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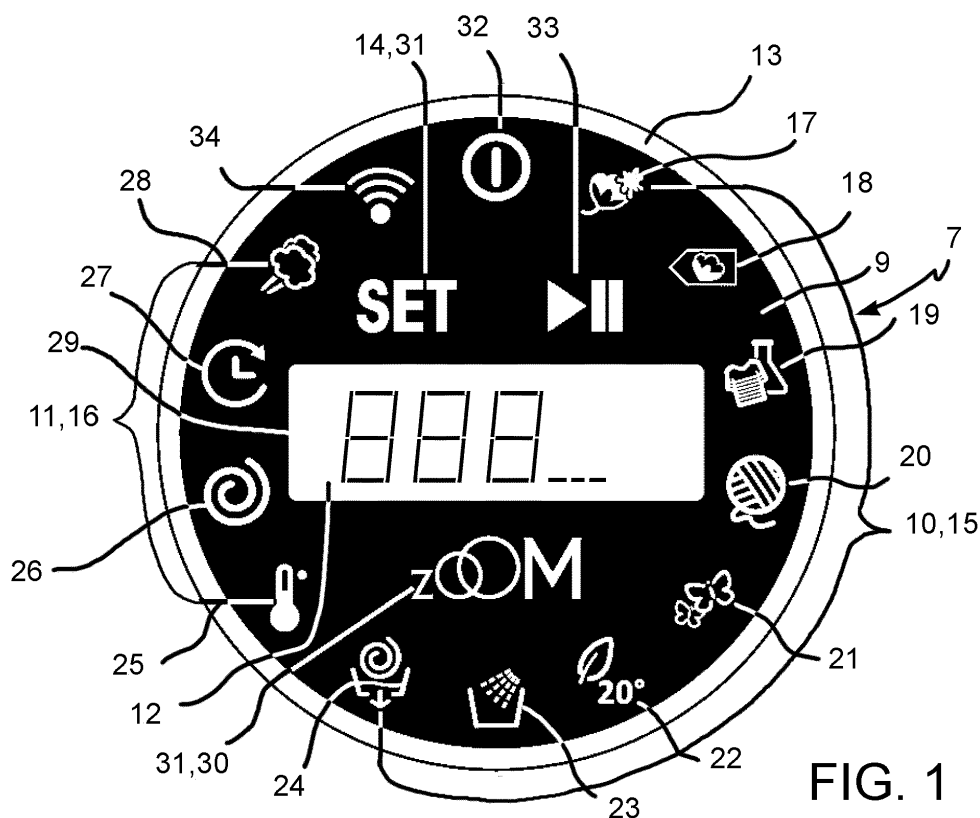
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(54) **LAUNDRY WASHING MACHINE AND METHOD FOR SELECTING WASHING MODES OF A LAUNDRY WASHING MACHINE**

(57) A method of controlling a washing machine characterized by three sequential control levels, wherein in the first level a washing program is selected, in the second level a washing parameter available for the selected washing program is selected, and in the third level a value of the selected washing parameter is changed, wherein

the selection and adjustment are performed by rotating a selection ring and confirming the selected or adjusted program, parameter, value and the switching between the three selection and adjustment levels is performed by activating a confirmation button.



**FIG. 1**

## Description

**[0001]** The present invention relates to a laundry washing machine and to a method for selecting washing modes of a laundry washing machine.

**[0002]** Laundry washing machines comprise a user control interface by means of which it is possible to control the operation of the laundry washing machine, select a washing program from a plurality of washing programs (for example wool, cotton) and, for the selected washing program, select washing options (for example with or without spin, with or without prewash) and adjust washing parameters (for example the temperature value or the rpm/min of the spin).

**[0003]** A user control interface of a known laundry washing machine comprises a plurality of pushbuttons and one or more knobs, through some of which it is possible to select the washing program and through others of which it is possible to select washing options and through others of which it is possible to set washing parameters.

**[0004]** It is also known to provide a display for displaying the selected program and options, as well as for displaying some further information concerning the execution of the washing program, for example the residual washing time.

**[0005]** The plurality of selection buttons and knobs, in addition to occupying an undesirably large space on the housing of the laundry washing machine, requires a plurality of electromechanical switching components requiring maintenance, and does not allow having a unique aesthetic design for a line of laundry washing machines with basic models (with fewer functions and options) and advanced models (with more functions and options).

**[0006]** A further requirement is that of further improving the control ergonomics of the washing machine.

**[0007]** Therefore, it is the object of the present invention to provide a laundry washing machine, in particular of the household type, having an improved user control interface, such as to overcome at least some of the drawbacks mentioned with reference to the prior art.

**[0008]** It is a particular object of the invention to provide a laundry washing machine and a method for selecting washing modes for a washing machine, having features such as to reduce the space occupied by the user control interface, allow a unique aesthetic design for laundry washing machine models with different numbers of functions and options and simplify and make more intuitive the selection and setting of the washing modes.

**[0009]** This object is achieved by a laundry washing machine according to claim 1 and by a method according to claim 22. The dependent claims describe advantageous and preferred embodiments.

**[0010]** According to an aspect of the invention, a laundry washing machine comprises:

- a housing,
- a laundry container adapted to contain laundry to be

washed, said laundry container being arranged within the housing and being closable and accessible by means of an access door,

- a treatment device employing water and cooperating with the laundry container, said treatment device being arranged within the housing,
- an electronic control unit controlling the treatment device depending on a treatment program selectable by the user,
- a user control interface configured to allow the user to select the treatment program, said user control interface being arranged on an external surface of the housing and in signal connection with the electronic control unit,

wherein the user control interface comprises:

- a stationary display displaying:
  - program icons identifying a plurality of selectable washing programs,
  - for each of said selectable washing programs, parameter icons identifying one or more settable washing parameters,
  - for each settable washing parameter, the set value,
  - a selection ring, extending around the display and rotatable with respect to the display and with respect to the housing,
  - a confirmation button formed in the display region within the selection ring,

wherein the user control interface is configured so that:

A) in a program selection mode of the user control interface:

- a rotation of the selection ring causes a highlighted displaying of the program icons, one after the other, by means of the display, and
- the activation of the confirmation button causes the selection of the washing program identified by the program icon displayed in a highlighted manner, as well as the transition from the program selection mode to a parameter selection mode,

B) in the parameter selection mode of the user control interface:

- a rotation of the selection ring causes a highlighted displaying of the parameter icons, one after the other, by means of the display, and
- the activation of the confirmation button causes the selection of the washing parameter identified by the parameter icon displayed in a highlighted manner, as well as the transition from the parameter selection mode to a setting mode,

C) in the setting mode of the user control interface:

- the display displays a selected washing parameter value, and
- a rotation of the selection ring causes a setting of the selected washing parameter value and
- the activation of the confirmation button causes the selection of the set selected washing parameter value.

