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(54) **METHOD AND APPARATUS FOR DETECTING AMOUNT OF LAUNDRY OF WASHING DEVICE, DEVICE AND STORAGE MEDIUM**

(57) The present application discloses a method and an apparatus for detecting an amount of laundry of a washing device, a device and a storage medium. The method includes: controlling the washing device to be supplied with water to reach a first set water level; controlling the washing device to perform a water supplement washing and acquiring a number of times of water

supplementing and/or an accumulated water supplementing duration during the water supplement washing; and determining a load level corresponding to an amount of laundry of the washing device based on whether the number of times of water supplementing and/or the accumulated water supplementing duration are zero.

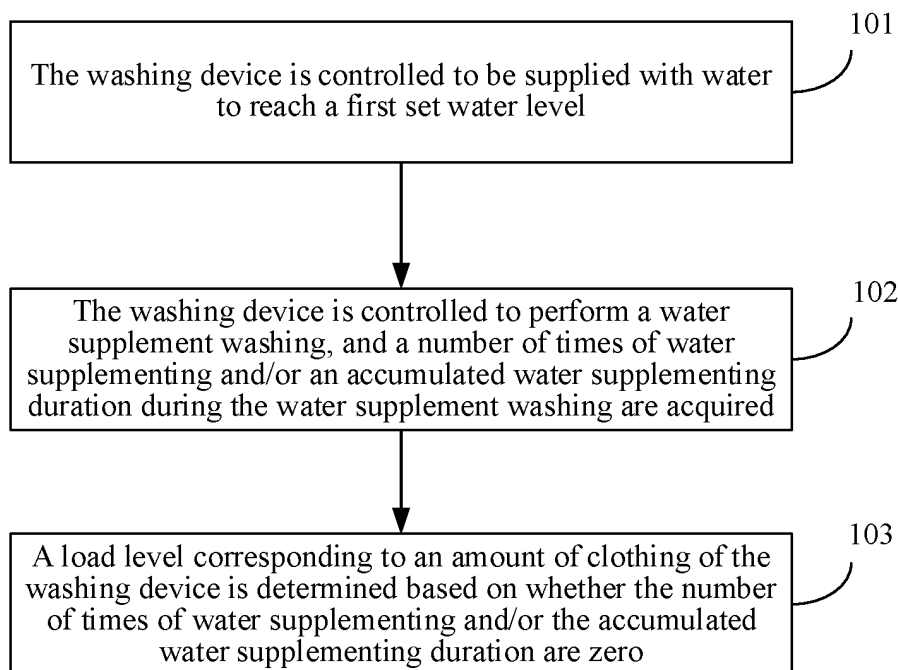


FIG. 1

Description

TECHNICAL FIELD

[0001] The disclosure relates to the field of laundry washing, and in particular to a method and an apparatus for detecting an amount of laundry of a washing device, a device and a storage medium.

BACKGROUND

[0002] A washing device often needs to determine an amount of laundry (also referred to as a load amount) in an inner drum of the washing device when washing the laundry, thereby selecting appropriate water-level grade, washing duration and other washing parameters according to the amount of laundry to achieve the purposes of saving the energy, reducing the emission and improving the washing effect.

[0003] In the relevant art, in order to detect the amount of laundry in the inner drum, the washing device uses the following solutions:

[0004] The first solution: the washing device determines the amount of laundry by collecting an electrical signal of a motor, for example, the washing device determines the amount of laundry based on a working current of the motor.

[0005] The second solution: the washing device determines the amount of laundry based on a number of times of water supplementing and a water supplementing duration in a water supplement washing stage.

[0006] The first solution needs to configure an additional collection circuit, which increases the hardware cost of the washing device. The second solution is limited by the precision of a water level sensor, which results in a limited discrimination for the number of times of water supplementing and the water supplementing duration among different amounts of laundry, thereby causing misjudgment easily.

SUMMARY

[0007] In view of this, the embodiments of the disclosure provide a method and an apparatus for detecting an amount of laundry of a washing device, a device and a storage medium, to improve the precision of detection on the amount of laundry without increasing the hardware cost of the washing device.

[0008] The technical solutions in the embodiments of the disclosure are implemented as follows.

