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(54) Washing machine with an electronic control system, having a simplified programming

Waschmaschine mit elektronischer Steuerung, mit einer vereinfachten Programmierung

Machine à laver à commande électronique avec programmation simplifiée

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Description

[0001] The present invention refers to a washing machine.

[0002] It is known that the evolution of electronic technologies and of the relative methods of control is offering ever increasing opportunities, in view of realising household appliances equipped with new functions and improved performance, characterised in a greater respect for the environment and having lower production costs.

[0003] However, the increasing complexity of the control systems of such household appliances often result in the necessity of greater diligence in programming by way of the user, in order to be able to obtain the maximum from the capacity of the product.

[0004] For instance, in the case of washing machines, the known art regarding electronically controlled household appliances substantially provides for two types of programming approaches, typically expressed by German and Japanese producers of household appliances.

[0005] The German type of approach, also known as the "input system" provides for a user-appliance interface, i.e. a control panel, equipped with lots of buttons, lights and dials, provided for selecting the multitude of possible parameters and functions. Such control panel is obviously made more complicated by the increase of the functions, as a consequence of the utilisation of the electronic control techniques.

[0006] In this case, therefore, the user has to input a great number of parameters and select the various functions of interest, and the electronic control system of the machine, acting on the inputs received and elaborating them, provides for carrying out a complete washing cycle.

[0007] In other words, therefore, the user is able to completely dominate a highly sophisticated washing machine, but the complexity of its control panel is directly proportional to the number of functions provided and the cost of the machine itself.

[0008] The programming approach followed by the Japanese producers is the total opposite, in practice, they propose with household appliances a technique which is widely used in the case of cameras, i.e. the functioning can be either completely automatic or manual, according to the discretion of the user.

[0009] In this case, the electronically controlled washing machine provides, in normal use, a single command means, which corresponds to the starting button of the washing cycle; the user is not therefore called upon to insert any input being particular to the electronic control system, thus in such situation it can be stated that the washing machine completely "dominates" the user.

[0010] According to the Japanese type of approach, in some applications, the machines are also equipped with a complicated keyboard, for the completely manual programming of the multitude of operative parameters. However, in the case in which the manual programming option is selected, the user has to face the problems of complexity as expressed above, with reference to the programming approach of the "input system".

[0011] In substance, therefore, the approaches of the known type to the programming of evolved household appliances present, on the one hand, the problem of excessive complexity, deriving from the number of commands, or on the other hand appliances being completely automated, that not all users are prepared to accept (for instance, if the results of an automatic wash are not acceptable for the user, the user cannot bring about modifications to the cycle without great complications).

[0012] Moreover, in the first case, the user is called upon to supply numerous types of information (fabric type, quantity of fabric, washing temperature, spin speed, water hardness, etc.) thatcalls for a certain mental care and reasoning, and without which the household appliance, notwithstanding its capacity, is not able to function correctly; in view of its complexity, it may occur that the user forgets to supply some important information.

[0013] In a certain sense, therefore, this constitutes an impediment for the diffusion of innovative products in the household appliance sector and consumer goods in general. French patent FR-2 429 579 A discloses a dishwashing machine comprising an electronic control system and manual command means in the form of a keyboard associated to a display panel. Said washing machine is able to choose, in function of the information on the dishes type obtained by way of said keyboard , a predetermined treating cycle from among a plurality of different possible treating cycles stored in the memory of the control system. The control system there disclosed operates through an electronic programmer that has necessity only of the information, inputted by the user by way of said keyboard, relative to the type of dishes loaded, the other parameters that determine the treating cycle being obtained in an automatic way by the programmer, through data coded in said memory.

The washing machine here disclosed, however, suffers some drawbacks. In fact, there is no possibility of correlating the treating cycle to be choosen to the working conditions in which the choice is made, since the treating cycle is univocally determined by the user input. Another drawback is that there is no control on the correctness of the information inputted by the user. From DE-4 202 656 A a washing machine is known for which the user selects a program, e.g. "delicate items" to be performed by an electronic control system. The program which is selected by a program selector is associated to laundry-related parameters which are sensed after the beginning or during the washing cycle. The sensed parameter values are used to automatically modify or adapt the selected program.

[0014] The purpose of the present invention is that of overcoming the abovementioned drawbacks and of realising a control panel of a washing machine with a sophisticated electronic control, with the aim of rendering the dialogue between the user and the washing machine extremely simple and, at the same time, however being able to fully satisfy the mutual necessity, from the user

to the machine and vice versa, of information being actually necessary.

[0015] Such purposes are reached according to the present invention by a washing machine in accordance to claim 1.

[0016] The characteristics and advantages of the present invention shall however result in being clear from the following detailed description and annexed drawings, supplied purely as an explanatory and nonlimiting example, wherein:

figure 1 schematically represents a laundry washing machine realised according to the details of the present invention;
figure 2 schematically represents a dishwashing machine realised according to the details of the present invention,
figure 3 schematically represents a detailed view of the machine of figure 1 or 2, according to a possible variant of the present invention.

[0017] The aims that the present invention intends to reach are obtained substantially by way of the electronic control system of the household appliance, which is equipped to carry out the three following related and complimentary actions.