**[0011]** According to a further aspect of the invention, the selection ring surrounds, closing within itself, the entire user control interface, which is free of input means or of displaying means externally to the selection ring.

**[0012]** According to an even further aspect of the invention, a method for selecting washing modes of a washing machine comprises:

- displaying by means of a stationary display on a housing of the laundry washing machine:
  - program icons identifying a plurality of selectable washing programs,
  - for each of said selectable washing programs, parameter icons identifying one or more settable washing parameters,
  - for each settable washing parameter, the set value,

A) in a program selection mode:

- causing, by means of the display, a highlighted displaying, one after the other, of the program icons in response to a rotation of a selection ring extending around the display and rotatable with respect to the display, and
- selecting the washing program identified by the program icon displayed in a highlighted manner and switching from the program selection mode to a parameter selection mode, in response to an activation of a confirmation button formed in the display region within the selection ring,

B) in the parameter selection mode:

- in response to a rotation of said selection ring, causing a highlighted displaying of the parameter icons, one after the other, and
- by the activation of said confirmation button, selecting the washing parameter identified by the parameter icon displayed in a highlighted manner and switching from the parameter selection mode to a setting mode,

C) in the setting mode:

- causing, by means of the display, the displaying of a selected washing parameter value, and
- by a rotation of the selection ring, causing a setting of the selected washing parameter value, and
- by the activation of the confirmation button, causing the selection of the set selected washing parameter value.

**[0013]** Due to the interaction between the display and the rotatable selection ring extending around the display, a space saving and a unique aesthetics are achieved, which can be used in a versatile manner for laundry washing machines with different washing programs and parameters. Moreover, due to the control and selection method implemented in the user control interface, a wide range of programs, parameters, options and values can be easily and intuitively selected and displayed, without requiring further input and display means externally to the selection ring.

**[0014]** The structuring of the display and the selection/adjustment according to the three program/parameter/value selection levels/modes further allows associating the respective and only possible sub-selections to each washing program and to each parameter, thus preventing the occurrence of doubts in the user if a certain option is or is not available or activatable/deactivatable for a specific washing program.

**[0015]** To better understand the invention and appreciate the advantages thereof, some exemplary non-limiting embodiments thereof are described hereinafter with reference to the accompanying figures, in which:

figure 1 is a view of a user control interface for a laundry washing machine according to an embodiment;

figure 2 is a front view of a laundry washing machine according to an embodiment,

figure 3 is a view of a user control interface for a washer-dryer machine according to an embodiment.

**[0016]** With reference to the figures, a laundry washing machine 1 comprises:

- a housing 2,
- a laundry container 3 adapted to contain laundry to be washed, said laundry container 3 being arranged within the housing 2 and being closable and accessible by means of an access door 4,
- a treatment device 5 employing water and cooperating with the laundry container 3, said treatment device 5 being arranged within the housing 2,
- an electronic control unit 6 controlling the treatment device 5 depending on a treatment program selectable by the user,

- a user control interface 7 configured to allow the user to select the treatment program, said user control interface 7 being arranged on an external surface 8 of the housing 2 and in signal connection with the electronic control unit 6,

wherein the user control interface 7 comprises:

- a display (preferably stationary) 9 displaying:
  - program icons 10 identifying a plurality of selectable washing programs,
  - for each of said selectable washing programs, parameter icons 11 identifying one or more settable washing parameters,
  - for each settable washing parameter, the set value 12,
- a selection ring 13 extending around the display 9 and rotatable with respect to the housing 2,
- a confirmation button 14 formed in the display region 9 within the selection ring 13,

wherein the user control interface 7 is configured so that:

A) in a program selection mode of the user control interface 7:

- a rotation of the selection ring 13 causes a highlighted displaying of the program icons 10, one after the other, by means of the display 9, and
- the activation of the confirmation button 14 causes the selection of the washing program identified by the program icon 10 displayed in a highlighted manner, as well as the transition from the program selection mode to a parameter selection mode,

B) in the parameter selection mode of the user control interface 7:

- a rotation of the selection ring 13 causes a highlighted displaying of the parameter icons 11, one after the other, by means of the display 9, and
- the activation of the confirmation button 14 causes the selection of the washing parameter identified by the parameter icon 11 displayed in a highlighted manner, as well as the transition from the parameter selection mode to a setting mode,

C) in the setting mode of the user control interface 7:

- the display 9 displays the selected washing parameter value 12, and
- a rotation of the selection ring 13 causes a setting of the selected washing parameter value 12 and

- the activation of the confirmation button 14 causes the selection of the set selected washing parameter value 12.

**[0017]** According to an embodiment, the selection ring 13 surrounds, closing within itself, the entire user control interface 7, which is free of input means or of displaying means externally to the selection ring 13.

