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(54) **WASHING DEVICE AND WATER INTAKE CONTROL METHOD THEREFOR, AND DRUM WASHING MACHINE**

WASCHVORRICHTUNG UND WASSEREINLASSSTEUERVERFAHREN DAFÜR SOWIE TROMMELWASCHMASCHINE

DISPOSITIF DE LAVAGE ET PROCÉDÉ DE COMMANDE D'ADMISSION D'EAU ASSOCIÉ, ET MACHINE À LAVER À TAMBOUR

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(73) Proprietor: **Wuxi Filin Electronics Co., Ltd. Jiangsu 214000 (CN)**

(72) Inventors:
• **ZHOU, Xiangyu**
Jiangsu 214000 (CN)
• **YANG, Ming**
Jiangsu 214000 (CN)

• **SHAO, Lei**
Jiangsu 214000 (CN)
• **QUE, Qiang**
Jiangsu 214000 (CN)

(74) Representative: **Whitlock, Holly Elizabeth Ann et al**
Maucher Jenkins
Seventh Floor Offices
Artillery House
11-19 Artillery Row
London SW1P 1RT (GB)

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EP 4 050 145 B1

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Description

TECHNICAL FIELD

[0001] The present invention relates to washing machines, and in particular, to a water inlet control method for a washing device, a washing device, and a drum washing machine.

BACKGROUND

[0002] In order to prevent a washing device from overtime water intake, in the related art, an overtime water intake warning algorithm is generally used for overtime water intake detection. The washing device is controlled to stop water intake in response to detecting overtime water intake, while a warning message is transmitted. However, the overtime water intake warning algorithm may cause misjudgments, such as misjudging that a siphon phenomenon is overtime water intake, which may interfere with after-sales maintenance work. US2008104770A1 and CN110144698A relate generally to methods of controlling a washing machine. CN106757971A relates generally to a method of controlling water intake of a washing machine.

SUMMARY

[0003] Aspects of the invention are set out in the claims. In the following, each of the described methods, apparatuses, embodiments, examples, and aspects, which do not fully correspond to the invention as defined in the claims is thus not according to the invention and is, as well as the whole following description, present for illustration purposes only or to highlight specific aspects or features of the claims. Embodiments not falling under the scope of the claims should be interpreted as examples useful for understanding the invention. The present invention provides a washing device and a water inlet control method therefor, and a drum washing machine, for controlling a water inlet process of the washing device based on a water-level variation value, and thus fault conditions and a siphon phenomenon in the washing device during the water inlet process can be accurately detected, facilitating the after-sales maintenance work.

[0004] In a first aspect, the present invention provides a water inlet control method for a washing device, includes: controlling the washing device to inflow water; obtaining a first water-level variation value of the washing device at intervals of a first preset time; and controlling, based on the first water-level variation value, a water inlet process of the washing device.

[0005] According to the water inlet control method for the washing device in the embodiment of the present invention, the control of the water intake of the washing device based on the first water-level variation value is beneficial to accurately detect the fault conditions and siphon phenomenon in the washing device during the

water inlet process, facilitating the after-sales maintenance work.

[0006] In addition, the water inlet control method for the washing device according to the above embodiments of the present invention may also have the following additional technical features.

[0007] According to the invention said controlling, based on the first water-level variation value, the water inlet process of the washing device includes: controlling, in response to determining based on the first water-level variation value that a water-level rise amount is greater than a first preset value, the washing device to maintain normal water intake; and performing a siphon processing in response to determining based on the first water-level variation value that a water-level fall amount is greater than a second preset value.

[0008] According to the invention, said controlling, based on the first water-level variation value, the water inlet process of the washing device further includes: in response to accumulating N1 determinations based on the first water-level variation value that the water-level fall amount is smaller than or equal to the second preset value, or in response to accumulating N1 determinations based on the first water-level variation value that the water-level rise amount is smaller than or equal to the first preset value, controlling the washing device to stop the water intake for a second preset time, and obtaining a second water-level variation value, wherein N1 is a natural number greater than or equal to 1; and performing the siphon processing in response to determining based on the second water-level variation value that the water-level fall amount is greater than or equal to a third preset value.

[0009] According to an embodiment of the present invention, said performing the siphon processing includes: controlling the washing device to stop the water intake for a third preset time; obtaining a third water-level variation value; and controlling, in response to accumulating N2 determinations based on the third water-level variation value that the water-level fall amount is greater than or equal to a fourth preset value, the washing device to send a first warning message, wherein N2 is a natural number greater than or equal to 1.

[0010] According to an embodiment of the present invention, the method further includes:

controlling, in response to determining based on the second water-level variation value that the water-level fall amount is smaller than the third preset value, the washing device to resume the water intake for a fourth preset time, and obtaining a fourth water-level variation value; controlling, in response to determining based on the fourth water-level variation value that the water-level rise amount is greater than the first preset value, the washing device to maintain the normal water intake; controlling, in response to determining based on the fourth water-level variation value that the water-level fall amount is greater than the second preset value, the washing device to send a first warning message; and

controlling, in response to determining based on the fourth water-level variation value that the water-level fall amount is greater than or equal to the first preset value or the water-level rise amount is smaller than or equal to the second preset value, the washing device to send a second warning message.

[0011] In a second aspect, the present invention provides a washing device, which includes a control module and an obtaining module. The control module is configured to control the washing device to inflow water. The obtaining module is configured to obtain a first water-level variation value of the washing device at intervals of a first preset time. The control module is further configured to control, based on the first water-level variation value, a water inlet process of the washing device.

[0012] According to the invention, the control module is further configured to: control, in response to determining based on the first water-level variation value that a water-level rise amount is greater than a first preset value, the washing device to maintain normal water intake; and perform a siphon processing in response to determining based on the first water-level variation value that a water-level fall amount is greater than a second preset value.

[0013] According to the invention, the control module is further configured to: in response to accumulating N1 determinations based on the first water-level variation value that the water-level fall amount is smaller than or equal to the second preset value, or in response to accumulating N1 determinations based on the first water-level variation value that the water-level rise amount is smaller than or equal to the first preset value, control the washing device to stop the water intake for a second preset time, and obtain a second water-level variation value, wherein N1 is a natural number greater than or equal to 1; and perform the siphon processing in response to determining based on the second water-level variation value that the water-level fall amount is greater than or equal to a third preset value.