1 Ask the user information of the type being purely "qualitative" (such as for instance the delicacy of the laundry, the level of dirtiness and fragility of the dishes), i.e. information deriving directly from the experience of the user, and in such a way that the inputting of such information is realised with extremely simplified operations and being of a limited number, such as the rotating of a single dial and the pressing of a single button.
2 Supply, with appropriate means (such as a led or liquid crystal display, indicating lamps, the illumination of graphic symbols) only the information that is really useful for the user, and in a qualitative form, for instance by way of symbols, levels and/or shapes, thus avoiding ambiguous signs and markings, of difficult interpretation.
3 Automatically obtain, by way of appropriate sensors, all the typical "quantitative" data, which is difficult for the user to input, necessary for the optimal management of the appliance, i.e. information relative to functional conditions of the machine and/or to the physical and chemical characteristics of the items onto which the apparatus operation is based, such as for instance the temperature of the washing liquid, the water hardness, the concentration of the detergent in the washing liquid, the level of humidity, the characteristics or type of dirt, etc.

[0018] The information obtained in the way mentioned above is then elaborated by the electronic control system and translated into appropriate actions, having the aim of managing the household appliance in such a way so as to obtain the maximum global performance in relation to a determined functional condition.

[0019] For instance, in the case of a laundry washing machine, the performance desired can be understood as the washing of the laundry without wearing the fibres, with a saving of water and electricity and having respect for the environment, to be obtained in relation to functional conditions of the machine such as the value of the power supply, the hardness level of the water, the quantity of detergents introduced by the user, the quantity and type of laundry, the quantity and type of dirt, the load unbalance entity of the laundry in the basket, etc.

[0020] The great advantage of household appliances realised according to the details of the present invention is thus represented by the fact that they are able to bring together the presence of highly sophisticated functions and performance with an extreme simplicity of use. With this aim, a fundamental characteristic of the so called "user-interface" of such household appliances according to the invention, i.e. their control panels, is the extreme simplicity, which is also translated in a considerable aesthetic sobriety.

[0021] The present description shall be executed with particular reference to washing machines, such as a laundry washing machine and a dishwashing machine, on which the present invention finds a use being particularly advantageous.

[0022] Such laundry washing machine and dishwashing machine are schematically represented in figures 1 and 2.

[0023] As can be seen from figure 1, the laundry washing machine indicated as a whole with 1 has an extremely simplified control panel 2.

[0024] For the aims of the invention a smooth turning dial, indicated with 3, a LED display, indicated with 4 and a program starting button, indicated with 5 are in fact sufficient: as shall be explained in the following of the present description, such means are sufficient for exchanging with the user information being strictly necessary for obtaining the desired results, i.e. a washing program predetermined or complete, that the household appliance is able to express, in virtue of its sensor means and the control technique based on fuzzy logic.

[0025] On the panel 2 two buttons are further supplied, respectively indicated with 6 and 7, and respectively carrying the symbols "+" and "-".

[0026] On the control panel 2 a traditional general switch of the machine is finally indicated with 8, for enabling the electrical power supply, and with 9 a drawer of a washing agents dispenser; the panel 2 can also eventually have indicating lamps for signalling one or more functional conditions of the machine.

[0027] As is seen, the dishwashing machine of figure 2 in practice has the same control elements as those represented in figure 1 on the laundry washing machine, and for this reason the elements have been distinguished with the same reference numbers, with the addition of

the letter "A"; with 10 a handle is indicated for realising the opening of the frontal loading door of the dishwashing machine; naturally in the case of the dishwasher the drawer of the washing agents dispenser is not present, because such device, as is known, is housed on the inner door of the machine.

[0028] Therefore, according to the aims of the present invention, the only substantial difference between the control panels 2 and 2A of the dishwashing machine and the laundry washing machine is the printing on the controls 3 and 3A.

[0029] In the case of the laundry washing machine 1, the dial 3 will be provided for the selection from among six options, corresponding to the following types of laundry to be washed: woollens, delicate fabrics, synthetics, coloured fabrics, very strong fabrics, or very dirty; such options can for instance be represented by way of graphic symbols, the likes of which recall the type of laundry.

[0030] In the case of the dishwashing machine 1A, the dial 3A will be for instance provided with the selection from among five options, corresponding to the following types of dishes to be washed: crystal, pots and pans, dishes with a normal level of soil, dishes with a low level of soil, wherein with crystal particularly delicate items are intended, such as for instance crystal glasses, whereas with pots and pans, items that can withstand vigorous treatment are intended, such for instance pans with a particularly resistant soil.

[0031] The electronic control system of the two washing machines 1 and 1A is of the type based on the use of a microcontroller, to which appropriate means are associated for realising the various actions in relation to the type of washing required; such control system provides for, in other words, a programmer, or timer, of the electronic type with which appropriate memory means are associated, within which the rules for realising the washing programs is stored in an appropriate manner.

[0032] To such control system sensor means are also associated, which allow for the control system in practice to obtain all the necessary quantitative information for the carrying out of the normal washing cycle.

[0033] In the case of the laundry washing machine 1, such sensor means comprise:

- a sensor of the quantity and/or the type of laundry;
- a sensor of the mains water hardness;
- a sensor of the detergents concentration in the washing water;
- a sensor of the type of soil associated to the laundry;
- a sensor of the laundry load balance inside the basket of the machine.

[0034] In the case of the dishwashing machine 1A such sensor means comprise:

- a sensor of the mains water hardness;
- a sensor of the type of soil associated to the dishes;
- a sensor of the detergents concentration in the washing water;
- a sensor of the presence of foam in the washing liquid.