**[0018]** Likewise, a method for selecting washing modes of a laundry washing machine 1 comprises:

- displaying by means of a display (preferably stationary) 9 on a housing 2 of the laundry washing machine 1:
  - program icons 10 identifying a plurality of selectable washing programs,
  - for each of said selectable washing programs, parameter icons 11 identifying one or more settable washing parameters,
  - for each settable washing parameter, the set value 12,

A) in a program selection mode:

- causing, by means of the display 9, a highlighted displaying, one after the other, of the program icons 10, in response to a rotation of a selection ring 13 extending around the display 9 and rotatable with respect to the housing 2, and
- selecting the washing program identified by the program icon 10 displayed in a highlighted manner and switching from the program selection mode to a parameter selection mode, in response to an activation of a confirmation button 14 formed in the display region 9 within the selection ring 13,

B) in the parameter selection mode:

- in response to a rotation of said selection ring 13, causing, by means of the display 9, a highlighted displaying of the parameter icons 11, one after the other, and
- by the activation of said confirmation button 14, selecting the washing parameter identified by the parameter icon 11 displayed in a highlighted manner and switching from the parameter selection mode to a setting mode,

C) in the setting mode:

- causing, by means of the display 9, the

displaying of a selected washing parameter value 12, and

- by a rotation of the selection ring 13, causing a setting of the selected washing parameter value 12, and
- by the activation of the confirmation button 14, causing the selection of the set selected washing parameter value 12.

**[0019]** Due to the interaction between the display 9 and the rotatable selection ring 13 extending around the display 9, a space saving and a unique aesthetics are achieved, which can be used in a versatile manner for laundry washing machines 1 with different washing programs and parameters. Moreover, due to the control and selection method implemented in the user control interface 7, a wide range of programs, parameters, options and values can be easily and intuitively selected and displayed, without requiring further input and display means externally to the selection ring 13.

**[0020]** The structuring of the display and the selection/adjustment according to the three program/parameter/value selection levels/modes further allows associating the respective and only possible sub-selections to each washing program and to each parameter, thus preventing the occurrence of doubts in the user if a certain option is or is not available or activatable/deactivatable for a specific washing program.

**[0021]** According to an embodiment, the program icons 10 are arranged and displayable in a highlighted manner in a program region 15 radially external to the display 9, extending as an arc of a circle adjacent to (but radially internal with respect to) the selection ring 13. Preferably, the program icons 10 are arranged and displayable in a highlighted manner, spaced apart from each other, in a single circumferential row.

**[0022]** According to an embodiment, the parameter icons 11 are arranged and displayable in a highlighted manner in a parameter region 16 radially external to the display 9, extending as an arc of a circle adjacent to (but radially internal with respect to) the selection ring 13. Preferably, the parameter icons 11 are arranged and displayable in a highlighted manner, spaced apart from each other, in a single circumferential row.

**[0023]** Advantageously, the program region 15 and the parameter region 16 are not overlapping. Even more advantageously, the parameter region 16 forms a circumferential continuation of the program region 15. In other words, the circumferential row of the parameter icons 11 is arranged as a continuation of the circumferential row of program icons 10.

**[0024]** These arrangement features of the icons 10, 11 facilitate their visibility and location and allow, for example, a displaying thereof by means of a simple selective back-lighting, for example by means of LEDs.

**[0025]** In a preferred embodiment, the program icons 10, as well as the parameter icons 11, illuminate one after

the other on rotating the selection ring 13, allowing the user to uniquely identify which washing program or which washing parameter is currently ready to be selected/confirmed by the activation of the confirmation button 14.

**[0026]** In one embodiment, the laundry washing machine 1 is configured to execute one or more (each combination is provided) of the following washing programs:

- a "Resistant Cotton" washing program, identified by a "Resistant Cotton" icon 17 of said program icons 10 on the display 9,
- a "Cotton" washing program, identified by a "Cotton" icon 18 of said program icons 10 on the display 9,
- a "Mixed/Colored" program, identified by a "Mixed/Colored" icon 19 of said program icons 10 on the display 9,
- a "Wool" program, identified by a "Wool" icon 20 of said program icons 10 on the display 9,
- a "Delicate" program, identified by a "Delicate" icon 21 of said program icons 10 on the display 9,
- an "Eco-friendly" program, identified by an "Eco-friendly" icon 22 of said program icons 10 on the display 9,
- a "Rinse" program, identified by a "Rinse" icon 23 of said program icons 10 on the display 9,
- a "Drain + Spin" program, identified by a "Drain + Spin" icon 24 of said program icons 10 on the display 9.

**[0027]** In one embodiment, the laundry washing machine 1 is configured to execute the washing programs with one or more (each combination is provided) of the following parameters:

- a "Temperature" parameter, identified by a "Temperature" icon 25 of said parameter icons 11 on the display 9,
- a "Spin" parameter, identified by a "Spin" icon 26 of said parameter icons 11 on the display 9,
- a "Delayed start time" parameter, identified by a "Delayed start time" 27 icon of said parameter icons 11 on the display 9,
- a "Steam" parameter, identified by a "Steam" icon 28 of said parameter icons 11 on the display 9,
- a "Drying" parameter, identified by a "Drying" icon 35 of said parameter icons 11 on the display 9.

**[0028]** In one embodiment, the confirmation button 14 allows confirming the selection of the washing program made by rotating the selection ring 13, and switching from the program selection mode to the parameter selection mode.

**[0029]** Preferably, the confirmation of the washing program selection and the transition of the user control interface 7 from the program selection mode to the parameter selection mode occur both at the same time in response to a single activation of the confirmation button 14.

**[0030]** In one embodiment, the confirmation button 14 allows confirming the selection of the washing parameter made by rotating the selection ring 13, and switching from the parameter selection mode to the adjustment mode.

**[0031]** Preferably, the confirmation of the washing parameter selection and the transition of the user control interface 7 from the parameter selection mode to the setting mode occur both at the same time in response to a single activation of the confirmation button 14.

**[0032]** In the adjustment mode it is possible to modify the parameter values by rotating the selection ring 13 and confirming the set value by actuating the confirmation button 14.