[0014] According to an embodiment of the present invention, the control module is further configured to: control the washing device to stop the water intake for a third preset time; obtain a third water-level variation value; and control, in response to accumulating N2 determinations based on the third water-level variation value that the water-level fall amount is greater than or equal to a fourth preset value, the washing device to send a first warning message, wherein N2 is a natural number greater than or equal to 1.

[0015] In a third aspect, the present invention provides a drum washing machine, including the washing device described above.

[0016] For the drum washing machine according to the embodiments of the present invention, based on the washing device of the above-mentioned embodiments, the water intake of the washing device can be controlled based on the first water-level variation value, which is beneficial to accurately detect the fault conditions and siphon phenomenon in the washing device during the

water inlet process, so as to facilitate the after-sales maintenance work.

BRIEF DESCRIPTION OF DRAWINGS

[0017] The above and/or additional aspects and advantages of the present invention will become apparent and readily understood in view of the following description of embodiments in conjunction with the accompanying drawings:

FIG. 1 is a flowchart of a water inlet control method for a washing device according to an embodiment of the present invention.

FIG. 2 is a flowchart of a water inlet control method for a washing device according to a specific embodiment of the present invention.

FIG. 3 is a structural block diagram of a washing device according to an embodiment of the present invention.

FIG. 4 is a structural block diagram of a drum washing machine according to an embodiment of the present invention.

DESCRIPTION OF EMBODIMENTS

[0018] Embodiments of the present invention are described in detail below, and examples of the embodiments are illustrated in the accompanying drawings, throughout which the same or similar reference numerals refer to the same or similar elements or elements having the same or similar functions. The embodiments described below with reference to the accompanying drawings are exemplary and intended to explain the present invention, and they should not be construed as limitations of the present invention.

[0019] With reference to FIG. 1 to FIG. 4, a washing device, a water inlet control method for the washing device, and a drum washing machine according to the embodiments of the present disclosure will be described below.

[0020] FIG. 1 is a flowchart of a water inlet control method for a washing device according to an embodiment of the present invention. As illustrated in FIG. 1, the water inlet control method of the washing device includes the following steps.

[0021] S1, the washing device is controlled to inflow water.

[0022] In this embodiment, when the user sets a washing mode (including a washing process and/or a rinsing process) and runs the washing program corresponding to the washing mode, the washing device automatically enters a water intake step, and a water inlet valve of the washing device is opened to supply water to the washing device.

[0023] As an example, before supplying water to the washing device, a display screen of the washing device or a display screen of a control terminal of the washing

device can be controlled to display a prompt whether to perform siphon detection, such as a pop-up sliding arrow. If it is required to perform the siphon detection, the user can swipe the arrow to the right to confirm the siphon detection, or if it is not required, the user can press a "Cancel" button. If no confirmation command or cancel command is detected within a preset time after the prompt is displayed, for example within 5s to 10s, the siphon detection can be performed by default, and the water inlet valve is controlled to be opened to supply water.

[0024] S2, a first water-level variation value of the washing device is obtained at intervals of a first preset time.

[0025] As an example, when the water inlet valve is opened, a water-level rise data can be detected by a pressure-type water-level sensor. The water-level rise data can be a frequency. A positive value of the water-level rise data indicates that the water level rises, and a negative value of the water-level rise data indicates that the water level falls. Then, the first water-level variation value of the washing device, i.e., the water level rise data, is obtained at intervals of the first preset time (such as 1 min). Optionally, the first preset time can be set in a setting bar of the display screen, ranging from 30s to 90s, for example, the first preset time can also be set to 30s.

[0026] S3, a water inlet process of the washing device is controlled based on the first water-level variation value.

[0027] According to the invention, a process of controlling the water inlet process of the washing device based on the first water-level variation value includes: controlling, in response to determining based on the first water-level variation value that a water-level rise amount is greater than a first preset value, the washing device to maintain normal water intake; and performing a siphon processing in response to determining based on the first water-level variation value that a water-level fall amount is greater than a second preset value.

[0028] The first preset value and the second preset value can be set according to a flow of the water intake of the washing device and the first preset time.

[0029] For example, as illustrated in FIG. 2, it is assumed that the first preset time is 1min. Within a first detection period, i.e., the first preset time of 1 min, if it is determined based on respective first water-level variation values that the water-level rise amount is greater than the first preset value, e.g., a frequency greater than 30Hz, it indicates that the water level has been rising. Then, the water inlet valve is controlled to be continuously be opened in a second detection period to control the washing device to maintain normal water intake, and a determination is made for a next detection period while the display screen is controlled to display a message such as "water supply is normal". Within the first detection period, i.e., the first preset time of 1 min, if it is determined at least one time based on the respective first water-level variation values that the water-level fall amount is greater

than the second preset value, e.g., the frequency smaller than -2Hz, it can be considered that a siphon phenomenon or a water leakage occurs in the washing device, and thus the siphon processing can be performed.

[0030] According to the invention, the process of controlling the water inlet process of the washing device based on the first water-level variation value further includes: in response to accumulating N1 determinations based on the first water-level variation value that the water-level fall amount is smaller than or equal to the second preset value, or in response to accumulating N1 determinations based on the first water-level variation value that the water-level rise amount is smaller than or equal to the first preset value, controlling the washing device to stop the water intake for a second preset time, and obtaining a second water-level variation value, where N1 is a natural number greater than or equal to 1; and performing the siphon processing in response to determining based on the second water-level variation value that the water-level fall amount is greater than or equal to a third preset value.

[0031] For example, as illustrated in FIG. 2, it is assumed that the first preset time is 1 min. Within the first detection period, if it is accumulatively determined, based on the first water-level variation value, for 3 times that the water-level rise amount is smaller than or equal to the first preset value or the water-level fall amount is smaller than or equal to the second preset value, e.g., the frequency greater than or equal to -2Hz and smaller than or equal to 30Hz for, the water inlet valve can be controlled to be closed for 2 min. Within the second preset time (i.e., 2 min), if it is determined based on the second water-level variation value that the water-level fall amount is greater than or equal to the third preset value, e.g., the frequency drops accumulatively by 5 Hz, it can be considered that the siphon phenomenon or water leakage occurs in the washing device, and thus the siphon processing is performed.