[0009] The embodiments of the disclosure provide a method for detecting an amount of laundry of a washing device, which may include the following operations.

[0010] The washing device is controlled to be supplied with water to reach a first set water level.

[0011] The washing device is controlled to perform a water supplement washing, and a number of times of water supplementing and/or an accumulated water sup-

plementing duration during the water supplement washing are acquired.

[0012] A load level corresponding to an amount of laundry of the washing device is determined based on whether the number of times of water supplementing and/or the accumulated water supplementing duration are zero.

[0013] The first set water level is configured such that when the amount of laundry of the washing device is at a first load level, no water supplementation is required during the water supplement washing, and when the amount of laundry of the washing device is at a second load level, a water supplementation is required during the water supplement washing; and the amount of laundry corresponding to the second load level is greater than that corresponding to the first load level.

[0014] The embodiments of the disclosure further provide an apparatus for detecting an amount of laundry of a washing device, which may include: an initial water supply module, a water supplement washing module and a determination module.

[0015] The initial water supply module is configured to control the washing device to be supplied with water to reach a first set water level.

[0016] The water supplement washing module is configured to control the washing device to perform a water supplement washing, and acquire a number of times of water supplementing and/or an accumulated water supplementing duration during the water supplement washing.

[0017] The determination module is configured to determine, based on whether the number of times of water supplementing and/or the accumulated water supplementing duration are zero, a load level corresponding to an amount of laundry of the washing device.

[0018] The first set water level is configured such that when the amount of laundry of the washing device is at a first load level, no water supplementation is required during the water supplement washing, and when the amount of laundry of the washing device is at a second load level, a water supplementation is required during the water supplement washing; and the amount of laundry corresponding to the second load level is greater than that corresponding to the first load level.

[0019] The embodiments of the disclosure further provide a washing device, which may include: a processor, and a memory configured to store a computer program executable by the processor; and the processor executes steps of the method in any embodiment of the disclosure when the computer program is executed by the processor.

[0020] The embodiments of the disclosure further provide a storage medium having a computer program stored thereon; and steps of the method in any embodiment of the disclosure are implemented when the computer program is executed by a processor.

[0021] According to the technical solutions provided by the embodiments of the disclosure, by setting the first set water level reasonably, when the washing device is

at the first load level, no water supplementation is required during the water supplement washing; and when the washing device is at the second load level, a water supplementation is required during the water supplement washing. Hence, it may be determined whether the amount of laundry of the washing device is at the first load level based on a result on whether the number of times of water supplementing and/or the accumulated water supplementing duration during the water supplement washing are zero, which improves the discrimination between the first load level and the second load level of the washing device, and improves the reliability of detection on the amount of laundry.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022]

FIG. 1 illustrates a flowchart schematic diagram of a method for detecting an amount of laundry of a washing device according to an embodiment of the disclosure.

FIG. 2 illustrates a flowchart schematic diagram of a method for detecting an amount of laundry of a washing device according to an application embodiment of the disclosure.

FIG. 3 illustrates a structural schematic diagram of an apparatus for detecting an amount of laundry of a washing device according to an embodiment of the disclosure.

FIG. 4 illustrates a structural schematic diagram of a washing device according to an embodiment of the disclosure.

DETAILED DESCRIPTION

[0023] The disclosure will be further described below in combination with the accompanying drawings and embodiments.

[0024] Unless otherwise defined, all technical and scientific terms used in the disclosure have a same meaning generally appreciated by a person skilled in the art to which the disclosure belongs. The terms used in the specification of the disclosure are merely to describe the specific embodiments, rather than to limit the disclosure.

[0025] The embodiments of the disclosure provide a method for detecting an amount of laundry of a washing device. The washing device may be a washing machine or a washing-drying integrated machine. For example, the washing device may be a drum type washing machine or an impeller type washing machine. As shown in FIG. 1, the method may include the following operations.

[0026] At 101, the washing device is controlled to be supplied with water to a first set water level.

[0027] Herein, the first set water level is configured

such that when the amount of laundry of the washing device is at a first load level, no water supplementation is required during the water supplement washing, and when the amount of laundry of the washing device is at a second load level, a water supplementation is necessary during the water supplement washing; and the amount of laundry corresponding to the second load level is greater than that corresponding to the first load level. The first set water level may be determined based on tests of washing devices in the same batch.