[0035] It is not considered necessary herein to describe in detail the aforementioned types of sensors and their methods of use inasmuch they are already known.

[0036] As an indication, regarding a detailed description of the greater part of such sensors and their methods of use in the case of washing machines, the Italian patent applications N° TO92A000668, TO93A000796, TO94A000058, TO93A000798, in the name of the same applicant are cited.

[0037] It is sufficient herein to mention, as already stated, that the presence of such sensors and the elaboration techniques according to the *fuzzy logic,* allow the control system of the machines 1 and 1A to carry out in an automatic manner, the greater part of the operations provided and to considerably simplify the interactivity with the user, because, as will be seen, according to the invention the latter is called upon to supply only one information being strictly necessary for the control system.

[0038] The functioning of the washing machines of figures 1 and 2 is very simply. In the case of the laundry washing machine 1 and the dishwashing machine 1A, the only operations that the user has to carry out are the following:

- turn on the machine by way of the general switch 8 or 8A;
- load the laundry to be washed in the basket of the laundry washing machine, or the dishes in the baskets of the dishwashing machine;
- introduce in the machine the necessary washing agents;
- appropriately position the control dial 3 or 3A, for indicating the most delicate item to be washed, in the case of the laundry washing machine, or the type of dishes, or their grade of dirtiness, in the case of the dishwashing machine 1A;
- press the program starting button 5 or 5A.

[0039] To such actions of the user, the laundry washing machine 1 and the dishwashing machine 1A will reply in the following way.

[0040] Upon turning on the washing machine 1 or 1A, by way of the general switch 8 or 8A by the user, the electronic control system will make appear on a display 4 or 4A a simplified graphic information, expressing the level of water hardness present in the mains supply with which the washing machine is connected.

[0041] Such value of the water hardness shown on the display 4 or 4A is a "historic" value, i.e. obtained by way of measures carried out by the abovementioned hardness sensor, day after day, wash after wash, and stored, with a technique in itself known, in an appropriate way, in permanent memory means associated to the microcontroller which manages the control system of the ma-

chine.

[0042] In the case of the laundry washing machine 1, three water hardness levels are established, i.e. low, medium or high, that are represented for instance on the display 4 or 4A respectively by way of one, two or three horizontal bars.

[0043] Such information relative to the water hardness is used by the user for carrying out, in the best way possible, the dosage of the detergents, in accordance with the amount specified by the producer of the washing agent; it is in fact known that such companies usually indicate, on the package of their products, the best quantity of detergent to use in accordance with the level of hardness of the water coming from the mains supply.

[0044] In the case of the dishwashing machine 1B, on the display 4A seven levels of water hardness are indicated; such information being more accurate, represented for instance by a number of horizontal bars corresponding to the hardness level memorised, is useful to the user for appropriately adjusting the brightener dosing device; it is in fact known that, similarly as that which takes place for the detergents in the case of laundry washing machines, the recommended dosage of brightener to be associated to each wash of dishes varies according to the hardness of the water.

[0045] Once the laundry or the dishes to be washed have been inserted, and the detergent and/or brightener has been added, the user can close the loading door of the machine and appropriately position the control dial 3 or 3A, for indicating to the control system the most delicate item to be washed, in the case of the laundry washing machine, or the type of dishes or the dirt level, in the case of the dishwashing machine 1A. At this point the user can start the washing cycle, pressing the appropriate button 5 or 5A.

[0046] Upon such action, the control system provides for making appear on the display 4 or 4A the temperature value that the control system itself has chosen in an automatic manner, in function of the "qualitative" information that the user inputted by way of the dial 3 or 3A, in virtue of the knowledge base encoded in the memory means.

[0047] The user, only if desired, can modify such temperature value, but only within determined "safety" limits which the machine allows; i.e. be it in the case of the laundry washing machine 1 or in the case of the dishwashing machine 1A. In particular, the temperature can be modified by the user by way of the appropriate increase buttons 6 or 6A (+) or the decrease buttons 7 or 7A (-).

[0048] In relation to the above it is to be noted that the control system of the laundry washing machine 1 imposes, so as to avoid damaging the fabric, a maximum limit to the temperature value, above which the user cannot go; such maximum limit is strictly correlated to the position selected by way of the dial 3, through which the user supplies the information relative to the most delicate item loaded in the machine.

[0049] In the case of the dishwashing machine 1A, for every position of the dial 3A that can be selected, a maximum temperature value and a minimum temperature value are associated and the user can therefore propose the eventual variations, by way of buttons 6A and 7A, only within such range; in the case of the dishwashing machine the maximum limit has the purpose to avoid damaging the dishes, while the lower limit has the purpose of guaranteeing the washing performance; even in such case the imposed limits are correlated to the position selected by way of the dial 3A.

[0050] After displaying the temperature value, in case but as mentioned not necessarily adjustable by the user, on the display 4 or 4A a time estimate of the activated washing cyde appears, calculated by the microcontroller of the control system by way of its internal clock; such time indication, that can for instance be expressed in hours and minutes, is updated by the control system with the passing of time, so as give a backward count.