[0032] It should be noted that, subsequent to two consecutive determinations that the water-level rise amount is smaller than or equal to the first preset value or that the water-level fall amount is smaller than or equal to the second preset value, if the water-level rise amount is greater than the first preset value for the third determination, a count value of determinations can be cleared to 0 and a new counting begins again.

[0033] In an embodiment of the present invention, said performing the siphon processing includes: controlling the washing device to stop the water intake for a third preset time, and obtaining a third water-level variation value, and controlling, in response to accumulating N2 determinations based on the third water-level variation value that the water-level fall amount is greater than or equal to a fourth preset value, the washing device to send a first warning message. N2 is a natural number greater than or equal to 1.

[0034] For example, it is assumed that the third preset time is 3 min. When the siphon phenomenon or the water

leakage occurs in the washing device, the water inlet valve of the washing device can be closed for 3 minutes. Within the first preset time (such as 1 minute), if it is determined based on the third water-level variation value that the water-level fall amount is greater than the fourth preset value, the number of times of current detections is added by 1. If it is detected for consecutive N2 times (for example, 3 times) that the third water-level variation value is greater than the fourth preset value, a buzzer in the washing device is controlled to send a siphon-warning message, and a message such as "Siphon exists" can be displayed on the display screen to prompt the user of the siphon.

[0035] In an embodiment of the present invention, if it is determined based on the second water-level variation value that the water-level fall amount is smaller than the third preset value, the washing device is controlled to resume the water intake for a fourth preset time, and a fourth water-level variation value is obtained. If it is determined based on the fourth water-level variation value that the water-level rise amount is greater than the first preset value, the washing device is controlled to maintain normal water inflow. If it is determined based on the fourth water-level variation value that the water-level fall amount is greater than the second preset value, the washing device is controlled to send a first warning message. If it is determined based on the fourth water-level variation value that the water-level fall amount is greater than or equal to the first preset value or the water-level rise amount is smaller than or equal to the second preset value, the washing device is controlled to send a second warning message.

[0036] In this embodiment, within the second preset time (such as 2 min), if it is determined based on the second water-level variation value that the water-level fall amount is smaller than the third preset value, it can be considered that the siphon phenomenon does not occur, and the water inlet valve is controlled to be opened for the fourth preset time (such as 4 min), and the water-level detection for the next detection period is performed, that is, the fourth water-level variation value of the washing device is detected at intervals of the first preset time (such as 1 min). Within in the first detection period, if it is detected that the fourth water-level variation value is a positive value and greater than the first preset value, the water inlet valve will be controlled to be opened continuously in the second detection period, and the water-level detection for the next detection period is performed, while the display screen is controlled to display a message such as "water supply is normal". Within in the first detection period, if it is detected that the fourth water-level variation value is a negative value and greater than the second preset value, it can be considered that the siphon phenomenon occurs in the washing device, and the water inlet valve is controlled to be closed, and the washing device is controlled to send the first warning message, for example, the display screen displaying "siphon exists", so as to prompt the user of the siphon.

Within the first detection period, if it detected for accumulative 3 times that the fourth water-level variation value is a negative value and smaller than the second preset value, or if it detected for accumulative 3 times that the fourth water-level variation value is a positive value and smaller than the first preset value, the water inlet valve can be controlled to be closed and the water outlet valve of the washing device can be controlled to be opened, and the washing device is controlled to send the second warning message, for example, the display screen displaying a fault code E10, so as to prompt the user of the fault.

[0037] As an example, the change of the water level, such as rise or drop, can also be determined according to the detected frequency, such that the water inlet valve can be controlled based a ratio of the number of rise times to the total detection frequency. The ratio of 100% indicates that the water level is continuously rising. For example, the above ratio is obtained at certain intervals. If the ratio is greater than a first preset ratio, the water inlet valve is controlled to be continuously opened. If the ratio is greater than or equal to the second preset value and smaller than or equal to the first preset value, the water inlet valve is controlled to be closed for a certain period of time, and the change of the water level within this period of time is obtained, and the water inlet valve is controlled based on the change of the water level. The ratio smaller than the second preset value indicates that the siphon or water leakage occurs, and the water inlet valve is controlled to be closed for a certain period of time, and the change of the water level within this period of time is obtained, and the water inlet valve is controlled based on the change of the water level.

[0038] The water inlet control method for the washing device according to the embodiments of the present invention can accurately detect the fault condition and siphon phenomenon in the washing device during the water inlet process, thereby facilitating the after-sales maintenance work.

[0039] FIG. 3 is a structural block diagram of a washing device according to an embodiment of the present invention. As illustrated in FIG. 3, the washing device 10 includes a control module 100 and an obtaining module 200.

[0040] The control module 100 is configured to control the washing device to inflow water.

[0041] The obtaining module 200 is configured to obtain a first water-level variation value of the washing device at intervals of a first preset time.

[0042] The control module 100 is further configured to control, based on the first water-level variation value, a water inlet process of the washing device.

[0043] In an embodiment of the present disclosure, the control module 100 is specifically configured to: control, in response to determining based on the first water-level variation value that a water-level rise amount is greater than a first preset value, the washing device to maintain normal water intake; and perform a siphon processing in

response to determining based on the first water-level variation value that a water-level fall amount is greater than a second preset value.

[0044] As an example, as illustrated in FIG. 2, within the first detection period, i.e., the first preset time of 1 min, if it is detected that the first water-level variation value is a positive value and greater than the first preset value, the control module 100 controls the water inlet valve to be continuously opened during the second detection period, to control the washing device to maintain normal water inlet, and a determination for the next detection period is performed, while the display screen is controlled to display a message of "water supply is normal". Within the first detection period, i.e., the first preset time of 1 min, if it is detected that the first water-level variation value is a negative value and greater than the second preset value, it can be considered that the siphon phenomenon or water leakage occurs in the washing device, and the siphon processing is performed by the control module 100.

[0045] According to the invention, the control module 100 is further configured to: in response to accumulating N1 determinations based on the first water-level variation value that the water-level fall amount is smaller than or equal to the second preset value, or in response to accumulating N1 determinations based on the first water-level variation value that the water-level rise amount is smaller than or equal to the first preset value, control the washing device to stop the water intake for a second preset time, and obtain a second water-level variation value, where N1 is a natural number greater than or equal to 1; and perform the siphon processing in response to determining based on the second water-level variation value that the water-level fall amount is greater than or equal to a third preset value.