[0028] In some embodiments, the amount of laundry may be a weight of laundry or a volume of laundry without taking the influence of a material of the laundry into consideration. In order to further improve the precision of detection on the amount of laundry, in some other embodiments, the amount of laundry may be a weight of laundry or a volume of laundry taking the influence of the material of the laundry into consideration. For example, an influencing factor may be set according to water absorbing capacities of different materials. The amount of laundry may be determined according to the influencing factor, the weight of laundry or the volume of laundry.

[0029] Herein, the first set water level may be determined based on an amount of water required by a primary washing at the first load level and an amount of water required by the primary washing at the second load level. The amount of water required by the primary washing at the first load level and the amount of water required by the primary washing at the second load level may be determined according to the corresponding amount of laundry. That is, by controlling an amount of water supply reasonably, the supplied water of the washing device may reach the first set water level.

[0030] Herein, a relationship between the primary washing and the water supplement washing may be appreciated below. A laundry treatment process may include a water supplement washing stage, a primary washing stage, a rinsing stage and a dewatering stage, etc. The water supplement washing is intended to make the amount of water and/or the water level meet the requirement of the primary washing.

[0031] In some embodiments, the operation that the washing device is controlled to be supplied with water to reach the first set water level may include the following operations.

[0032] The washing device is controlled to be supplied with the water to an amount of water supply corresponding to the first set water level, the amount of water supply corresponding to the first set water level being greater than an amount of water required by the primary washing at the first load level, and the amount of water supply corresponding to the first set water level being smaller than an amount of water required by the primary washing at the second load level.

[0033] Herein, the amount of water required by the primary washing refers to an amount of water required during the primary washing of the laundry. The laundry treatment process may include the water supplement washing

stage, the primary washing stage, the rinsing stage and the dewatering stage. The water supplement washing is intended to make the amount of water and/or the water level meet the requirement of the primary washing.

[0034] In an application example, the load level of the washing device includes a light load, a medium load and a heavy load. For example, for a washing machine having a capacity of 8 Kg, the light load may correspond to the amount of laundry < 2 Kg, the medium load may correspond to $2\text{Kg} \leq \text{the amount of laundry} < 4$ Kg, and the heavy load may correspond to the amount of laundry > 4 Kg. Each load level has a corresponding amount of water required by the primary washing. The amount of water required by the primary washing corresponding to the light load is Q2, the amount of water required by the primary washing corresponding to the medium load is Q3, and the amount of water required by the primary washing corresponding to the heavy load is Q4. Supposing that the amount of water supply corresponding to the first set water level L1 is Q1, then $Q2 < Q1 < Q3$.

[0035] In some embodiments, the washing device may control a water supply duration of a water inlet valve, such that the washing device is supplied with the water to reach the first set water level. If the amount of water supply corresponding to the first set water level L1 is Q1, the first set water level L1 may be achieved by controlling the amount of water supply Q1.

[0036] At 102, the washing device is controlled to perform water supplement washing, and a number of times of water supplementing and/or an accumulated water supplementing duration during a water supplement washing are acquired.

[0037] After the washing device is supplied with the water to reach the first set water level, the water supplement washing is started. During the water supplement washing, as the laundry absorbs the water, the water level in the inner drum of the washing device is lowered, and thus it is frequent that the water is supplemented for multiple times. As the lowering of the water level is caused by the absorption of water by the laundry, the lowering of the water level is relevant to the magnitude of the amount of laundry. In the relevant art, as there is a small change amplitude, for example, less than 2 Kg, between the amount of laundry corresponding to the first load level and the amount of laundry corresponding to the second load level, if the load level is determined based on the number of times of water supplementing or the accumulated water supplementing duration and a threshold interval corresponding to the load level, the misjudge occurs frequently.

[0038] In the embodiment of the disclosure, the first set water level may be controlled reasonably such that when the amount of laundry of the washing device is at the first load level, no water supplementation is required during the water supplement washing, and when the amount of laundry of the washing device is at the second load level, a water supplementation is required during the water supplement washing.