[0051] The washing program is therefore managed by the control system, that will appropriately command the various agent devices of the machine, making use of the information obtained by way of its various sensors, its programmed functional rules and the information coming from the user. With such aim, as mentioned, the control system of the machine according to the invention is programmed according to the fuzzy logic technique, in virtue of the capacity of such technique to manage information being of the "qualitative" type.

[0052] From that described above it results in being clear that the dial 3 or 3A is an instrument that allows the user to condition in an important manner the washing strategy chosen by the control system from among the various strategies available, in consideration of the data detected by the sensors; in other words, therefore, the user does in fact have the possibility of dominating the machine, despite the high level of technology, with a very simple operation, such as rotating the dial.

[0053] With this aim it is to be considered once again that the information associated to the dial 3 or 3A is of the qualitative type, i.e. being substantially relative to a single characteristic of the article that the machine has to treat, and deriving from the day to day experience of the user.

[0054] The inputting of such information is of no difficulty to the user, but is of fundamental importance for the washing machine, and constitutes an instrument for involving and creating responsibility in the user.

[0055] It is to finally be noted that the control system of the machine according to the invention can be when needed programmed for controlling, within certain limits, the correctness of the selection carried out by the user of the dial 3; in other words, therefore, the control system is able to detect eventual discrepancies between the type of laundry actually introduced in the machine 1 and the type of laundry selected by way of the dial 3.

[0056] As an example we can cite a case wherein the user introduces in the laundry washing machine towelling

items and incorrectly selects the washing cycle for synthetics. In the specific case, the control system will be able to detect the discrepancy between the inputted information and the reality, by way of the said sensor of the type of laundry (for such aims note , as previously mentioned, the Italian patent application T093A000798) and eventually indicate such discrepancy to the user.

[0057] From the given description the characteristics and advantages of the present invention result in being clear. In particular according to the invention an intermediate programming approach is offered respect those mentioned in the opening of the present description, based on which:

- the complexity of numerous commands is avoided, typical of the "input system", thus simplifying user-machine interaction;
- total automation is refused, so as to avoid "conflicting" situations between the appliance and the user (for instance the aforementioned case of an automatic wash being unsatisfactory for the user, who cannot execute simple modifications to a program if not with extreme difficulty);
- the passage from "fully automatic" to "fully manual" is similarly refused, which as a matter of fact do not solve the problems of the user;
- an interaction of the type being purely "qualitative" is proposed to the user, i.e. relative to a limited number of inputs (substantially only one), that do not require any mental force, inasmuch related to the common sense and experience of the user, and of such to stimulate in a very discrete manner the involvement of the user in choosing the predetermined washing cycle, to be realised, in accordance with the delicacy of the fabrics or dishes.

[0058] All the above having the aim of making the electronically controlled washing machine of easier use for the user and at the same time able to carry out advanced operative cycles, in virtue of its sensor means and its advanced control system, based on the fuzzy logic, according to the invention, as already said, the complete programming is allowed of a normal washing cycle by way of a single, simple and evident manual selection action.

[0059] It is clear that numerous variants are possible by the skilled man to the washing machine described as an example. For instance the possibility is cited of equipping the washing machine with an infra-red remote control unit, or a small key pad, hidden in an appropriate housing within the cabinet of the machine, being close to the dial 3 or 3A; on such remote control or key pad the mentioned increase keys 6 or 6A and the decrease keys 7 or 7A of the temperature chosen by the control system for the wash can be transferred.

[0060] Figure 3 schematically illustrates a possible variant of the present invention, according to which the said key board is integrated in the dial 3 (or 3A) of the washing machine.

[0061] The dial 3 of figure 3 is in particular of the type able to take on two axially functional positions, i.e.:

- a first position, in which the dial 3 results in being housed, against the action of appropriate mechanical-kinematic means (realised according to the known art), within a suitable housing present on the control panel 2; in such position, therefore, the frontal surface of the dial 3 results in being substantially flush with the frontal surface of the control panel 2;
- a second position, of selection, in which the dial 3, due to the action of the said mechanical-kinematic means, exits said housing, so as to enable its rotation as desired by the user for programming the machine.

[0062] The exchange between the two positions is obtained by way of simple pressure on the frontal surface of the dial 3; said mechanical-kinematic means, comprising for instance a mobile element having inclined planes and a spiral spring, are of the known type (generally known as push-push) and are already used on household appliances.

[0063] As can be seen in figure 3, in the central part 11 of the dial 3 the housing for a plurality of keys 12 is obtained; such keys 12, that can comprise the previously mentioned keys 6 and 7, are of the type normally used with remote control units, or of the type in which the selection of the desired function simply takes place by simply touching the actual key, without the necessity of excessive pressure; naturally appropriate means are provided for the connection of such keys to the control system.

[0064] It is therefore dear that, according to the variant of figure 3, the styling of the control panel 2 of the machine results in being even more simplified, inasmuch all the control means of the machine, preferably with the exception of the ON/OFF key (8), can be integrated in the program selection dial 3.

[0065] In another possible variant the selection dial 3 or 3A could be substituted with a suitable cursor, i.e. a linear movement selector rather than an angular movement selector.

[0066] From the previous description it results in being clear that the machine according to the invention is able to realise a plurality of different predetermined washing programs, or standard, that the control system is able to manage in an automatic manner, in virtue of its knowledge base and in function of the single "qualitative" information inputted by the user and of the "quantitative" information obtained by way of the said sensor means.

