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(71) Applicant: **WHIRLPOOL CORPORATION**
Benton Harbor Michigan 49022 (US)

(72) Inventors:
- **Haselmeier, Ralf**
  V.le G. Borghi 27, 21025 Comerio (IT)
- **Gross, Thomas**
  V.le G. Borghi 27, 21025 Comerio (IT)
- **Christmann, Luise**
  V.le G. Borghi 27, 21025 Comerio (IT)
- **Loos, Marita**
  V.le G. Borghi 27, 21025 Comerio (IT)
- **Autrum, Beate**
  V.le G. Borghi 27, 21025 Comerio (IT)

(74) Representative: **Guerci, Alessandro**
Whirlpool Europe S.r.l.
Patent Department
Viale G. Borghi 27
21025 Comerio (VA) (IT)

(54) A method for programming the laundering process, in particular the drying process, in devices that handle fabrics, such as washing machines, clothes dryers, spin dryers etc.

(57) The invention concerns a method for programming the laundering process, in particular the drying process, of fabric items pretreated with substances like water, solvent, lye or fabric softener and introduced into the laundering chamber of a laundering device, such as a washing machine, clothes dryer, spin dryer, etc., contingent upon the fabric type of the fabric items. By measuring the conductivity value of the fabric items introduced into the laundering chamber and ascertainment of the fabric type in comparison with stored conductivity value ranges and laundering parameters assigned to the fabric types, a fully automated program can be achieved.

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Description

[0001] The invention concerns a method for programming the laundering process, in particular the drying process, of fabric items pretreated with substances like water, solvent, lye or fabric softener and introduced into the laundering chamber of a laundering device, such as a washing machine, clothes dryer, spin dryer, etc., contingent upon the conductivity value of the fabric items, wherein conclusions concerning the type of fabric and the weight of the wash load are drawn from these conductivity values and the laundering process is adjusted by comparing designated, predetermined laundering parameters to the load introduced into the laundering chamber.

[0002] A method for programming the laundering process in a device for laundering is known from WO 01/46 509 A1. A measuring device for electromagnetic radiation comprising senders and receivers in the laundering chamber is provided within the laundry drum. Consequently, radiation reflected and/or transmitted from the fabric items is measured and the properties of the fabric items introduced into the laundering chamber are inferred from that data and the laundering process is adapted accordingly.

[0003] In this known method the load can be judged according to the amount of laundry introduced and the laundering process optimized.

[0004] As DE 44 11 958 A1 shows, sensors have also already been put into the wash drum of a laundering machine, e.g. clothes dryer, that register the conductivity value of the fabric items. Criteria for continuation of the drying process are derived from temporal changes in the conductivity values measured and the parameters for the remaining laundering process are set.

[0005] In this known method, it is the absolute conductivity values alone that determine the laundering process.

[0006] If the load of fabric items comprises a variety of fabric types, then the sensors ascertain various drying levels, which inevitably can lead to misleading measurement results since different types of fabrics provide different conductivity values based on their chemical makeup.

[0007] It is the task of the invention to provide a method of the type mentioned at the outset in which, when loading fabric items of various types into the laundering chamber, the load can be recorded according to fabric types and used to adapt the laundering process.

[0008] According to the invention, this task is solved in that the conductivity values recorded are compared with conductivity value ranges for various types of fabrics stored in the control logic and that depending on the assignment of the recorded conductivity values to one or several fabric types, the laundering process for the load is carried out based on the laundering parameters adapted to the registered fabric types.

[0009] It is recognized thereby that fabrics such as cotton, synthetics, silk, delicate laundry etc., can basically be divided into different conductivity value ranges based on their chemical makeup. Such various conductivity values can be recorded, particularly if the fabric items are physically pretreated. This includes different compositions with water, fabric softeners, scented care substances and the temperature of the fabric items. This means that the washed fabric types can be discernable in terms of their conductivity value ranges and subsequently can be evaluated. For that reason a determination can be made very quickly as to which types of fabric a load comprises. There is no need to wait for changes in the conductivity value of the load, which can be time-consuming. The laundering process for the load introduced can be adapted quite soon.