**[0033]** As a non-limiting example:

- for the "Temperature" washing parameter, the display 9 may display a numerical temperature value,
- for the "Spin" parameter, the display 9 may display a numerical-revolutions-per-minute value and/or the wording OFF,
- for the "Delayed start time" parameter, the display 9 may display a numerical minutes or hours and minutes value,
- for the "Steam" parameter, the display 9 may display an ON or OFF value,
- for the "Drying" parameter, the display 9 may display an ON or OFF value.

**[0034]** According to an embodiment, the display 9 forms a value displaying region 29, such as an LED or LCD displaying region, for displaying the value 12 of the selected washing parameters.

**[0035]** Advantageously, the value displaying region 29 is not overlapped to one of the program displaying region 15 and parameter displaying region 16. Preferably, the value displaying region 29 is arranged in a central area of the display 9. Even more preferably, the value displaying region 29 has a shape with a horizontal width or extension greater than the vertical height or extension, e.g. a shape of rectangle or horizontal tape.

**[0036]** The confirmation button 14 can be an electromechanical button or a touch-sensitive button. The confirmation button 14 can be displayed via the display 9, for example as a confirmation icon, for example "SET", possibly back-lit by an LED.

**[0037]** Advantageously, the position of the confirmation button 14 does not overlap with the position of the program icons 10 and/or with the position of the parameter icons 11 and/or with the value displaying region 29.

**[0038]** Preferably, the confirmation button 14 is positioned above the value displaying region 29.

**[0039]** According to an embodiment, the washing machine 1 is configured to perform one or more of the above washing programs in accelerated mode, for example within a predetermined maximum time period, for example selected in the range from 45min to 75min, about 60, 59 min, keeping at least some of the values 12 of the washing parameters as selected by the user, but modifying

the feeding time of a washing liquid and the heating time of the washing liquid and the handling/rotation time of the laundry container 3 with respect to the pre-set times for a normal (non-accelerated) run of the same washing program.

**[0040]** According to an embodiment, the user control interface 7 is configured so that, once set the accelerated mode, it allows the selection and setting of the washing program and of the washing parameter values limited to washing programs, washing parameters and values compatible with the reduced washing time.

**[0041]** This accelerated washing mode is activatable by means of the activation of a dedicated acceleration button 30 arranged in the display region 9 within the selection ring 13.

**[0042]** The acceleration button 30 can be an electromechanical button or a touch-sensitive button. The acceleration button 30 can be displayed via the display 9, for example as an acceleration icon, for example "ZOOM", possibly back-lit by an LED.

**[0043]** Advantageously, the position of the acceleration button 30 does not overlap with the position of the confirmation button 14 and/or with the position of the program icons 10 and/or with the position of the parameter icons 11 and/or with the value displaying region 29.

**[0044]** Preferably, the acceleration button 30 is centrally located below (radially outside the) the value displaying region 29.

**[0045]** According to an embodiment, the user control interface 7 comprises interdiction means 31 for the blocking normal operation thereof, in particular for blocking the operation of the confirmation 14, acceleration 30, start/pause buttons and of the selection ring 13, in order to prevent undesirable or accidental modifications or manipulations.

**[0046]** The interdiction means can be activated by pressing a plurality of buttons in a manner or in a sequence not foreseen during normal use of the user control interface 7, for example by pressing the confirmation button 14 and the acceleration button 30 together for a predetermined extended period of time, for example 3 seconds, and can be deactivated by repeating, for example, the same operation or switching off the laundry washing machine 1.

**[0047]** The user control interface 7 further comprises a turning-on and turning-off button 32 arranged in the region of the display 9 within the selection ring 13 and provided for turning the laundry washing machine 1 on and off.

**[0048]** The turning-on and turning-off button 32 can be an electromechanical button or a touch-sensitive button. The turning-on and turning-off button 32 can be displayed via the display 9, for example as a turning-on and turning-off icon, possibly back-lit by an LED.

**[0049]** Advantageously, the position of the turning-on and turning-off button 32 does not overlap with the position of the confirmation button 14 and/or with the position of the program icons 10 and/or with the position of the

parameter icons 11 and/or with the value displaying region 29 and/or with the position of the acceleration button 30.

**[0050]** Preferably, the turning-on and turning-off button 32 is positioned in a radially external central-upper region of the display 9.

**[0051]** The user control interface 7 further comprises a start/pause button 33 arranged in the region of the display 9 within the selection ring 13 and provided for starting and/or interrupting the execution of the laundry treatment program by means of the washing program and the values of the washing parameters selected and adjusted by the user.

**[0052]** The turning-on and turning-off button 33 can be an electromechanical button or a touch-sensitive button. The turning-on and turning-off button 33 can be displayed via the display 9, for example as a start/pause icon, possibly back-lit by an LED.

**[0053]** Advantageously, the position of the start/pause button 33 does not overlap with the position of the turning-on and turning-off button 32 and/or with the position of the confirmation button 14 and/or with the position of the program icons 10 and/or with the position of the parameter icons 11 and/or with the value displaying region 29 and/or with the position of the acceleration button 30.

**[0054]** Preferably, the start/pause button 33 is positioned above the value displaying region 29 and next to the confirmation button 14.

**[0055]** According to an embodiment, the user control interface 7 is configured to delete a program selection or a parameter selection already confirmed by an activation of the confirmation button 14 and return to the program selection or parameter selection mode, in response to a subsequent further activation of the confirmation button 14 (in the absence of rotation of the selection ring 13 between the two successive activations of the confirmation button 14), or by activating the start button 32 for a predefined extended period of time, for example 3 seconds.

**[0056]** According to an embodiment, the user control interface 7 comprises a wireless interface with Wi-Fi data transmission and displays a wireless control icon 34 to signal a control of the laundry washing machine 1 remotely.

**[0057]** According to an embodiment, the selection ring 13 is formed by an edge of a disk with a transparent central portion superimposed on the display 9.

**[0058]** Alternatively, the selection ring 13 may be replaced by a stationary circumferential edge provided with touch sensors (e.g., capacitive), so as to implement a responsive touch control to a sliding contact such as to simulate a rotatable selection ring.

