate transmission device to the dosing system, which comprises at least one pump, connected with a conduit which leads either directly or indirectly (through the water inlet)to the washing or cleaning chamber of the machine, for activating the pump to cause the delivery of the composition or ingredient in accordance with the received instructions.

[0021] The containers of this preferred system may also be multi-compartmented. each compartment having a discharge opening attached to a conduit leading to a pump, the encoded set of information containing information about the contents of each compartment and their respective use instructions. The encoded sets of information relating to the containers of this preferred system of the invention also contain information about the sequence in which the contents of these containers are to be dosed into the machine.

[0022] When using this preferred system, at least two containers with different products or ingredients are placed in the container house in random order. The containers have previously been provided with an encoded set of information, e.g. in the form of a bar code, about their contents and use instructions. The user then switches on the system. The scanning device will read the bar code information, and transmit that information directly to the transmission device which activates the pump, or to the computer data bank from which appropriate instructions will then be transmitted to the activating device of the pump.

[0023] Since the scanning device will read the encoded set of instructions of all the containers, it will automatically select the proper sequence for dosing the respective products, and thus it will ignore the improper placing by the user of the containers in the container house, thus making the system "use-proof". Thus, the user can place the containers in any order in the container house, and the scanning device will read the encoded set of instructions and determine which product should be dosed first and so on. Multi-compartment containers can contain separate products or ingredients, e.g. a bleach product and a bleach activator, or a perfume, or an enzyme separated from the bleach product,

and again by reading the encoded set of information on each compartment the scanning device will determine its content and its use instructions, thus determining the proper sequence of dosing.

[0024] The dosing system of the invention desirably has the ability to dose detergent material in a controlled way into the water inlet of the washing machine. In this preferred embodiment, water entering the washing machine contains pre-dissolved detergent solution having a desired detergent concentration. As a result the operation of the washing machine can be optimized leading to a reduced risk of residue formation and of dye damage on the treated fabric.

[0025] The flow rate required to dose the contents of each of the containers of the system of the invention will depend on a number of factors. Some of these factors are dependent on properties of the contents of these containers, such as the composition, viscosity and density thereof. Another factor is the rate of water flow being taken up by the washing machine. Information regarding the properties of the detergent compositions present in each of the containers, may be stored in the barcode of the respective containers, whereby this information may be provided through retrieving means such as a scanning device. In addition, existing sensors on the automatic dosing system of the invention may provide information on the rate of water uptake by the washing machine. Combination of these two sources of information gives all information required for determining the correct rate of addition into the water inlet stream for each of the detergent compositions to be added.

[0026] The invention also provides for a process for automatically dosing a washing or cleaning product or ingredient to an existing fabric washing or dishwashing machine, comprising the steps of measuring, by means of one or more sensors which are non-intrusively connected with the washing machine, at least one parameter of the washing machine or process when in operation, feeding the signal from the sensor or sensors to a signal—receiving and transmitting device which is connected with a device for activating a pump connected with one or more containers for the washing or cleaning product or ingredient, activating through said device said pump causing the delivery of said product or ingredient to the water-inlet conduit of the machine.

1. A non-intrusive automatic dosing system, capable of being used with an existing fabric- or dishwashing machine, said system comprising a container house which can contain at least one container for a product or ingredient suitable for use in a fabric washing or dishwashing process or stage thereof in the fabric- or dishwashing machine, said container being connected with a pump, said pump being connected with the water inlet conduit of the machine, said container house also contaning means for receiving and transmitting signals, said means for receiving signals being capable of receiving signals from at least one sensor which is capable of reading at least one parameter of the washing process or machine when in operation, said means for transmitting signals being capable of activating the pump to cause the delivery to the water inlet conduit of the product or ingredient from the container.

2. A system according to claim 1, containing a combination of two or more sensors, each reading a different parameter of the washing process or machine.

3. A system according to claim 1, further comprising a computer system with a database for storing the readings of the sensors.

4. A system according to claim 1, further comprising a timer device for resetting the system after completion of the washing or cleaning operation.

5. A system according to claim 1, wherein said system is used for automatically and sequentially dosing different washing- or cleaning compositions or ingredients thereof in a fabric- or dishwashing machine, said system being adapted to contain at least two containers for said different products or ingredients, each container having an encoded set of information about its contents and its use instructions affixed to it, said system further comprising means for retrieving and, optionally, storing said information, and means for executing instructions either received directly from the retrieved information or from the stored information and dosing the compositions or ingredients thereof into the machine at the start of or during the operation of the washing or cleaning process according to the received instructions in the proper sequential order.

6. A system according to claim 1, in which the encoded set of information is in the form of a bar code, or a magnetic strip, or a microchip.

7. A system according to claim 1, in which at least one of the containers is a multi-compartment container.

8. A system according of claim 1, in which the means for retrieving the information from the encoded set of information is a scanning device.

9. A process for automatically dosing a washing or cleaning product or ingredient to an existing fabric washing or dishwashing machine, comprising the steps of measuring, by means of one or more sensors which are non intrusively connected with the washing machine, at least one parameter of the washing process or machine when in operation, feeding the signal from the sensor or sensors to a signal-receiving and transmitting device which is connected with a device for activating a pump connected with one or more containers for the washing or cleaning product or ingredients, activating through said device said pump to cause the delivery of said product or ingredient to the water inlet conduit of the machine.

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