(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 4 050 145 A1**

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
31.08.2022 Bulletin 2022/35

(21) Application number: **20950016.4**

(22) Date of filing: **29.09.2020**

(51) International Patent Classification (IPC):
D06F 33/34 *(2020.01)*

(86) International application number:
PCT/CN2020/118841

(87) International publication number:
WO 2022/036812 (24.02.2022 Gazette 2022/08)

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(30) Priority: **20.08.2020 CN 202010842091**

(71) Applicant: **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)

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

(57) A washing device and a water intake control method therefor, and a drum washing machine, which relate to the technical field of washing machines. The control method comprises: controlling water intake of a washing device; acquiring a first water level variation value of the washing device every first preset time; and controlling a water intake process of the washing device according to the first water level variation value.

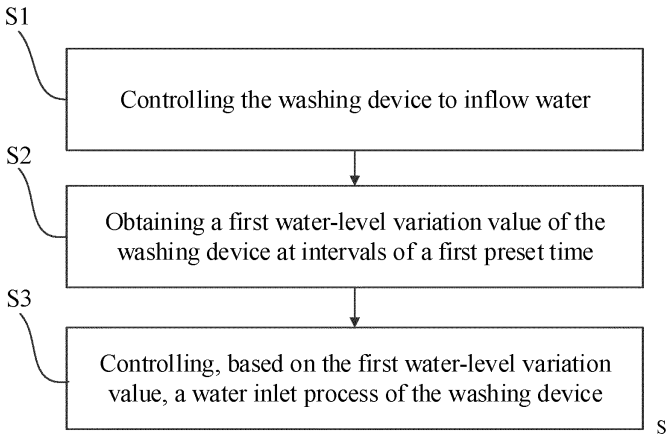

FIG. 1

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Description

CROSS-REFERENCE TO RELATED APPLICATION

[0001] The present disclosure claims priority to Application No. 202010842091.9, titled "WASHING DEVICE AND WATER INLET CONTROL METHOD FOR WASHING DEVICE, AND DRUM WASHING MACHINE" and filed on August 20, 2020 with China National Intellectual Property Administration which is hereby incorporated by reference in its entirety

TECHNICAL FIELD

[0002] The present disclosure 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

[0003] 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.

SUMMARY

[0004] The present disclosure 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.

[0005] In a first aspect, the present disclosure 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.

[0006] According to the water inlet control method for the washing device in the embodiment of the present disclosure, 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.

[0007] In addition, the water inlet control method for the washing device according to the above embodiments of the present disclosure may also have the following additional technical features.

[0008] According to an embodiment of the present disclosure, 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.

[0009] According to an embodiment of the present disclosure, 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 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.

[0010] According to an embodiment of the present disclosure, 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.

[0011] According to an embodiment of the present disclosure, 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.

[0012] In a second aspect, the present disclosure 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.

[0013] According to an embodiment of the present disclosure, 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.

[0014] According to an embodiment of the present disclosure, 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.

[0015] According to an embodiment of the present disclosure, 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.

[0016] In a third aspect, the present disclosure provides a drum washing machine, including the washing device described above.

[0017] For the drum washing machine according to the embodiments of the present disclosure, 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

[0018] The above and/or additional aspects and advantages of the present disclosure 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 disclosure.

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

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

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

DESCRIPTION OF EMBODIMENTS

[0019] Embodiments of the present disclosure 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 disclosure, and they should not be construed as limitations of the present disclosure.

[0020] 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.

[0021] FIG. 1 is a flowchart of a water inlet control method for a washing device according to an embodiment of the present disclosure. As illustrated in FIG. 1, the water inlet control method of the washing device includes the following steps.

[0022] S1, the washing device is controlled to inflow water.

[0023] 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.

[0024] 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.

[0025] S2, a first water-level variation value of the washing device is obtained at intervals of a first preset time.

[0026] 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.

[0027] S3, a water inlet process of the washing device is controlled based on the first water-level variation value.

[0028] In an embodiment of the present disclosure, 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.

[0029] 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.

[0030] For example, as illustrated in FIG. 2, it is assumed that the first preset time is lmin. 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.

[0031] In an embodiment of the present disclosure, 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.

[0032] 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.

[0033] 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.

[0034] In an embodiment of the present disclosure, 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.

[0035] 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.