[0039] In some embodiments, the operation that the washing device is controlled to perform the water supplement washing and the number of times of water supplementing and/or the accumulated water supplementing duration during the water supplement washing are acquired may include the following operations.

[0040] The washing device is controlled to supplement water until a target supplementing water level is reached in response to a determination that a water level of the washing device is lowered to a second set water level.

[0041] It is determined that the water supplement washing is performed for a set duration, and then the number of times of water supplementing and/or the accumulated water supplementing duration during the water supplement washing are counted.

[0042] The second set water level is smaller than the first set water level, and the target supplementing water level is greater than or equal to the first set water level.

[0043] In an application example, the target supplementing water level may be the first set water level, and a difference value between the first set water level and the second set water level is a water supplementing return difference δ .

[0044] During the water supplement washing, when it is detected by a water level sensor that the water level in the inner drum is lower than the first set water level by $-\delta$, the washing device controls the water inlet valve to be opened so as to supplement the water; and when it is detected by a water level sensor that the water level in the inner drum reaches the first set water level, the washing device controls the water inlet valve to be closed. The above operation is carried out repeatedly until the set duration for the water supplement washing is ended. During the water supplement washing, the washing device may count the number of times of water supplementing by a counter. The washing device may further count the accumulated water supplementing duration by a timer. Herein, the accumulated water supplementing duration may be obtained by timing of a separate timer. In other embodiments, considering that the water supply duration of the washing device when it is supplied with the water to reach the first set water level is approximately same every time, it may be possible to use a timer for counting a total water supply duration to count the accumulated water supplementing duration. That is, the accumulated water supplementing duration of the washing device may be obtained by subtracting the water supply duration when the water reaches the first set water level from a timing result of the timer for counting the total water supply duration.

[0045] In other embodiments, the target supplementing water level may also be greater than the first set water level to reduce the number of times of water supplementing during the water supplement washing.

[0046] At 103, based on whether the number of times of water supplementing and/or the accumulated water supplementing duration are zero, a load level corresponding to an amount of laundry of the washing device

is determined.

[0047] Herein, the washing device may determine whether the amount of laundry of the washing device is at the first load level, based on a result on whether the number of times of water supplementing and/or the accumulated water supplementing duration are zero. If the number of times of water supplementing and/or the accumulated water supplementing duration are zero, it is determined that the amount of laundry of the washing device is at the first load level.

[0048] In an actual application, the detection apparatus has an intrinsic error, and there is a small difference between the amount of laundry for the first load level and the amount of laundry for the second load level. As a result, during the water supplement washing, the water supplementing misjudge occurs due to the intrinsic error of the detection apparatus, and distinguishing the first load level from the second load level based on an amplitude of variation of the number of times of water supplementing and/or the accumulated water supplementing duration has a problem of inconspicuous discrimination. In the embodiment of the disclosure, by setting the first set water level reasonably, when the washing device is at the first load level, no water supplementation is required during the water supplement washing, and when the washing device is at the second load level, a water supplementation is required during the water supplement washing. Hence, it may be determined whether the amount of laundry of the washing device is at the first load level based on the result on whether the number of times of water supplementing and/or the accumulated water supplementing duration during the water supplement washing are zero, which improves the discrimination between the first load level and the second load level, and improves the reliability of detection on the amount of laundry.

[0049] In some embodiments, the operation that the load level corresponding to the amount of laundry of the washing device is determined based on whether the number of times of water supplementing and/or the accumulated water supplementing duration are zero may include the following operations.

[0050] It is determined that the amount of laundry of the washing device is at the first load level in response to a determination that the number of times of water supplementing and/or the accumulated water supplementing duration are zero.

[0051] The load level corresponding to the amount of laundry of the washing device is determined based on the number of times of water supplementing and/or the accumulated water supplementing duration and a set threshold, in response to a determination that the number of times of water supplementing and/or the accumulated water supplementing duration are not zero.

[0052] Herein, the washing device may determine whether the number of times of water supplementing is zero by the counter, and/or whether the accumulated water supplementing duration is zero by the timer.

[0053] In some embodiments, it may be determined that the amount of laundry of the washing device is at the first load level based on the fact that the number of times of water supplementing is zero.