[0067] It is in any event to be mentioned that, according to another possible variant of the invention, some optional modifying features can be provided, with the aim of satisfying the needs of even the most demanding users, or "conservative", bound to the traditional way of washing.

[0068] Such various options can be managed by the

mentioned infra-red remote control, or by way of the mentioned key pad, being integral or not to the dial 3 or 3A, that is substantially the same as that of the remote control.

[0069] By way of such remote control or key pad, and in case with the use of the display 4 or 4A, it could for instance be possible, in the case of the laundry washing machine, to input a delayed wash (1 to 24 hours), modify the washing temperature (as described above), select a program of rinsing only, or spinning only, or with the exclusion of spinning, or a rapid program. Similarly, in the case of the dishwashing machine, there could be provided, apart from the aforementioned delayed wash, a soaking program, i.e. an operative cycle of the dishwashing machine comprising a simple soaking of the dishes, with the aim of avoiding hardening of the residues, in such a way as to be able to carry out the washing cycle at a later time.

[0070] It is however to be noted that the carrying out of the normal functional cycles of the machine according to the invention, i.e. the execution of predetermined washing programs, depends upon the options mentioned above, which in fact concern particular functions to be assigned to a washing cycle, which in practice are rarely employed.

Claims

1. Washing machine, that comprise at least an electronic control system and manual command means (3;3A), said washing machine (1; 1 A) being able to carry out, in function of information obtained by way of said command means (3;3A), at least one predetermined treating cycle selected from among a plurality of different available possible treating cycles, the carrying out of said treating cycles depending upon numerous parameters relative to characteristics of the products to be washed, said control system comprising an electronic programmer to which memory means for storing data regarding treating cycle and sensor means, arranged within the machine and operative for controlling the execution of said selected treating cycle, are associated, wherein for the selection of a treating cycle predetermined and stored in said memory means, said programmer has the necessity of a single information, inputted by the user by way of said manual command means (3;3A), relative to a characteristic parameter of the products to be washed, wherein at least one or more further parameters, which are difficult for the user to input and which are necessary for the optimal management of the washing machine, are obtained in an automatic way by the programmer in function of information detected by said sensor means, wherein facultative user command means (6,7;6A,7A) are provided, for modifying the predetermined treating cycle and/or for creating particular cycles, said facultative command means comprising at least a key (6,7;6A,7A) for an eventual modification of a temperature value of the washing liquid obtained in an automatic way by the programmer and wherein the programmer imposes a maximum limit and a minimum limit to the temperature value that can be modified by the user with the facultative key means (6,7;6A,7A), the maximum limit being provided so as to avoid damage to the dishes or laundry, the minimum value being provided for guaranteeing the performance of the wash.

2. Washing machine, according to claim 1, **characterised in that** said programmer is apt to check the correctness of said single information inputted by the user.

3. Washing machine, according to claim 2, **characterised in that** said command means comprise a rotating dial (3;3A) or a linear selector, for inputting said single information.

4. Washing machine, according to at least one of the previous claims, **characterised in that** a display device is provided, in particular of the LED or LCD type, for displaying the data representing one or more of the further parameters necessary for the optimal management of the washing machine.

5. Washing machine, according to claim 4, **characterised in that** such parameters comprise the level of the water hardness coming from the mains

6. Washing machine, according to claim 4, **characterised in that** such parameters comprise a temperature value for the washing liquid, chosen by the programmer in an automatic manner in function of said single information

7. Washing machine, according to claim 4, **characterised in that** such parameters comprise an estimated duration for the selected treating cycle.

8. Washing machine, according to any previous claim, **characterised in that** a remote control or key pad normally hidden is provided, where said facultative command means are present.

9. Washing machine, according to claim 3, **characterised in that** said rotating dial (3;3A) is of the type able to take on two different axial functional positions, i.e.:

   - a first position, in which the dial (3) results in being housed within an appropriate seat on the control panel of the machine (2), wherein in said position the frontal surface of the dial results in being substantially flush with the surface of the frontal wall of the panel (2);

- a second position, in which the dial (3) exits said seat, so as to allow rotation of the same,

10. Washing machine, according to the previous claim 9, **characterised in that** in the intermediate part of said dial (3) a seat (11) is obtained for one or more command keys (12), said command keys being in particular of a facultative use (6,7;6A,7A), for modifying the predetermined treating cycle and/or for the selection of particular treating cycles.

11. Washing machine, according to claim 1, **characterised in that** it further comprises sensor means for automatically detecting said single information, relative to the to the type of laundry to be washed, for example woollens, delicates, synthetics, coloured fabrics, resilient fabrics and/or of the relative level of dirt, the user having to in particular indicate to the control system the most delicate laundry item from among those to be washed, in order to check the correctness of the informations inputted by the user.