[0036] In an embodiment of the present disclosure, 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.

[0037] 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.

[0038] 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.

[0039] The water inlet control method for the washing device according to the embodiments of the present disclosure 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.

[0040] FIG. 3 is a structural block diagram of a washing device according to an embodiment of the present disclosure. As illustrated in FIG. 3, the washing device 10 includes a control module 100 and an obtaining module 200.

[0041] The control module 100 is configured to control the washing device to inflow water.

[0042] 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.

[0043] 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.

[0044] 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.

[0045] 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.

[0046] In an embodiment of the present disclosure, 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.

[0047] 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.

[0048] In an embodiment of the present disclosure, 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.

[0049] 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.

[0050] The washing device according to the embodiments of the present disclosure can accurately detect the fault conditions and siphon phenomenon during the water inlet process, thereby facilitating the after-sale maintenance work.

[0051] Further, the present disclosure provides a drum washing machine. As illustrated in FIG. 4, the drum washing machine 1000 includes the washing device 10 described above.

[0052] 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.

[0053] 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.

[0054] It can be appreciated that each part of the present disclosure 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 appli-

cation-specific integrated circuit with suitable combined logic gates, a Programmable Gate Array (PGA), a Field Programmable Gate Array (FPGA), etc.

[0055] 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 disclosure. In this specification, schematic representations of the above terms do not necessarily refer to the same embodiment or example. Furthermore, the particular features, structures, materials or characteristics described may be combined in any suitable manner in any one or more embodiments or examples.

[0056] In the description of the present disclosure, it is to be understood that the terms of the orientations or positional relationships "center", "longitudinal", "lateral", "length", "width", "thickness", "upper", "lower", "front", "rear", "left", "right", "vertical", "horizontal", "top", "bottom", "inner", "outer", "clockwise", "counterclockwise", "axial direction", "radial direction", "circumferential direction" and the like, are based on the orientations or positional relationships illustrated in the drawings, and are only for the convenience of describing the present disclosure and simplifying the description, rather than indicating or implying the indicated devices or elements must have a particular orientation and they must be constructed and operate in the particular orientation. Therefore, they should not be construed as limitations of the present disclosure.

[0057] In addition, the terms "first" and "second" are only used for descriptive purposes, and should not be construed as indicating or implying relative importance or implying the number of indicated technical features. Thus, a feature delimited with "first", "second" may expressly or implicitly include at least one of the features. In the description of the present disclosure, "plurality" means at least two, such as two, three, etc., unless expressly and specifically defined otherwise.

[0058] In the present disclosure, unless otherwise expressly specified and limited, the term "installed", "connected", "connection", "fixed", or other terms should be understood in a broad sense. For example, it may be a fixed connection or a detachable connection, or formed as one piece; or it may be a mechanical connection or an electrical connection; or it may be directly or indirectly connected through an intermediate medium; or it may be the internal connection of two elements or the interaction relationship between the two elements, unless otherwise specified limit. For those of ordinary skill in the art, the specific meanings of the above terms in the present disclosure can be understood according to specific situations.

[0059] In the present disclosure, unless expressly stated and defined otherwise, a first feature "on" or "under" a second feature may indicate that the first and second features are in direct contact or they indirectly contact with each other through an intermediate medium between the first and second features. The first feature being "on", "over" and "above" the second feature may indicate that the first feature is directly above or obliquely above the second feature, or a level of the first feature is higher than a level of the second feature. The first feature being "below", "under" and "underline" the second feature may indicate that the first feature is directly below or obliquely below the second feature, or the level of the first feature is lower than the level of the second feature.

[0060] Although the embodiments of the present disclosure have been illustrated and described above, it should be understood that the above embodiments are exemplary and should not be construed as limitations of the present disclosure, and those skilled in the art may make variations, modifications, and substitutions to the above-described embodiments within the scope of the present disclosure.

Claims

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

   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.

2. The water inlet control method according to claim 1, 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; 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.

3. The water inlet control method according to claim 2, 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 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.

4. The water inlet control method according to claim 2 or 3, 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.

5. The water inlet control method of claim 3, 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.

6. A washing device, comprising:

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

7. The washing device according to claim 6, 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; 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.