**[0059]** According to an embodiment, the selection ring 13 is rotatable in both opposite rotation directions and, preferably, along an unlimited rotary stroke.

**[0060]** According to a further embodiment, the user control interface comprises snap positioning means which determine or facilitate positioning of the selection

ring 13 in a plurality of discrete selection positions and thus facilitate the correct positioning of the selection ring 13 with reference to an icon 10, 11 or a value to be selected.

**[0061]** According to an embodiment, in an operating mode of the user control interface 7, one or more or all of the confirmation 14, acceleration 30, turning on and turning off 32, start and pause 33 buttons can be displayed in a first color (e.g. white) and the program 10 and parameter 11 icons can be displayed in a highlighted manner in a second color (e.g. blue) different from the first color. According to a further embodiment, once one of the confirmation 14, acceleration 30, turning on and turning off 32, start and pause 33 buttons, has been activated, this color change (for example from the first color to the second color) to highlight that it has already been activated.

**[0062]** When the display 9 displays one of the program icons 10, it additionally displays a written description of the washing program identified by the program icon 10 displayed in a highlighted manner (for example "Wool") and, preferably, also the default values of the washing parameters associated with the washing program identified by the program icon 10 displayed in a highlighted manner. The descriptive text can be displayed in the form of text which scrolls from right to the left on the display. Preferably, the display of the descriptive text takes place in the value displaying region 29.

**[0063]** This makes the user control interface 7 particularly versatile and enables a large amount of detailed information and explanations to be provided in a small space. With the icon highlighted, the descriptive text of the program or parameter identified by the icon appears on the display.

**[0064]** According to an embodiment, the user control interface 7 allows selection of the display language. For example, after the first turning on by means of the turning on and turning off button 32, the display enters the language selection mode. In the language selection mode, the display displays, preferably in the value displaying region 29, a writing indicating the preset language, e.g. "ITALIAN" or "ENGLISH" or "DEUTSCH" and, in response to a rotation of the selection ring 13, the displayed language changes, and an activation of the confirmation button 14 confirms the language currently displayed as the set language. Alternatively or in addition, the user control interface 7 can be set to the language selection mode by continuous activation of the confirmation button 14 for a predetermined period of time, e.g. 5 seconds.

**[0065]** According to a further embodiment, the user control interface 7 displays, in at least one or more operating modes, a curved arrow to indicate to the user the need to rotate the selection ring 13.

**[0066]** According to an embodiment, the user control interface 7 displays and allows selection of a water hardness used for the laundry treatment. The water hardness can be displayed as a parameter icon 11 and adjustable as described in relation to the washing parameters, or

via an independent "water hardness" menu.

**[0067]** According to an embodiment, the user control interface 7 displays maintenance warnings, for example a number of residual washing cycles until the next scheduled maintenance, or a filter cleaning or replacement warning. 5

**[0068]** According to a further embodiment, the user control interface 7 is configured to execute a demo display through the display 9 which illustrates one or more sequences of steps to be carried out for the selection of the washing program, the adjustment of the washing parameters and the selection of possible further options for the purpose of instructing the user. 10

**[0069]** According to a further embodiment, in the absence of confirmation by activating the confirmation button 14 of the program selections and the parameter settings, an activation of the start/pause button 33 starts the operation of the laundry washing machine 1 with the default settings without taking into account any selections made through the ring but not yet confirmed by the confirmation button 14. 15 20

**[0070]** Advantageously, the control unit 6 of the laundry washing machine 1 comprises a Bluetooth transceiver which cooperates with a corresponding Bluetooth transceiver of a handheld device (such as a tablet or a smartphone) during a control initialization step of the laundry washing machine 1 remotely, via internet and Wi-Fi connection. 25

**[0071]** Advantageously, the laundry washing machine 1 is a front-loading washing machine as shown in figure 2. 30

## Claims

1. A laundry washing machine (1) comprising: 35

- a housing (2),
- a laundry container (3) adapted to contain laundry to be washed, said laundry container (3) being arranged within the housing (2) and being closable and accessible by means of an access door (4), 40
- a treatment device (5) employing water and cooperating with the laundry container (3), said treatment device (5) being arranged within the housing (2), 45
- an electronic control unit (6) controlling the treatment device (5) depending on a treatment program selectable by the user,
- a user control interface (7) configured to allow the user to select the treatment program, said user control interface (7) being arranged on an external surface (8) of the housing (2) and in signal connection with the electronic control unit (6), 50 55

wherein the user control interface (7) comprises:

- a display (9) displaying:

- program icons (10) identifying a plurality of selectable washing programs,
- for each of said selectable washing programs, parameter icons (11) identifying one or more settable washing parameters,
- for each settable washing parameter, the set value (12),
- a selection ring (13) extending around the display (9) and rotatable with respect to the housing (2),
- a confirmation button (14) formed in the display region (9) within the selection ring (13),

wherein the user control interface (7) is configured so that:

A) in a program selection mode of the user control interface (7):

- a rotation of the selection ring (13) causes a highlighted displaying of the program icons (10), one after the other, by means of the display (9), and
- the activation of the confirmation button (14) causes the selection of the washing program identified by the program icon (10) displayed in a highlighted manner, as well as the transition from the program selection mode to a parameter selection mode,

B) in the parameter selection mode of the user control interface (7):

- a rotation of the selection ring (13) causes a highlighted displaying of the parameter icons (11), one after the other, by means of the display (9), and
- the activation of the confirmation button (14) causes the selection of the washing parameter identified by the parameter icon (11) displayed in a highlighted manner, as well as the transition from the parameter selection mode to a setting mode,

C) in the setting mode of the user control interface (7):

- the display (9) displays the selected washing parameter value (12), and
- a rotation of the selection ring (13) causes a setting of the selected washing parameter value (12) and
- the activation of the confirmation button (14) causes the selection of the set selected washing parameter value (12).