Patentansprüche

1. Waschmaschine, die zumindest ein elektronisches Steuersystem und von Hand zu betätigende Befehlsmittel (3; 3A) enthält, wobei die Waschmaschine (1; 1A) in der Lage ist, in Abhängigkeit der durch die Befehlsmittel (3; 3A) erhaltenen Informationen zumindest einen vorbestimmten Behandlungszyklus auszuführen, der aus einer Vielzahl unterschiedlicher verfügbarer möglicher Behandlungszyklen ausgewählt ist, wobei die Ausführung des Behandlungszyklus von verschiedenen Parametern, die sich auf die Eigenschaften der zu waschenden Produkte beziehen, abhängt, wobei das Steuersystem eine elektronische Programmiereinrichtung aufweist, der Speichermittel zum Speichern von Daten, die den Behandlungszyklus betreffen, und Sensormittel, die innerhalb der Maschine angeordnet sind und die zur Ausführungssteuerung des ausgewählten Behandlungszyklus dienen, zugeordnet sind, wobei zum Auswählen eines vorbestimmten Behandlungszyklus, der in den Speichermitteln gespeichert ist, die Programmiereinrichtung eine auf einen Eigenschaftsparameter der zu waschenden Produkte bezogene Einzelinformation benötigt, die durch den Benutzer mittels der von Hand zu bedienenden Befehlsmittel (3; 3A) eingegeben wird, wobei zumindest ein oder mehrere weitere Parameter, dessen oder deren Eingabe für den Benutzer schwierig ist und der oder die für die optimale Steuerung der Waschmaschine notwendig ist oder sind, automatisch durch die Programmiereinrichtung in Abhängigkeit der durch die Sensormittel erfassten Informationen erhalten werden, wobei fakultative Benutzerbefehlsmittel (6, 7; 6A, 7A) zum Modifizieren des vorbestimmten Behandlungszyklus und/oder zum Erzeugen besonderer Zyklen vorgesehen sind, wobei die fakultativen Befehlsmittel zumindest eine Taste (6, 7; 6A, 7A) für eine eventuelle Modifikation eines Temperaturwertes der Waschflüssigkeit umfassen, der automatisch durch die Programmiereinrichtung erhalten wird, und wobei die Programmiereinrichtung einen oberen Grenzwert und einen unteren Grenzwert für den Temperaturwert vorgibt, der durch den Benutzer mit den fakultativen Tastenmitteln (6, 7; 6A, 7A) modifiziert werden kann, wobei der obere Grenzwert vorgesehen ist, um eine Beschädigung des Geschirrs oder der Wäsche zu vermeiden, und wobei der untere Grenzwert vorgesehen ist, um die Waschleistung zu garantieren.

2. Waschmaschine nach Anspruch 1, **dadurch gekennzeichnet, dass** die Programmiereinrichtung in der Lage ist, die Richtigkeit der Einzelinformation, die durch den Benutzer eingegeben wird, zu überprüfen.

3. Waschmaschine nach Anspruch 2, **dadurch gekennzeichnet, dass** die Befehlsmittel eine Drehwähleinrichtung (3; 3A) oder eine Linearwähleinrichtung zum Eingeben der Einzelinformation enthalten.

4. Waschmaschine nach zumindest einem der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** eine Anzeigeeinrichtung, insbesondere eine LED- oder LCD-Anzeige, zum Anzeigen der Daten vorgesehen ist, die einen oder mehrere der weiteren Parameter wiedergeben, welche für die optimale Steuerung der Waschmaschine notwendig sind.

5. Waschmaschine nach Anspruch 4, **dadurch gekennzeichnet, dass** diese Parameter den Grad der Härte des Wassers, welches aus der Wasserleitung austritt, umfassen.

6. Waschmaschine nach Anspruch 4, **dadurch gekennzeichnet, dass** diese Parameter einen Temperaturwert für die Waschflüssigkeit umfassen, der durch die Programmiereinrichtung automatisch in Abhängigkeit der Einzelinformation gewählt wird.

7. Waschmaschine nach Anspruch 4, **dadurch gekennzeichnet, dass** diese Parameter eine abgeschätzte Dauer für den ausgewählten Behandlungszyklus umfassen.

8. Waschmaschine nach einem der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** eine Fernsteuerung oder ein Tastenfeld, welches üblicherweise verborgen ist, vorgesehen ist, an denen die fakultativen Befehlsmittel vorhanden sind.

9. Waschmaschine nach Anspruch 3, **dadurch ge-**

kennzeichnet, dass die Drehwähleinrichtung (3; 3A) in der Lage ist, zwei unterschiedliche axiale Funktionsstellungen einzunehmen, d.h.:

a. eine erste Stellung, in der die Wähleinrichtung (3) innerhalb eines geeigneten Sitzes an dem Steuerfeld der Maschine (2) aufgenommen ist, wobei in dieser Stellung die vordere Oberfläche der Wähleinrichtung im Wesentlichen mit der Oberfläche der Vorderwand der Feldes (2) fluchtet,
b. eine zweite Stellung, in der die Wähleinrichtung (3) aus diesem Sitz hervortritt, um die Drehung der Wähleinrichtung zu ermöglichen.

10. Waschmaschine nach dem vorstehenden Anspruch 9, **dadurch gekennzeichnet, dass** in dem Zwischenteil der Wähleinrichtung (3) ein Sitz (11) für eine oder mehrere Befehlstasten (12) vorgesehen ist, wobei die Befehlstasten insbesondere einen fakultativen Gebrauch (6, 7; 6A, 7A) ermöglichen, um den vorbestimmten Behandlungszyklus zu modifizieren und/oder um besondere Behandlungszyklen auszuwählen.