[0046] Specifically, as illustrated in FIG. 2, within the first detection period, if it detected for accumulative 3 times that the first water-level variation value is a negative value and smaller than the second preset value or that the first water-level variation value is a positive value and smaller than the first preset value, the control module 100 can control the water inlet valve to be closed for the second preset time (for example, 2 min). In addition, if it is detected that the second water-level variation value within the second preset time (for example, 2 min) is a negative value and greater than or equal to the third preset value, it can be considered that the siphon phenomenon or a water leakage occurs in the washing device, and the control module 100 performs the siphon processing.

[0047] In an embodiment of the present invention, the control module 100 is further configured to control the washing device to stop the water intake for a third preset time, and obtain a third water-level variation value, and control, in response to accumulating N2 determinations based on the third water-level variation value that the water-level fall amount is greater than or equal to a fourth preset value, the washing device to send a first warning

message. N2 is a natural number greater than or equal to 1.

[0048] It should be noted that, for other specific implementations of the washing device in the embodiments of the present disclosure, reference may be made to the specific implementations of the water inlet control method for the washing device in the above-mentioned embodiments of the present disclosure.

[0049] The washing device according to the embodiments of the present invention can accurately detect the fault conditions and siphon phenomenon during the water inlet process, thereby facilitating the after-sale maintenance work.

[0050] Further, the present invention provides a drum washing machine. As illustrated in FIG. 4, the drum washing machine 1000 includes the washing device 10 described above.

[0051] For the drum washing machine according to the embodiments of the present disclosure, with the washing device of the above-mentioned embodiments, fault conditions and siphon phenomenon during the water inlet process can be accurately detected, thereby facilitating the after-sales maintenance work.

[0052] It should be noted that the logics and/or steps represented in the flowchart or described otherwise herein can be, for example, considered as a list of ordered executable instructions for implementing logic functions, and can be embodied in any computer-readable medium that is to be used by or used with an instruction execution system, apparatus, or device (such as a computer-based system, a system including a processing module, or any other system that can retrieve and execute instructions from an instruction execution system, apparatus, or device). For the specification, a "computer-readable medium" can be any apparatus that can contain, store, communicate, propagate, or transmit a program to be used by or used with an instruction execution system, apparatus, or device. More specific examples of computer-readable mediums include, as a non-exhaustive list: an electrical connector (electronic device) with one or more wirings, a portable computer disk case (magnetic devices), a Random-Access Memory (RAM), a Read Only Memory (ROM), an Erasable Programmable Read Only Memory (EPROM or flash memory), a fiber optic device, and a portable Compact Disk Read Only memory (CDROM). In addition, the computer-readable medium may even be paper or other suitable medium on which the program can be printed, as the program can be obtained electronically, e.g., by optically scanning the paper or the other medium, and then editing, interpreting, or otherwise processing the scanning result when necessary, and then stored in a computer memory.

[0053] It can be appreciated that each part of the present invention can be implemented in hardware, software, firmware or any combination thereof. In the above embodiments, a plurality of steps or methods can be implemented using software or firmware stored in a memory and executed by a suitable instruction execution

system. For example, when implemented in hardware, as in another embodiment, it can be implemented by any one or combination of the following technologies known in the art: a discrete logic circuit having logic gate circuits for implementing logic functions on data signals, an application-specific integrated circuit with suitable combined logic gates, a Programmable Gate Array (PGA), a Field Programmable Gate Array (FPGA), etc.

[0054] In the specification, description with reference to the terms "one embodiment," "some embodiments," "example," "specific example," or "some examples", etc., means that specific features, structures, materials described in combination with the embodiment or example, or features are included in at least one embodiment or example of the present invention. In this specification, schematic representations of the above terms do not necessarily refer to the same embodiment or example. Furthermore, those of ordinary skill in the art may interpret the above-described embodiments within the scope of the present invention, which is defined by the appended claims.

Claims

1. A water inlet control method for a washing device, comprising:

controlling (S1) the washing device to inflow water;
 obtaining (S2) a first water-level variation value of the washing device at intervals of a first preset time;
 controlling (S3), based on the first water-level variation value, a water inlet process of the washing device, wherein said controlling, based on the first water-level variation value, the water inlet process of the washing device comprises:

controlling, in response to determining based on the first water-level variation value that a water-level rise amount is greater than a first preset value, the washing device to maintain normal water intake;
 performing a siphon processing in response to determining based on the first water-level variation value that a water-level fall amount is greater than a second preset value, and wherein said controlling, based on the first water-level variation value, the water inlet process of the washing device further comprises:

in response to accumulating N1 determinations, based on the first water-level variation value, that the water-level fall amount is smaller than or equal to the second preset value, or in response

to accumulating N1 determinations, based on the first water-level variation value, that the water-level rise amount is smaller than or equal to the first preset value, controlling the washing device to stop the water intake for a second preset time, and obtaining a second water-level variation value, wherein N1 is a natural number greater than or equal to 1; and
 performing the siphon processing in response to determining based on the second water-level variation value that the water-level fall amount is greater than or equal to a third preset value.

2. The water inlet control method according to claim 1, wherein said performing the siphon processing comprises:

controlling the washing device to stop the water intake for a third preset time;
 obtaining a third water-level variation value; and
 controlling, in response to accumulating N2 determinations, based on the third water-level variation value, that the water-level fall amount is greater than or equal to a fourth preset value, the washing device to send a first warning message, wherein N2 is a natural number greater than or equal to 1.

3. The water inlet control method of claim 1, further comprising:

controlling, in response to determining based on the second water-level variation value that the water-level fall amount is smaller than the third preset value, the washing device to resume the water intake for a fourth preset time, and obtaining a fourth water-level variation value;
 controlling, in response to determining based on the fourth water-level variation value that the water-level rise amount is greater than the first preset value, the washing device to maintain the normal water intake;
 controlling, in response to determining based on the fourth water-level variation value that the water-level fall amount is greater than the second preset value, the washing device to send a first warning message; and
 controlling, in response to determining based on the fourth water-level variation value that the water-level fall amount is greater than or equal to the first preset value or the water-level rise amount is smaller than or equal to the second preset value, the washing device to send a second warning message.