2. A laundry washing machine (1) according to claim 1, wherein the selection ring (13) surrounds, closing within itself, the entire user control interface (7), which is free of input means or of displaying means externally to the selection ring (13). 5
  
  3. A laundry washing machine (1) according to claim 1 or 2, wherein the program icons (10) are arranged and displayable in a highlighted manner in a program region (15) radially external to the display (9), extending as an arc of a circle adjacent to the selection ring (13). 10
  
  4. A laundry washing machine (1) according to claim 3, wherein the program icons (10) are displayable one at a time, spaced apart from one another, in a single circumferential row. 15
  
  5. A laundry washing machine (1) according to one of the preceding claims, wherein the parameter icons (11) are arranged and displayable in a highlighted manner in a parameter region (16) radially external to the display (9), extending as an arc of a circle adjacent to the selection ring (13). 20
  
  6. A laundry washing machine (1) according to claim 5, wherein the parameter icons (11) are displayable one at a time, spaced apart from one another, in a single circumferential row. 25
  
  7. A laundry washing machine (1) according to claim 5 or 6, wherein the program and parameter regions (15, 16) do not overlap. 30
  
  8. A laundry washing machine (1) according to one of the preceding claims, wherein the laundry washing machine (1) is configured to perform one or more of the washing programs selected from the group consisting of: 35
    - a "Resistant Cotton" washing program, identified by a "Resistant Cotton" icon (17) of said program icons (10) on the display (9),
    - a "Cotton" washing program, identified by a "Cotton" icon (18) of said program icons (10) on the display (9), 40
    - a "Mixed/Colored" program, identified by a "Mixed/Colored" icon (19) of said program icons (10) on the display (9), 45
    - a "Wool" program, identified by a "Wool" icon (20) of said program icons (10) on the display (9), 50
    - a "Delicate" program, identified by a "Delicate" icon (21) of said program icons (10) on the display (9), 55
    - an "Eco-friendly" program, identified by an "Eco-friendly" icon (22) of said program icons (10) on the display (9),
    - a "Rinse" program, identified by a "Rinse" icon
  
  - (23) of said program icons (10) on the display (9),
  - a "Drain + Spin" program, identified by a "Drain + Spin" icon (24) of said program icons (10) on the display (9),
- and wherein the laundry washing machine (1) is configured to perform the washing programs with one or more of the parameters selected from the group consisting of:
- a "Temperature" parameter, identified by a "Temperature" icon (25) of said parameter icons (11) on the display (9),
  - a "Spin" parameter, identified by a "Spin" icon (26) of said parameter icons (11) on the display (9),
  - a "Delayed start time" parameter, identified by a "Delayed start time" (27) icon of said parameter icons (11) on the display (9),
  - a "Steam" parameter, identified by a "Steam" icon (28) of said parameter icons (11) on the display (9), and wherein:
- for the "Temperature" washing parameter, the display (9) displays a numerical temperature value,
  - for the "Spin" parameter, the display (9) displays a numerical-revolutions-per-minute value,
  - for the "Delayed start time" parameter, the display (9) displays a numerical minutes or hours and minutes value,
  - for the "Steam" parameter, the display (9) may display an ON or OFF value.
9. A laundry washing machine (1) according to one of the preceding claims, wherein:
    - the confirmation of the washing program selection and the transition of the user control interface (7) from the program selection mode to the parameter selection mode occur both at the same time in response to a single activation of the confirmation button (14);
    - the confirmation of the washing parameter selection and the transition of the user control interface (7) from the parameter selection mode to the setting mode occur both at the same time in response to a single activation of the confirmation button (14).
  
  10. A laundry washing machine (1) according to one of the preceding claims, wherein the display (9) forms a value displaying region (29) for displaying the value (12) of the selected washing parameters, said value displaying region (29) not overlapping with program icons (10) and parameter icons (11) displaying regions,

said value displaying region (29) being arranged in a central area of the display (9), wherein the position of the confirmation button (14) does not overlap with the position of the program icons (10) and/or with the position of the parameter icons (11) and/or with the value displaying region (29),  
said confirmation button (14) being positioned above the value displaying region (29).

11. A laundry washing machine (1) according to one of the preceding claims, wherein the laundry washing machine (1) is configured to perform one or more of the washing programs in accelerated mode, within a predetermined maximum time period,  
said accelerated washing mode being activatable by means of the activation of an acceleration button (30) arranged in the display region (9) within the selection ring (13), the user control interface (7) being configured so that, once set the accelerated mode, the selection and setting of the washing program and of the washing parameter values are allowed limited to washing programs, washing parameters and values compatible with the reduced washing time.
12. A laundry washing machine (1) according to claim 11, wherein the position of the acceleration button (30) does not overlap with the position of the confirmation button (14), the position of the program icons (10), the position of the parameter icons (11), the value displaying region (29),  
said acceleration button (30) being centrally positioned below the value displaying region (29).
13. A laundry washing machine (1) according to one of the preceding claims, wherein the user control interface (7) comprises a turning-on and turning-off button (32) arranged in the display region (9) within the selection ring (13), and wherein the position of the turning-on and turning-off button (32) does not overlap with the position of the confirmation button (14), the position of the program icons (10), the position of the parameter icons (11), the value displaying region (29), the position of the acceleration button (30), said turning-on and turning-off button (32) being positioned in a radially external central-upper region of the display (9).
14. A laundry washing machine (1) according to one of the preceding claims, wherein the user control interface (7) comprises a start/pause button (33) arranged in the display region (9) within the selection ring (13) and intended to start and/or stop the execution of the laundry treatment program, and wherein the position of the start/pause button (33) does not overlap with the position of the turning-on and turning-off button (32), the position of the confirmation button (14), the position of the program icons (10), the position of the parameter icons (11), the value

displaying region (29), the position of the acceleration button (30),  
said start/pause button (33) being positioned above the value displaying region (29) and next to the confirmation button (14).

15. A laundry washing machine (1) according to one of the preceding claims, wherein when the display (9) displays one of the program icons (10) in a highlighted manner, it additionally displays a written description of the washing program identified by the program icon (10) displayed in a highlighted manner and, optionally, default values of the washing parameters associated with the washing program identified by the program icon (10) displayed in a highlighted manner.