5 **[0054]** In some other embodiments, it may be determined that the amount of laundry of the washing device is at the first load level based on the fact that the accumulated water supplementing duration is zero.

10 **[0055]** In some other embodiments, it may be determined that the amount of laundry of the washing device is at the first load level based on the fact that the number of times of water supplementing is zero and the accumulated water supplementing duration is zero.

15 **[0056]** In some embodiments, the operation that the load level corresponding to the amount of laundry of the washing device is determined based on the number of times of water supplementing and/or the accumulated water supplementing duration and the set threshold may include the following operations.

20 **[0057]** It is determined whether the number of times of water supplementing is greater than or equal to a first number-of-times threshold, and/or whether the accumulated water supplementing duration is greater than or equal to a first duration threshold.

25 **[0058]** If no, i.e., the number of times of water supplementing is smaller than the first number-of-times threshold, and/or the accumulated water supplementing duration is smaller than the first duration threshold, it is determined that the amount of laundry of the washing device is at the second load level.

30 **[0059]** Herein, the first load level and the second load level may be distinguished based on whether the water is supplemented during the water supplement washing. When the washing device further includes an another load level at which the amount of laundry is greater than the amount of laundry at the second load level, a threshold of the corresponding load level may be set. The second load level is distinguished from the another load level based on the threshold.

35 **[0060]** In an embodiment, the washing device further includes a third load level at which the amount of laundry is greater than the amount of laundry at the second load level, and a first number-of-times threshold corresponding to a number of times of water supplementing at the third load level and a first duration threshold corresponding to an accumulated water supplementing duration at the third load level may be determined based on a test.

40 **[0061]** If the number of times of water supplementing counted by the washing device is smaller than the first number-of-times threshold, and/or the accumulated water supplementing duration counted by the washing device is smaller than the first duration threshold, it is determined that the amount of laundry of the washing device does not reach the third load level, and thus it is determined that the amount of laundry of the washing device is at the second load level.

45 **[0062]** If the number of times of water supplementing counted by the washing device is greater than or equal

to the first number-of-times threshold, and/or the accumulated water supplementing duration counted by the washing device is greater than or equal to the first duration threshold, it is determined that the amount of laundry of the washing device reaches the third load level.

[0063] In an actual application, the washing device may determine that the amount of laundry of the washing device reaches the third load level, in response to a determination that the number of times of water supplementing is greater than or equal to the first number-of-times threshold and the accumulated water supplementing duration is greater than or equal to the first duration threshold. In this way, the reliability for determining the load level may be improved.

[0064] In some embodiments, the load levels of the washing device may further include another load level at which the amount of laundry is greater than the amount of laundry at the third load level. For example, the load levels of the washing device further include a fourth load level. A threshold of the fourth load level may be set and the third load level may be distinguished from the fourth load level based on the threshold.

[0065] Herein, a second number-of-times threshold corresponding to a number of times of water supplementing at the fourth load level and a second duration threshold corresponding to an accumulated water supplementing duration at the fourth load level may be determined based on a test. The second number-of-times threshold is greater than the first number-of-times threshold, and the second duration threshold is greater than the first duration threshold.

[0066] The operation that the load level corresponding to the amount of laundry of the washing device is determined based on the number of times of water supplementing and/or the accumulated water supplementing duration and the set threshold may further include the following operations.

[0067] If the number of times of water supplementing is greater than or equal to the first number-of-times threshold, and/or the accumulated water supplementing duration is greater than or equal to the first duration threshold, it is determined whether the number of times of water supplementing is greater than or equal to the second number-of-times threshold, and/or whether the accumulated water supplementing duration is greater than or equal to the second duration threshold.

[0068] If yes, it is determined that the amount of laundry of the washing device is at the fourth load level.

[0069] If no, it is determined that the amount of laundry of the washing device is at the third load level.

[0070] In some embodiments, the method may further include the following operation.

[0071] Based on a determined load level, the washing device is controlled to operate a corresponding washing control procedure.

[0072] As different load levels correspond to different amounts of laundry, when the washing device works, corresponding washing parameters may be set, including

but not limited to: a heating duration, a washing beat, a washing water level, etc. Therefore, the electric energy and washing time may be saved, and the washing efficiency may be improved.