[0010] Recording the permanent and temporary properties of fabrics can be done safely using their electric conductivity values. Their conductivity values can be measured with a simple sensor housed in the laundering chamber of the laundering device. The fabric items can be wetted with a liquid substance, dried, spun, fortified, ironed, mangled, divided into portions, cut, chemically cleaned or treated similarly. Therefore, the method can be universally applied to fabric laundering devices where fabric type needs to be taken into consideration in the laundering process.

[0011] The criteria, i.e. the laundering parameters for the laundering process are determined in that the recorded conductivity values are compared with conductivity value ranges stored in the control logic of the laundering device for the various types of fabrics. It has been demonstrated, that even with arising conductivity value tolerances, a definite correlation to the fabric types, which are characterized by the stored conductivity value ranges programmed, can be derived. The respective laundering parameters for the laundering process are assigned to the fabric types in the control logic such that the laundering process is executed in an optimal manner and adapted to fabric type.

[0012] The programming for the specific load of the laundering device can be done to protect fabrics and optimize time and/or energy, wherein program selection occurs automatically. The new method furthermore permits automatic recognition of non-textile, foreign items or individual fabric items with conductivity values that deviate greatly when loading the laundering device. Therefore, for example, it can be recognized if a wool sock has been inadvertently included a load of cottons. Fabric-type recognition is ensured even if the fabric item was not subject to the prelaundering provided.

[0013] If there is an absence of conductivity value measurements or a measurement result continues to remain the same, then this can be viewed as a clue that the rotational movement of the laundering chamber has broken down.

[0014] Additionally, it has proven with laundering devices in particular to be especially beneficial if the fabric items are introduced into a laundering chamber of the

laundering device that can be set into rotation, in which chamber sensors are also arranged; if the conductivity values can be measured in a short introductory phase when the fabric items are put into contact with the sensors; and if there is a laundering process with the respective laundering parameters subsequent to the introductory phase.

[0015] In a specifically arranged introduction phase, the fabric type, i.e. laundry type is registered and the laundering process is set and carried out during comparison with the stored conductance value ranges.

[0016] The laundering process can be improved even more in that a criterion for the amount of fabric items in the laundering chamber of the laundering device is derived from the frequency of the recorded conductivity values per unit of time, and in that the resulting evaluation is taken into consideration when determining the laundering parameters for the subsequent laundering process.

[0017] If according to a subsequent design it is provided that in the case of fabric items of differing types introduced into the laundering chamber of the laundering device, the portion ratio and the amounts of the portions of fabric types are derived from the registered conductivity values and are taken into consideration when determining the laundering parameters, then the method can be variegated such that when loading the laundering chamber of the laundering device with fabric items of varying fabric type, the laundering process is divided into segments and that after a first segment of the laundering process, the fabric items assigned to the characteristic conductivity value are allowed to be removed. In the case of shortened laundering time a fabric type can be taken out in the first segment of the laundering process already while the remaining amount of fabrics continues on to be treated in the following segment.

[0018] According to another embodiment, the method can also be improved in that information about size, thickness and number of laundered fabric items as well as their moisture content and moisture content changes can be derived from temporal alteration of the conductivity values during the laundering process.

[0019] The information derived can be used for continuous, automatic adjustment of the laundering process.

[0020] The rotation speed of the laundering chamber, the length of the laundering process, the amount of fabric items loaded, the amount of substances to be added, the temperature in the laundering chamber etc. can be used as laundering parameters. This is adjusted according to how the fabrics are to be laundered.

[0021] Fabric type and/or certain laundering parameters, e.g. duration or rest period, can be displayed to the user of the laundering device through a display feature.

[0022] The new method can be executed automatically i.e. in washing machines to optimize spin rotation speeds, water quantities, detergent amounts, mechanical handling, acceptable laundering temperatures, respectively taking into consideration the laundry type.