8. The washing device according to claim 7, 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.

9. The washing device according to claim 8, 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.

10. A drum washing machine, comprising the washing device according to any one of claims 6 to 9.

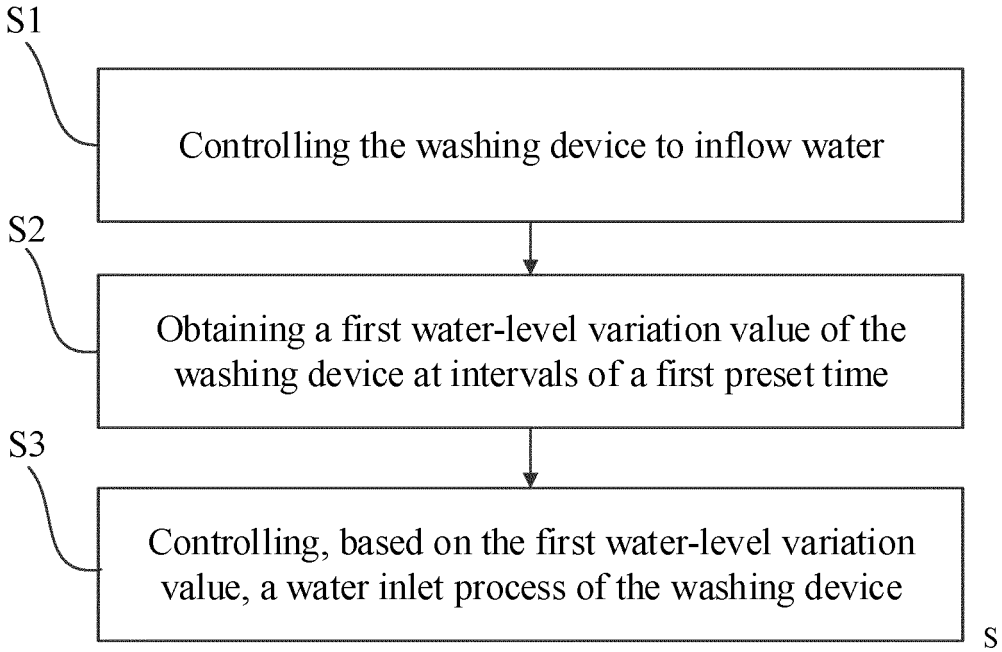
S1
Controlling the washing device to inflow water
S2
Obtaining a first water-level variation value of the washing device at intervals of a first preset time
S3
Controlling, based on the first water-level variation value, a water inlet process of the washing device
S