4. A washing device (10), comprising:

a control module (100) configured to control the washing device (10) to inflow water; and an obtaining module (200) configured to obtain a first water-level variation value of the washing device (10) at intervals of a first preset time, wherein the control module (100) is further configured to control, based on the first water-level variation value, a water inlet process of the washing device (10), wherein the control module is further configured to:

control, in response to determining based on the first water-level variation value that a water-level rise amount is greater than a first preset value, the washing device to maintain normal water intake; perform a siphon processing in response to determining based on the first water-level variation value that a water-level fall amount is greater than a second preset value, and wherein the control module is further configured to:

in response to accumulating N1 determinations, based on the first water-level variation value, that the water-level fall amount is smaller than or equal to the second preset value, or in response to accumulating N1 determinations, based on the first water-level variation value, that the water-level rise amount is smaller than or equal to the first preset value, control the washing device to stop the water intake for a second preset time, and obtain a second water-level variation value, wherein N1 is a natural number greater than or equal to 1; and

perform the siphon processing in response to determining based on the second water-level variation value that the water-level fall amount is greater than or equal to a third preset value.

5. The washing device according to claim 4, wherein the control module is further configured to:

control the washing device to stop the water intake for a third preset time; obtain a third water-level variation value; and control, in response to accumulating N2 determinations, based on the third water-level variation value, that the water-level fall amount is greater than or equal to a fourth preset value, the washing device to send a first warning message, wherein N2 is a natural number greater

than or equal to 1.

6. A drum washing machine (1000), comprising the washing device (10) according to claim 4 or 5.

Patentansprüche

1. Wasserzulaufregelverfahren für eine Waschvorrichtung, das Folgendes umfasst:

derartiges Steuern (S1) der Waschvorrichtung, dass Wasser zuläuft, Ermitteln (S2) eines ersten Werts für die Wasserstandsänderung bei der Waschvorrichtung in Abständen von einer ersten voreingestellten Dauer, Regeln (S3) eines Wasserzulaufprozesses bei der Waschvorrichtung auf der Grundlage des ersten Werts für die Wasserstandsänderung, wobei das Regeln des Wasserzulaufprozesses bei der Waschvorrichtung auf der Grundlage des ersten Werts für die Wasserstandsänderung Folgendes umfasst:

als Reaktion auf das Bestimmen auf der Grundlage des ersten Werts für die Wasserstandsänderung, dass ein Betrag für den Wasserstandanstieg einen ersten voreingestellten Wert übersteigt, derartiges Steuern der Waschvorrichtung, dass eine normale Wasserzufuhr beibehalten wird, als Reaktion auf das Bestimmen auf der Grundlage des ersten Werts für die Wasserstandsänderung, dass ein Betrag für den Wasserstandabfall einen zweiten voreingestellten Wert übersteigt, Durchführen einer Absaugverarbeitung, und wobei das Regeln des Wasserzulaufprozesses bei der Waschvorrichtung auf der Grundlage des ersten Werts für die Wasserstandsänderung ferner Folgendes umfasst:

als Reaktion auf das Ansammeln von N1 Bestimmungen auf der Grundlage des ersten Werts für die Wasserstandsänderung, dass der Betrag für den Wasserstandabfall maximal dem zweiten voreingestellten Wert entspricht, oder als Reaktion auf das Ansammeln von N1 Bestimmungen auf der Grundlage des ersten Werts für die Wasserstandsänderung, dass der Betrag für den Wasserstandanstieg maximal dem ersten voreingestellten Wert entspricht, derartiges Steuern der Waschvorrichtung, dass die Wasserzufuhr für eine zweite voreingestellte Dauer ge-

stoppt wird, und Ermitteln eines zweiten Werts für die Wasserstandsänderung, wobei N1 eine natürliche Zahl größer gleich 1 ist, und Durchführen der Absaugverarbeitung als Reaktion auf das Bestimmen auf der Grundlage des zweiten Werts für die Wasserstandsänderung, dass der Betrag für den Wasserstandabfall mindestens einem dritten voreingestellten Wert entspricht.

2. Wasserzulaufregelverfahren nach Anspruch 1, wobei das Durchführen der Absaugverarbeitung Folgendes umfasst:

derartiges Steuern der Waschvorrichtung, dass die Wasserzufuhr für eine dritte voreingestellte Dauer gestoppt wird, Ermitteln eines dritten Werts für die Wasserstandsänderung und als Reaktion auf das Ansammeln von N2 Bestimmungen auf der Grundlage des dritten Werts für die Wasserstandsänderung, dass der Betrag für den Wasserstandabfall mindestens einem vierten voreingestellten Wert entspricht, derartiges Steuern der Waschvorrichtung, dass eine erste Warnmeldung gesendet wird, wobei N2 eine natürliche Zahl größer gleich 1 ist.

3. Wasserzulaufregelverfahren nach Anspruch 1, das ferner Folgendes umfasst:

als Reaktion auf das Bestimmen auf der Grundlage des zweiten Werts für die Wasserstandsänderung, dass der Betrag für den Wasserstandabfall unter dem dritten voreingestellten Wert liegt, derartiges Steuern der Waschvorrichtung, dass die Wasserzufuhr für eine vierte voreingestellte Dauer fortgesetzt wird, und Ermitteln eines vierten Werts für die Wasserstandsänderung, als Reaktion auf das Bestimmen auf der Grundlage des vierten Werts für die Wasserstandsänderung, dass der Betrag für den Wasserstandanstieg über dem ersten voreingestellten Wert liegt, derartiges Steuern der Waschvorrichtung, dass die normale Wasserzufuhr beibehalten wird, als Reaktion auf das Bestimmen auf der Grundlage des vierten Werts für die Wasserstandsänderung, dass der Betrag für den Wasserstandabfall über dem zweiten voreingestellten Wert liegt, derartiges Steuern der Waschvorrichtung, dass eine Warnmeldung gesendet wird, und als Reaktion auf das Bestimmen auf der Grundlage des vierten Werts für die Wasserstands-

änderung, dass der Betrag für den Wasserstandabfall mindestens dem ersten voreingestellten Wert oder der Betrag für den Wasserstandanstieg maximal dem zweiten voreingestellten Wert entspricht, derartiges Steuern der Waschvorrichtung, dass eine zweite Warnmeldung gesendet wird.