11. Waschmaschine nach Anspruch 1, **dadurch gekennzeichnet, dass** weiterhin Sensormittel zum automatischen Erfassen der Einzelinformation, die sich auf die Art der zu waschenden Wäsche, wie beispielweise Wolltextilien, feine Textilien, synthetische Textilien, farbige Textilien, elastische Textilien, und/oder auf den relativen Verschmutzungsgrad bezieht, vorgesehen sind, wobei der Benutzer dem Steuersystem insbesondere das empfindlichste Stück aus der Menge der zu waschenden Textilien anzugeben hat, um die Richtigkeit der durch den Benutzer eingegebenen Informationen zu überprüfen.

Revendications

1. Machine à laver, qui comporte au moins un système de commande électronique et des moyens de commande manuelle (3 ; 3A), ladite machine à laver (I ; IA) étant à même d'exécuter, en fonction d'une information fournie par l'intermédiaire desdits moyens de commande (3 ; 3A), au moins un cycle de traitement prédéterminé parmi une pluralité de différents cycles de traitement possibles disponibles, l'exécution dudit cycle de traitement dépendant de nombreux paramètres relatifs à des caractéristiques des articles à laver, ledit système de commande comprenant un programmateur électronique, auquel sont associés des moyens de mémoire servant à mémoriser des données concernant le cycle de traitement et des moyens formant capteurs, disposés dans la machine et pouvant agir de manière à commander l'exécution dudit cycle de traitement sélectionné, et dans laquelle pour la sélection d'un cycle de traitement prédéterminé et mémorisé dans lesdits moyens de mémoire, ledit programmateur a besoin d'une seule information, introduite par l'utilisateur à l'aide desdits moyens de commande manuels (3 ; 3A) et concernant un paramètre caractéristique des articles à laver, où au moins un ou plusieurs autres paramètres, qui sont difficiles à introduire par l'utilisateur et qui sont nécessaires pour la gestion optimale de la machine à laver, sont obtenus d'une manière automatique par le programmateur en fonction d'une information détectée par lesdits moyens formant capteurs, où des moyens facultatifs (6, 7 ; 6A, 7A) de commande par l'utilisateur sont prévus pour modifier le cycle de traitement prédéterminé et/ou pour créer des cycles particuliers, lesdits moyens de commande facultative comprenant au moins une touche (6, 7 ; 6A, 7A) pour modifier éventuellement une valeur de température du liquide de lavage fournie d'une manière automatique par un programmateur et où le programmateur impose une limite maximale et une limite minimale à la valeur de température, qui peut être modifiée par l'utilisateur à l'aide des moyens facultatifs en forme de touches (6, 7 ; 6A, 7A), la limite maximale étant prévue de manière à éviter un endommagement de la vaisselle ou du linge à laver, la valeur minimale étant prévue de manière à garantir la performance de lavage.

2. Machine à laver selon la revendication 1, **caractérisée en ce que** ledit programmateur est apte à vérifier le caractère correct de ladite information unique introduite par l'utilisateur.

3. Machine à laver selon la revendication 2, **caractérisée en ce que** lesdits moyens de commande comprennent un cadran rotatif (3 ; 3A) ou un sélecteur linéaire, pour l'introduction de ladite information unique.

4. Machine à laver selon au moins l'une des revendications précédentes, **caractérisée en ce qu'**il est prévu un dispositif d'affichage, en particulier du type diode LED ou affichage à cristal liquide LCD, pour l'affichage des données représentant un ou plusieurs des autres paramètres nécessaires pour la gestion optimale de la machine à laver.

5. Machine à laver selon la revendication 4, **caractérisée en ce que** de tels paramètres comprennent le degré de dureté de l'eau délivrée par le réseau.

6. Machine à laver selon la revendication 4, **caractérisée en ce que** de tels paramètres comprennent la température du liquide de lavage, choisie par le programmateur d'une manière automatique en fonction de ladite information unique.

7. Machine à laver selon la revendication 4, **caractérisée en ce que** de tels paramètres comprennent une durée estimée pour le cycle de traitement sélectionné.

8. Machine à laver selon l'une quelconque des revendications précédentes, **caractérisée en ce qu'**il est prévu un bloc de commande à distance ou de touches normalement masqué, là où lesdits moyens facultatifs de commande sont présents.

9. Machine à laver selon la revendication 3, **caractérisée en ce que** ledit cadran rotatif (3 ; 3A) est du type pouvant prendre deux positions axiales de fonctionnement différentes ; c'est-à-dire :

   - une première position, dans laquelle le cadran (3) est logé dans un siège approprié sur le panneau de commande de la machine (2), dans lequel, dans ladite position, la surface avant du cadran est essentiellement de niveau avec la surface de la paroi avant du panneau (2) ;
   - une seconde position, dans laquelle le cadran (3) sort dudit siège de sorte qu'il peut tourner.

10. Machine à laver selon la revendication précédente 9, **caractérisée en ce que**, dans la partie intermédiaire dudit cadran (3), un siège (11) est formé pour une ou plusieurs touches de commande (12), lesdites touches de commande étant notamment celles d'une utilisation facultative (6, 7 ; 6A, 7A), pour la modification du cycle de traitement prédéterminé et/ou pour la sélection de cycles de traitement particuliers.

11. Machine à laver selon la revendication 1, **caractérisée en ce qu'**elle comporte en outre des moyens formant capteurs pour détecter automatiquement ladite information unique, concernant le type de linge à laver, par exemple des lainages, des tissus délicats, des synthétiques, des tissus colorés, des tissus élastiques et/ou en rapport avec le niveau relatif de saleté, l'utilisateur devant indiquer notamment au système de commande le type de linge le plus délicat parmi ceux devant être lavés, afin de contrôler l'état correct des informations introduites par l'utilisateur.