FIG. 1

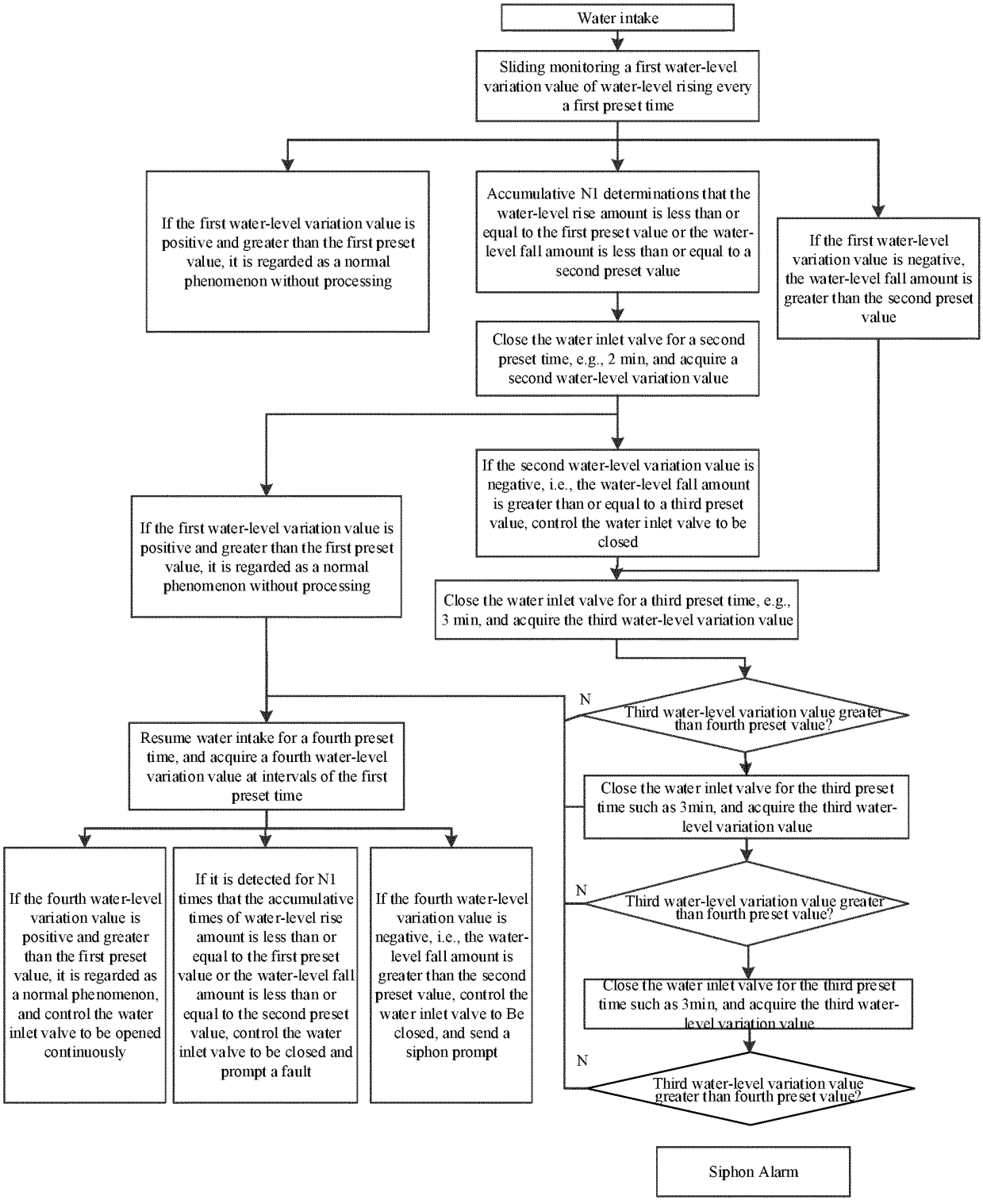
Water intake
Sliding monitoring a first water-level variation value of water-level rising every a first preset time
If the first water-level variation value is positive and greater than the first preset value, it is regarded as a normal phenomenon without processing
Accumulative N1 determinations that the water-level rise amount is less than or equal to the first preset value or the water-level fall amount is less than or equal to a second preset value
If the first water-level variation value is negative, the water-level fall amount is greater than the second preset value
Close the water inlet valve for a second preset time, e.g., 2 min, and acquire a second water-level variation value
If the second water-level variation value is negative, i.e., the water-level fall amount is greater than or equal to a third preset value, control the water inlet valve to be closed
If the first water-level variation value is positive and greater than the first preset value, it is regarded as a normal phenomenon without processing
Close the water inlet valve for a third preset time, e.g., 3 min, and acquire the third water-level variation value
N
Third water-level variation value greater than fourth preset value?
Resume water intake for a fourth preset time, and acquire a fourth water-level variation value at intervals of the first preset time
Close the water inlet valve for the third preset time such as 3min, and acquire the third water-level variation value
N
Third water-level variation value greater than fourth preset value?
If the fourth water-level variation value is positive and greater than the first preset value, it is regarded as a normal phenomenon, and control the water inlet valve to be opened continuously
If it is detected for N1 times that the accumulative times of water-level rise amount is less than or equal to the first preset value or the water-level fall amount is less than or equal to the second preset value, control the water inlet valve to be closed and prompt a fault
If the fourth water-level variation value is negative, i.e., the water-level fall amount is greater than the second preset value, control the water inlet valve to Be closed, and send a siphon prompt
Close the water inlet valve for the third preset time such as 3min, and acquire the third water-level variation value
N
Third water-level variation value greater than fourth preset value?
Siphon Alarm