[0073] The disclosure will be further described below in combination with an application embodiment.

[0074] In the application embodiment, the washing device is the drum type washing machine. The washing device includes four load levels at which the amounts of laundry are increased sequentially: a first load level R1, a second load level R2, a third load level R3 and a fourth load level R4. Taking the 8-Kg drum type washing machine as an example, the R1 corresponding to the amount of laundry < 2 Kg, the R2 corresponding to $2 \text{ Kg} \leq$ the amount of laundry < 4 Kg, the R3 corresponding to $4 \text{ Kg} \leq$ the amount of laundry < 6 Kg, and the R4 corresponding to the amount of laundry > 6 Kg may be set. The first set water level is L1, the first number-of-times threshold corresponding to the R3 is c1, and the first duration threshold corresponding to the R3 is t1; and the second number-of-times threshold corresponding to the R4 is c2, and the second duration threshold corresponding to the R4 is t2. As shown in FIG. 2, the method for detecting the amount of laundry of the washing device may include the following operations.

[0075] At 201, the washing device is controlled to be supplied with water to reach the L1.

[0076] Herein, the L1 is greater than an amount of water required by primary washing corresponding to the R1 and is smaller than an amount of water required by primary washing corresponding to the R2, such that when the amount of laundry of the washing device is at the R1, no water supplementation is required during the water supplement washing, and when the amount of laundry of the washing device is at the R2, a water supplementation is required during the water supplement washing.

[0077] At 202, the washing device is controlled to perform water supplement washing, and a number of times of water supplementing and/or an accumulated water supplementing duration during the water supplement washing are acquired.

[0078] During the water supplement washing, the washing device has a water supplementing return difference of δ . When it is detected by the water level sensor that the water level in the inner drum is lower than the L1 by $-\delta$, the washing device controls the water inlet valve to be opened to supplement the water; and when it is detected by the water level sensor that the water level in the inner drum reaches the L1, the washing device controls the water inlet valve to be closed. The operation is repeated until the set duration corresponding to the water supplement washing is ended. During the water supplement washing, the washing device may count the number of times of water supplementing the counter, and count the accumulated water supplementing duration by the timer.

[0079] At 203, it is determined whether the number of times of water supplementing and the accumulated water

supplementing duration are zero; if yes, 204 is performed; and if no, 205 is performed.

[0080] At 204, it is determined that the amount of laundry of the washing device is at the R1, and then a washing procedure corresponding to the R1 is executed.

[0081] At 205, it is determined whether the number of times of water supplementing is greater than or equal to the c1, and whether the accumulated water supplementing duration is greater than or equal to the t1; if no, 206 is performed; and if yes, 207 is performed.

[0082] At 206, it is determined that the amount of laundry of the washing device is at the R2, and then a washing procedure corresponding to the R2 is executed.

[0083] At 207, it is determined whether the number of times of water supplementing is greater than or equal to the c2, and whether the accumulated water supplementing duration is greater than or equal to the t2; if no, 208 is performed; and if yes, 209 is performed.

[0084] At 208, it is determined that the amount of laundry of the washing device is at the R3, and then a washing procedure corresponding to the R3 is executed.

[0085] At 209, it is determined that the amount of laundry of the washing device is at the R4, and then a washing procedure corresponding to the R4 is executed.

[0086] Therefore, the method for detecting the amount of laundry of the washing device provided by the embodiments of the disclosure may determine whether the amount of laundry of the washing device is at the R1 based on a result on whether the number of times of water supplementing and the accumulated water supplementing duration during the water supplement washing are zero. In this way, the discrimination between the R1 and the R2 of the washing device and the reliability of detection on the amount of laundry may be improved. Moreover, no additional collection circuit is provided, such that the hardware cost of the washing device is saved.

[0087] In order to implement the method in the embodiments of the disclosure, the embodiments of the disclosure further provides an apparatus for detecting an amount of laundry of a washing device. The apparatus for detecting the amount of laundry of the washing device corresponds to the above method for detecting the amount of laundry of the washing device. Each step in the embodiment of the method for detecting the amount of laundry of the washing device is also completely adapted to the embodiment of the apparatus for detecting the amount of laundry of the washing device.