4. Waschvorrichtung (10), die Folgendes umfasst:

ein Steuermodul (100), das so konfiguriert ist, dass es die Waschvorrichtung (10) so steuert, dass Wasser zuläuft, und ein Ermittlungsmodul (200), das so konfiguriert ist, dass es in Abständen von einer ersten voreingestellten Dauer einen ersten Wert für die Wasserstandsänderung bei der Waschvorrichtung (10) ermittelt, wobei das Steuermodul (100) ferner so konfiguriert ist, dass es auf der Grundlage des ersten Werts für die Wasserstandsänderung einen Wasserzulaufprozess bei der Waschvorrichtung (10) regelt, wobei das Steuermodul ferner so konfiguriert ist, dass es:

als Reaktion auf das Bestimmen auf der Grundlage des ersten Werts für die Wasserstandsänderung, dass ein Betrag für den Wasserstandanstieg einen ersten voreingestellten Wert übersteigt, die Waschvorrichtung so steuert, dass eine normale Wasserzufuhr beibehalten wird, als Reaktion auf das Bestimmen auf der Grundlage des ersten Werts für die Wasserstandsänderung, dass ein Betrag für den Wasserstandabfall einen zweiten voreingestellten Wert übersteigt, eine Absaugverarbeitung durchführt, und wobei das Steuermodul ferner so konfiguriert ist, dass es:

als Reaktion auf das Ansammeln von N1 Bestimmungen auf der Grundlage des ersten Werts für die Wasserstandsänderung, dass der Betrag für den Wasserstandabfall maximal dem zweiten voreingestellten Wert entspricht, oder als Reaktion auf das Ansammeln von N1 Bestimmungen auf der Grundlage des ersten Werts für die Wasserstandsänderung, dass der Betrag für den Wasserstandanstieg maximal dem ersten voreingestellten Wert entspricht, die Waschvorrichtung so steuert, dass die Wasserzufuhr für eine zweite voreingestellte Dauer gestoppt wird, und einen zweiten Wert für die Wasserstandsänderung ermittelt, wobei N1 eine natürliche Zahl größer

gleich 1 ist, und
als Reaktion auf das Bestimmen auf
der Grundlage des zweiten Werts für
die Wasserstandsänderung, dass der
Betrag für den Wasserstandabfall min-
destens einem dritten voreingestellten
Wert entspricht, die Absaugverarbei-
tung durchführt.

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5. Waschvorrichtung nach Anspruch 4, wobei das
Steuermodul ferner so konfiguriert ist, dass es:

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die Waschvorrichtung so steuert, dass die Was-
serzufuhr für eine dritte voreingestellte Dauer
gestoppt wird,
einen dritten Wert für die Wasserstandsände-
rung ermittelt und
als Reaktion auf das Ansammeln von N2 Be-
stimmungen auf der Grundlage des dritten
Werts für die Wasserstandsänderung, dass
der Betrag für den Wasserstandabfall mindes-
tens einem vierten voreingestellten Wert ent-
spricht, die Waschvorrichtung so steuert, dass
eine erste Warnmeldung gesendet wird, wobei
N2 eine natürliche Zahl größer gleich 1 ist.

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6. Trommelwaschmaschine (1000), die die Waschor-
richtung (10) nach Anspruch 4 oder 5 umfasst.

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Revendications

1. Procédé de commande d'entrée d'eau pour un dis-
positif de lavage, comportant les étapes consistant
à :

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commander (S1) le dispositif de lavage afin de
faire entrer de l'eau ;
obtenir (S2) une première valeur de variation du
niveau d'eau du dispositif de lavage à des inter-
valles d'une première durée prédéfinie ;
commander (S3), sur la base de la première
valeur de variation du niveau d'eau, un proces-
sus d'entrée d'eau du dispositif de lavage, dans
lequel ladite étape consistant à commander, sur
la base de la première valeur de variation du
niveau d'eau, le processus d'entrée d'eau du
dispositif de lavage comporte les étapes consis-
tant à :

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en réponse à la détermination, sur la base
de la première valeur de variation du niveau
d'eau, comme quoi une quantité de montée
du niveau d'eau est supérieure à une pre-
mière valeur prédéfinie, commander le dis-
positif de lavage afin de maintenir une ad-
mission d'eau normale ;
effectuer un traitement de siphon en ré-

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ponse à la détermination, sur la base de
la première valeur de variation du niveau
d'eau, comme quoi une quantité de baisse
du niveau d'eau est supérieure à une deu-
xième valeur prédéfinie, et dans lequel la-
dite étape consistant à commander, sur la
base de la première valeur de variation du
niveau d'eau, le processus d'entrée d'eau
du dispositif de lavage comporte par ailleurs
les étapes consistant à :

en réponse à l'accumulation de N1 dé-
terminations, sur la base de la première
valeur de variation du niveau d'eau,
comme quoi la quantité de baisse du
niveau d'eau est inférieure ou égale à la
deuxième valeur prédéfinie, ou en ré-
ponse à l'accumulation de N1 détermi-
nations, sur la base de la première
valeur de variation du niveau d'eau,
comme quoi la quantité de montée du
niveau d'eau est inférieure ou égale à la
première valeur prédéfinie, comman-
der le dispositif de lavage afin d'arrêter
l'admission d'eau au cours d'une deu-
xième durée prédéfinie, et obtenir une
deuxième valeur de variation du niveau
d'eau, où N1 est un entier naturel su-
périeur ou égal à 1 ; et
effectuer le traitement de siphon en
réponse à la détermination, sur la base
de la deuxième valeur de variation du
niveau d'eau, comme quoi la quantité
de baisse du niveau d'eau est supéri-
eure ou égale à une troisième valeur
prédéfinie.

2. Procédé de commande d'entrée d'eau selon la re-
vendication 1, dans lequel ladite étape consistant à
effectuer le traitement de siphon comporte les éta-
pes consistant à :

commander le dispositif de lavage afin d'arrêter
l'admission d'eau au cours d'une troisième du-
rée prédéfinie ;
obtenir une troisième valeur de variation du
niveau d'eau ; et
en réponse à l'accumulation de N2 détermi-
nations, sur la base de la troisième valeur de
variation du niveau d'eau, comme quoi la quan-
tité de baisse du niveau d'eau est supérieure ou
égale à une quatrième valeur prédéfinie,
commander le dispositif de lavage afin d'en-
voyer un premier message d'avertissement,
où N2 est un entier naturel supérieur ou égal
à 1.