FIG. 2

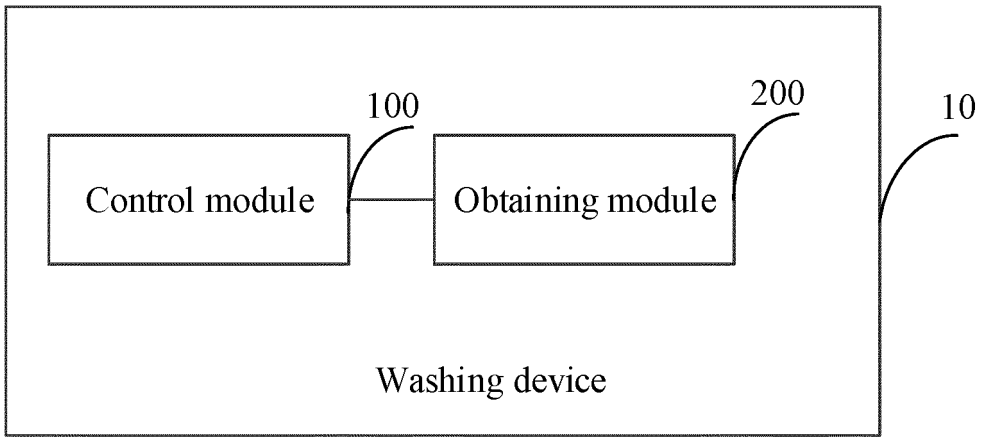
100
200
10
Control module
Obtaining module
Washing device

FIG. 3

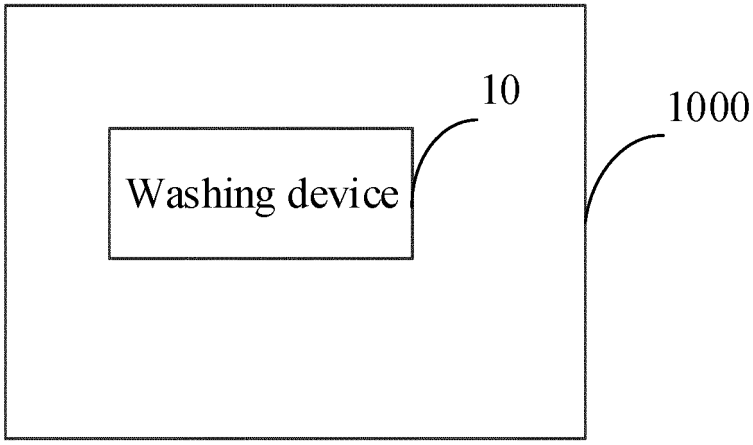
10
1000
Washing device

FIG. 4

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2020/118841

A. CLASSIFICATION OF SUBJECT MATTER

D06F 33/34(2020.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

D06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

SIPOABS, DWPI, CNABS, CNTXT, CNKI: 虹吸, 进水, 供水, 给水, 水位, 排水, 液位, 检测, 感测, water, liquid, level, sens+, detect+, measur+, 飞翎

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 101195953 A (LG ELECTRONICS INC.) 11 June 2008 (2008-06-11) description, page 4 paragraph 3 to page 7 paragraph 3, figures 1-2	1-10
X	CN 110541284 A (QINGDAO HAIER WASHING MACHINE CO., LTD.) 06 December 2019 (2019-12-06) description, paragraphs [0024]-[0025], and figures 1-5	1, 6, 10
X	CN 102587080 A (PANASONIC HOME APPLIANCES R&D CENTER (HANGZHOU) CO., LTD. et al.) 18 July 2012 (2012-07-18) description, paragraphs [0006]-[0032], and figures 1-4	1, 6, 10
A	US 2004040345 A1 (SAMSUNG ELECTRONICS CO., LTD.) 04 March 2004 (2004-03-04) entire document	1-10
A	EP 2712950 A1 (ELECTROLUX HOME PROD CORP.) 02 April 2014 (2014-04-02) entire document	1-10

☐ Further documents are listed in the continuation of Box C. ☑ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
30 April 2021	**19 May 2021**
Name and mailing address of the ISA/CN **China National Intellectual Property Administration (ISA/CN)** **No. 6, Xitucheng Road, Jimenqiao, Haidian District, Beijing 100088** **China**	Authorized officer
Facsimile No. **(86-10)62019451**	Telephone No.

Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2020/118841

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				DE	102007052184	A1	05 June 2008
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				KR	101192342	B1	18 October 2012
				DE	102007052184	B4	16 February 2012
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				PL	2904140	T3	29 September 2017
				WO	2014048771	A1	03 April 2014
				EP	2904140	B1	22 March 2017

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REFERENCES CITED IN THE DESCRIPTION

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