16. A method for selecting washing modes of a laundry washing machine (1) comprising:

- displaying by means of a display (9) on a housing (2) of the laundry washing machine (1):

- program icons (10) identifying a plurality of selectable washing programs,
- for each of said selectable washing programs, parameter icons (11) identifying one or more settable washing parameters,
- for each settable washing parameter, the set value (12),

A) in a program selection mode:

- causing, by means of the display (9), a highlighted displaying, one after the other, of the program icons (10), in response to a rotation of a selection ring (13) extending around the display (9) and rotatable with respect to the housing (2), and
- selecting the washing program identified by the program icon (10) displayed in a highlighted manner and switching from the program selection mode to a parameter selection mode in response to an activation of a confirmation button (14) formed in the display region (9) within the selection ring (13),

B) in the parameter selection mode:

- causing, by means of the display (9), a highlighted displaying, one after the other, of the parameter icons (11), in response to a rotation of said selection ring (13), and

- selecting the washing parameter identified by the parameter icon (11) displayed in a highlighted manner and switching from the parameter selection mode to a setting mode, in response to an activation of said confirmation button (14),

C) in the setting mode:

- causing, by means of the display (9), the displaying of a selected washing parameter value (12), and  
- causing a setting of the selected washing parameter value (12) in response to a rotation of the selection ring (13), and  
- causing the selection of the set value (12) of the selected washing parameter in response to the activation of the confirmation button (14).

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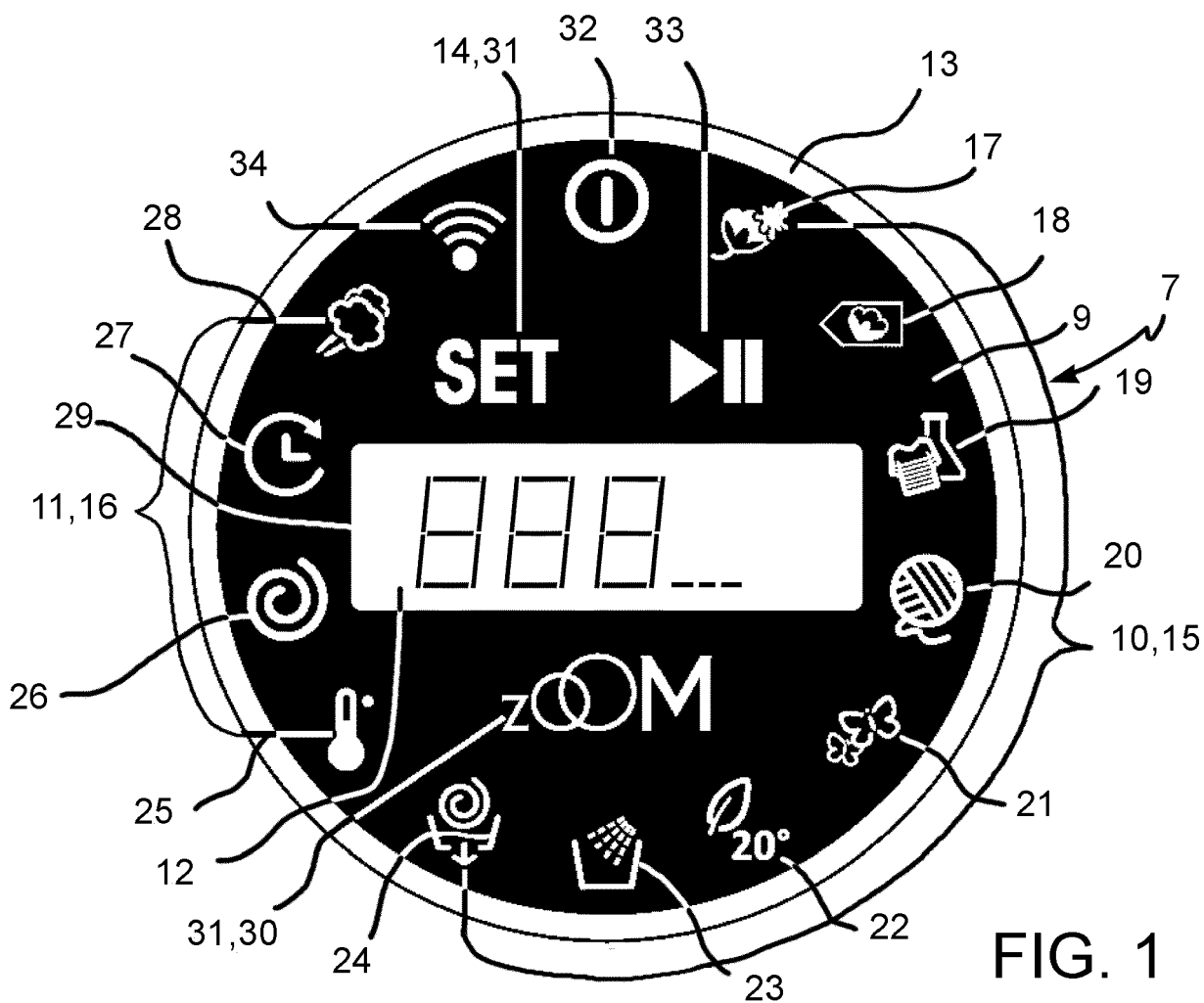