[0023] In laundry drying devices timely removal of sensitive laundry items with a varying drying properties can be achieved with mixed loads (i.e. prior removal of laundry to be pressed). Loads with foreign items such as belt buckles, other metallic or electric objects that conduct poorly such as plastics etc. can be identified and displayed. Fabric items incorrectly pre-laundered can be identified when the conductivity values are registered and corrected as necessary.

[0024] The time contingency of the conductivity values in the laundering process is another critical factor for the new method for optimizing the laundering process. This is important particularly for laundry drying devices. The laundering duration time of the laundry items, for example, therefore can be automatically adjusted, wherein the ascertainment of a final wetness of the laundry items can be used to automatically terminate the laundering process.

[0025] There are also other feasible control possibilities for the laundering process that are contingent upon the temporal changes of the conductivity values of the laundry items.

[0026] With rotating laundering chambers in which fabric items are interchangeably risen and dropped, the frequency of contact with the sensor, which is housed stationary in the laundering chamber, can be an important element for the ascertainment of information about the amount of a load. This information influences determination of the laundering process and serves to further optimize the automatic laundering process.

[0027] The new method also opens up the other possibilities for the consideration of other factors essential to the fabric items and the intended laundering treatment. All these factors can be stored in the control logic and automatically accounted for by means of laundering parameters assigned to the conductivity value ranges for the registered fabric type.

[0028] The burden is taken off the user of the laundering device with this fully automated laundering method and erroneous use is no longer possible. The user can be informed about the selected program and/or specific parameters.

Claims

1. A method for programming the laundering process, in particular the drying process, of fabric items pretreated with substances like water, solvent, lye or fabric softener and introduced into the laundering chamber of a laundering device, such as a washing machine, clothes dryer, spin dryer, etc., contingent upon the conductivity value of the fabric items, wherein conclusions concerning the type of fabric and the weight of the wash load are drawn from these conductivity values and the laundering proc-

ess is adjusted by comparing designated, predetermined laundering parameters to the load introduced into the laundering chamber,
characterized in that
the registered conductivity values are compared with conductivity value ranges stored in the control logic for varying fabric types and that depending upon the assignment of the registered conductivity values to one or several fabric types, the laundering process for the load is carried out based on the laundering parameters adapted to the registered fabric types.

2. A method according to claim 1,
characterized in that
the fabric items are introduced into a laundering chamber of the laundering device that can be set into rotation, in which chamber sensors for registering are also arranged,
the conductivity values are measured in a short introductory phase when the fabric items are put into contact with the sensors and
a laundering process with the laundering parameters follows the introductory phase.

3. A method according to claims 1 or 2,
characterized in that
a criterion for the amount of fabric items in the laundering chamber of the laundering device is derived from the frequency of the registered conductivity values per unit of time and
the resulting evaluation is taken into consideration when determining the laundering parameters for the subsequent laundering process.

4. A method according to one of claims 1 through 3,
characterized in that
in the case of fabric items of differing types introduced into the laundering chamber of the laundering device, the portion ratio and the amounts of the portions of fabric types are derived from the registered conductivity values and are taken into consideration when determining the laundering parameters.

5. A method according to one of claims 1 through 4,
characterized in that
when loading the laundering chamber of the laundering device with fabric items of varying fabric type, the laundering process is divided into segments and
after a first segment of the laundering process, the fabric items assigned the characteristic conductivity values are allowed to be removed.

6. A method according to one of claims 1 through 5,
characterized in that
information about size, thickness and number of laundered fabric items as well as their moisture content and moisture content changes can be derived from temporal alteration of the conductivity values during the laundering process.

7. A method according to one of claims 1 through 6,
characterized in that
the rotation speed of the laundering chamber, the length of the laundering process, the amount of fabric items loaded, the amount of substances to be added, the temperature in the laundering chamber etc. can be used as laundering parameters.

8. A method according to one of claims 1 through 7,
characterized in that
the registered fabric type and/or the laundering parameters as well as other quantities, e.g. remaining laundering time, can be displayed to the user of the laundering device through a display feature.