FIG. 2

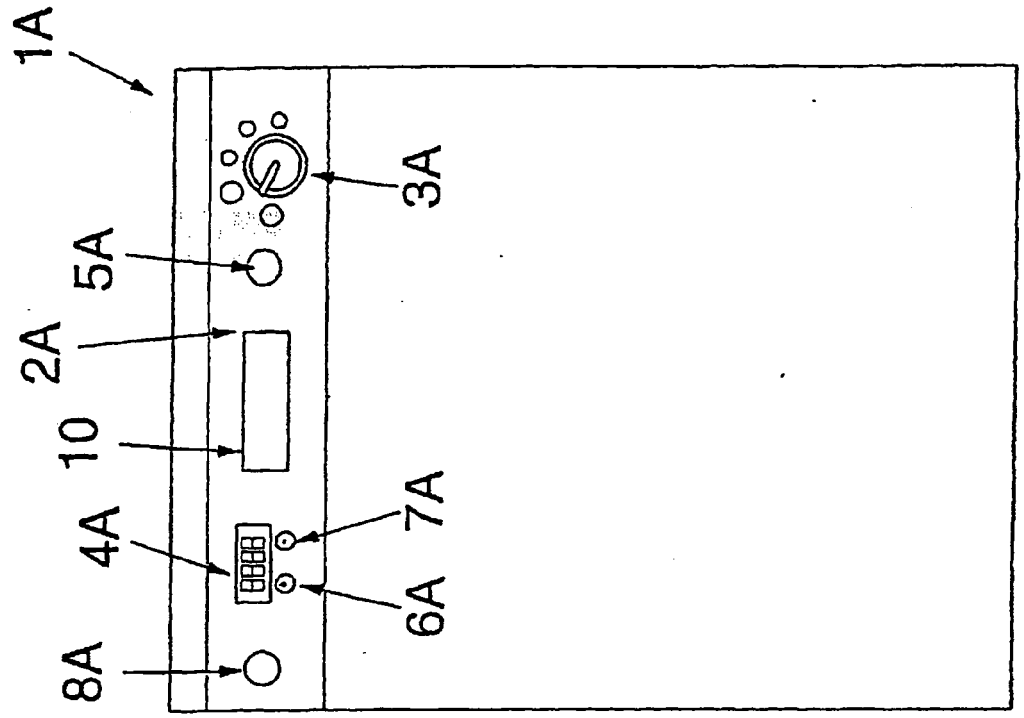

FIG. 1

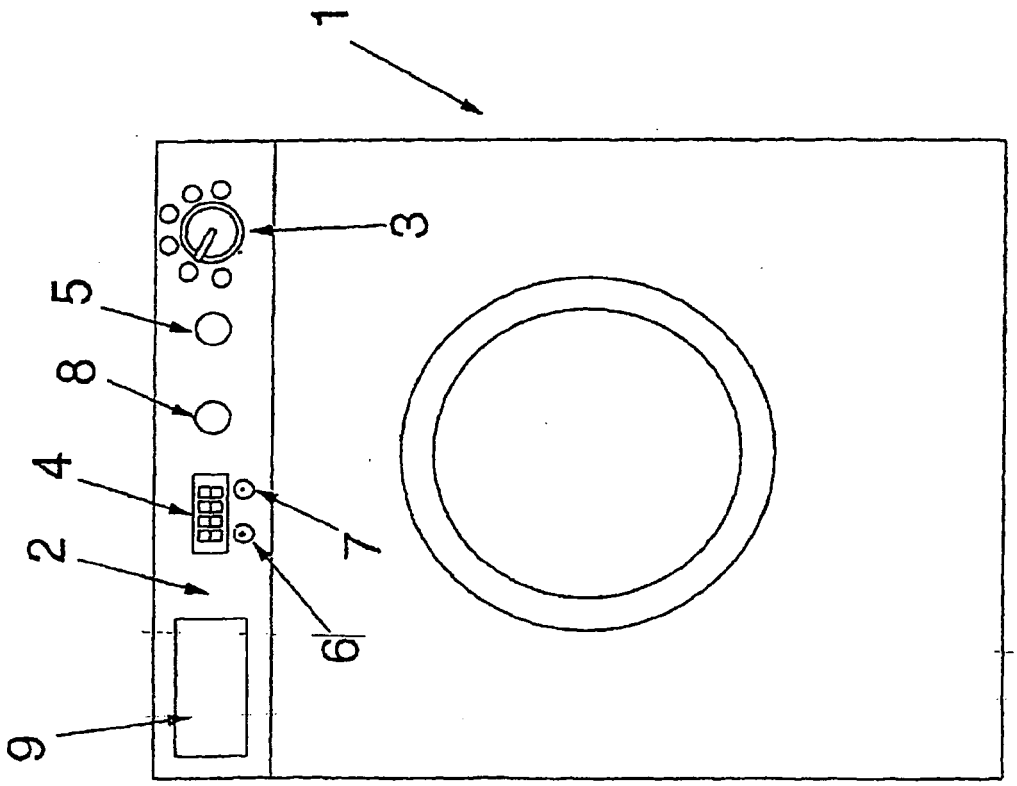

FIG. 3