3. Procédé de commande d'entrée d'eau selon la re-

revendication 1, comportant par ailleurs les étapes consistant à :

en réponse à la détermination, sur la base de la deuxième valeur de variation du niveau d'eau, comme quoi la quantité de baisse du niveau d'eau est inférieure à la troisième valeur prédéfinie, commander le dispositif de lavage afin de reprendre l'admission d'eau au cours d'une quatrième durée prédéfinie, et obtenir une quatrième valeur de variation du niveau d'eau ;
 en réponse à la détermination, sur la base de la quatrième valeur de variation du niveau d'eau, comme quoi la quantité de montée du niveau d'eau est supérieure à la première valeur prédéfinie, commander le dispositif de lavage afin de maintenir l'admission d'eau normale ;
 en réponse à la détermination, sur la base de la quatrième valeur de variation du niveau d'eau, comme quoi la quantité de baisse du niveau d'eau est supérieure à la deuxième valeur prédéfinie, commander le dispositif de lavage afin d'envoyer un premier message d'avertissement ; et
 en réponse à la détermination, sur la base de la quatrième valeur de variation du niveau d'eau, comme quoi la quantité de baisse du niveau d'eau est supérieure ou égale à la première valeur prédéfinie ou comme quoi la quantité de montée du niveau d'eau est inférieure ou égale à la deuxième valeur prédéfinie, commander le dispositif de lavage afin d'envoyer un deuxième message d'avertissement.

4. Dispositif de lavage (10), comportant :

un module de commande (100) configuré pour commander le dispositif de lavage (10) afin de faire entrer de l'eau ; et
 un module d'obtention (200) configuré pour obtenir une première valeur de variation du niveau d'eau du dispositif de lavage (10) à des intervalles d'une première durée prédéfinie, dans lequel le module de commande (100) est par ailleurs configuré pour commander, sur la base de la première valeur de variation du niveau d'eau, un processus d'entrée d'eau du dispositif de lavage (10), dans lequel le module de commande est par ailleurs configuré pour :

en réponse à la détermination, sur la base de la première valeur de variation du niveau d'eau, comme quoi une quantité de montée du niveau d'eau est supérieure à une première valeur prédéfinie, commander le dispositif de lavage afin de maintenir une admission d'eau normale ;
 effectuer un traitement de siphon en ré-

ponse à la détermination, sur la base de la première valeur de variation du niveau d'eau, comme quoi une quantité de baisse du niveau d'eau est supérieure à une deuxième valeur prédéfinie, et dans lequel le module de commande est par ailleurs configuré pour :

en réponse à l'accumulation de N1 déterminations, sur la base de la première valeur de variation du niveau d'eau, comme quoi la quantité de baisse du niveau d'eau est inférieure ou égale à la deuxième valeur prédéfinie, ou en réponse à l'accumulation de N1 déterminations, sur la base de la première valeur de variation du niveau d'eau, comme quoi la quantité de montée du niveau d'eau est inférieure ou égale à la première valeur prédéfinie, commander le dispositif de lavage afin d'arrêter l'admission d'eau au cours d'une deuxième durée prédéfinie, et obtenir une deuxième valeur de variation du niveau d'eau, où N1 est un entier naturel supérieur ou égal à 1 ; et
 effectuer le traitement de siphon en réponse à la détermination, sur la base de la deuxième valeur de variation du niveau d'eau, comme quoi la quantité de baisse du niveau d'eau est supérieure ou égale à une troisième valeur prédéfinie.

5. Dispositif de lavage selon la revendication 4, dans lequel le module de commande est en outre configuré pour :

commander le dispositif de lavage afin d'arrêter l'admission d'eau au cours d'une troisième durée prédéfinie ;
 obtenir une troisième valeur de variation du niveau d'eau ; et
 en réponse à l'accumulation de N2 déterminations, sur la base de la troisième valeur de variation du niveau d'eau, comme quoi la quantité de baisse du niveau d'eau est supérieure ou égale à une quatrième valeur prédéfinie, commander le dispositif de lavage afin d'envoyer un premier message d'avertissement, où N2 est un entier naturel supérieur ou égal à 1.

6. Machine à laver à tambour (1000), comportant le dispositif de lavage (10) selon la revendication 4 ou la revendication 5.