FIG. 1

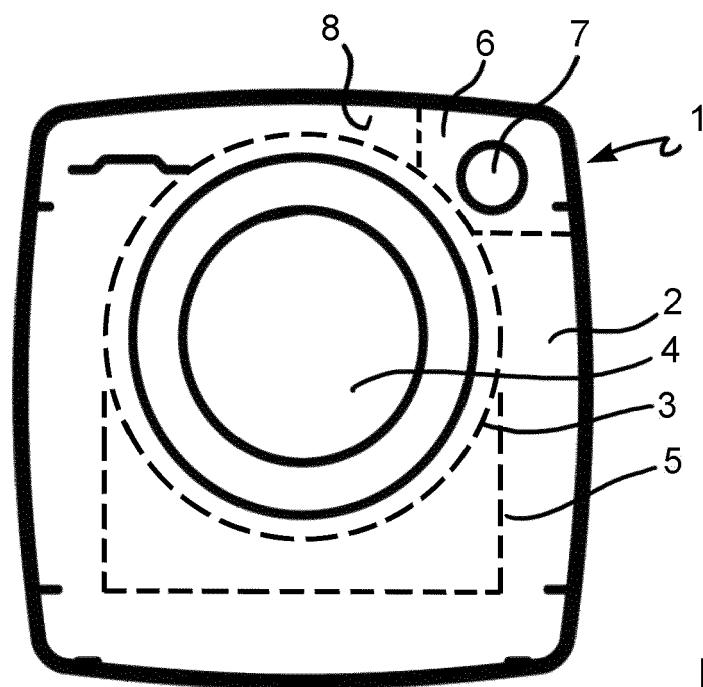


FIG. 2

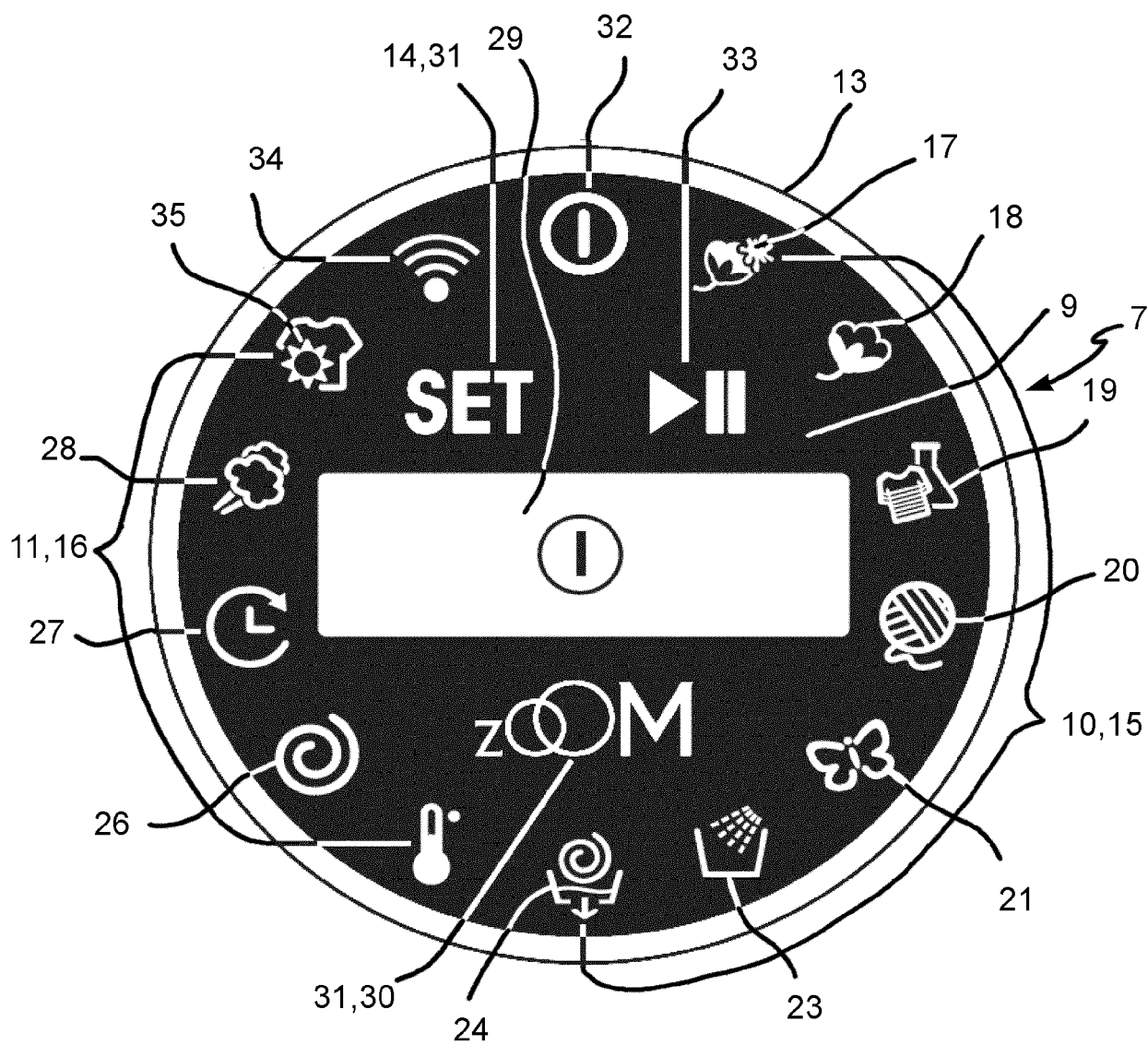


FIG. 3



## EUROPEAN SEARCH REPORT

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| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                      |                                                           |                                         |
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| The present search report has been drawn up for all claims                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                      |                                                           |                                         |
| Place of search<br><b>Munich</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                      | Date of completion of the search<br><b>27 August 2018</b> | Examiner<br><b>Stroppa, Giovanni</b>    |
| CATEGORY OF CITED DOCUMENTS<br>X : particularly relevant if taken alone<br>Y : particularly relevant if combined with another document of the same category<br>A : technological background<br>O : non-written disclosure<br>P : intermediate document<br>T : theory or principle underlying the invention<br>E : earlier patent document, but published on, or after the filing date<br>D : document cited in the application<br>L : document cited for other reasons<br>& : member of the same patent family, corresponding document |                                                                                                                                      |                                                           |                                         |

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ON EUROPEAN PATENT APPLICATION NO.**

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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
The members are as contained in the European Patent Office EDP file on  
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27-08-2018

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