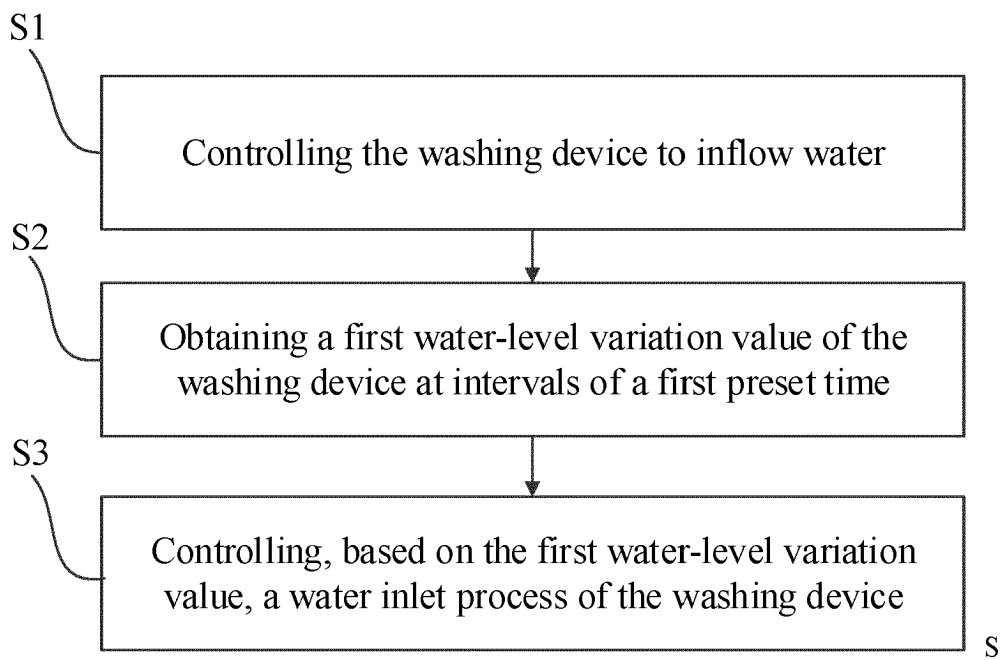


FIG. 1

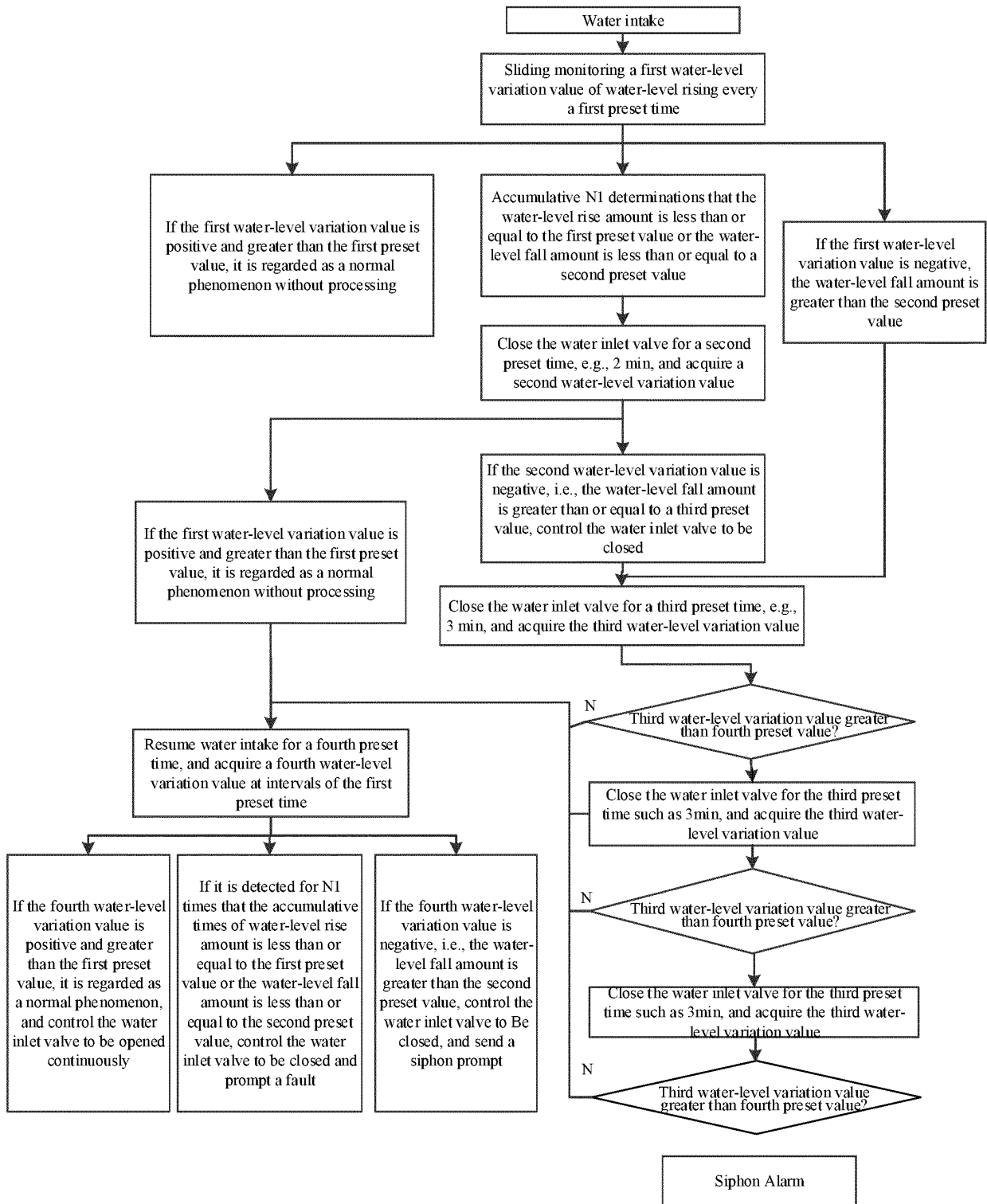


FIG. 2

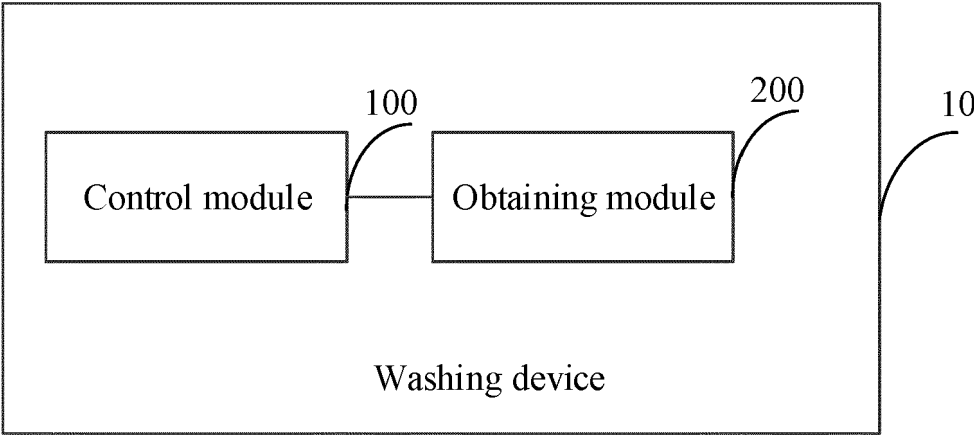


FIG. 3

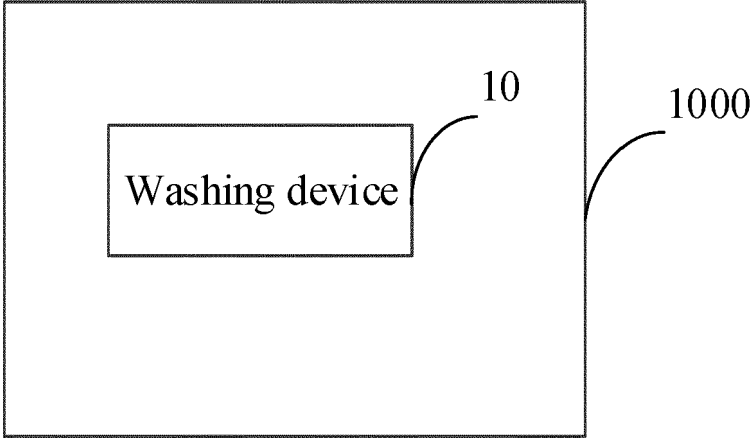


FIG. 4

REFERENCES CITED IN THE DESCRIPTION

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