[0088] As shown in FIG. 3, the apparatus for detecting the amount of laundry of the washing device may include: an initial water supply module 301, a water supplement washing module 302 and a determination module 303. The initial water supply module 301 is configured to control the washing device to be supplied with water to reach a first set water level; the water supplement washing module 302 is configured to control the washing device to perform a water supplement washing, and acquire the number of times of water supplementing and/or an ac-

cumulated water supplementing duration during the water supplement washing; and the determination module 303 is configured to determine, based on whether the number of times of water supplementing and/or the accumulated water supplementing duration are zero, a load level corresponding to an amount of laundry of the washing device.

[0089] Herein, the first set water level is configured such that when the amount of laundry of the washing device is at a first load level, no water supplementation is required during the water supplement washing, and when the amount of laundry of the washing device is at a second load level, a water supplementation is required during the water supplement washing. The amount of laundry corresponding to the second load level is greater than that corresponding to the first load level.

[0090] In some embodiments, the determination module 303 is specifically configured to determine the amount of laundry of the washing device is at the first load level in response to a determination that the number of times of water supplementing and/or the accumulated water supplementing duration are zero.

[0091] In some embodiments, the determination module 303 is specifically configured to determine that the amount of laundry of the washing device is at the second load level in response to a determination that the number of times of water supplementing is smaller than a first number-of-times threshold and/or the accumulated water supplementing duration is smaller than a first duration threshold.

[0092] In some embodiments, the determination module 303 is specifically configured to determine that the amount of laundry of the washing device is at a third load level in response to a determination that the number of times of water supplementing is greater than or equal to a first number-of-times threshold and/or the accumulated water supplementing duration is greater than or equal to a first duration threshold.

[0093] The amount of laundry corresponding to the third load level is greater than that corresponding to the second load level.

[0094] In some embodiments, the determination module 303 is specifically configured to determine that the amount of laundry of the washing device is at a fourth load level, in response to a determination that the number of times of water supplementing is greater than or equal to a first number-of-times threshold, and/or the accumulated water supplementing duration is greater than or equal to a first duration threshold, and in response to a determination that the number of times of water supplementing is greater than or equal to a second number-of-times threshold, and/or the accumulated water supplementing duration is greater than or equal to a second duration threshold.

[0095] The second number-of-times threshold is greater than the first number-of-times threshold, the second duration threshold is greater than the first duration threshold, the amount of laundry corresponding to the third load

level is greater than that corresponding to the second load level, and the amount of laundry corresponding to the fourth load level is greater than that corresponding to the third load level.

[0096] In some embodiments, the water supplement washing module 302 is specifically configured to control the washing device to supplement water until a target supplementing water level is reached, in response to a determination that a water level of the washing device is lowered to a second set water level; and count the number of times of water supplementing and/or the accumulated water supplementing duration during the water supplement washing, in response to a determination that the washing of the water supplement washing is performed for a set duration.

[0097] The second set water level is smaller than the first set water level, and the target supplementing water level is greater than or equal to the first set water level.

[0098] In some embodiments, the apparatus for detecting the amount of laundry of the washing device may further include an operation module 304.

[0099] The operation module 304 is configured to control, based on a determined load level, the washing device, to operate a corresponding washing control procedure.

[0100] In an actual application, the initial water supply module 301, the water supplement washing module 302, the determination module 303 and the operation module 304 may be implemented by a processor in the apparatus for detecting the amount of laundry of the washing device. The processor may operate a computer program in a memory to implement the function.

[0101] It is to be noted that when the apparatus for detecting the amount of laundry of the washing device provided by the above embodiment detects the amount of laundry of the washing device, each program module is merely an illustrative example. In an actual application, the above processing may be carried out by different program modules as required. That is, an internal structure of the apparatus is composed of different program modules to complete all or a part of processing described above. In addition, the apparatus for detecting the amount of laundry of the washing device provided by the above embodiment has a same concept as the method for detecting the amount of laundry of the washing device, and a specific implementation process of the apparatus is described in detail in the method embodiment and will no longer be repeated herein.

[0102] Based on hardware implementation of the program module, and in order to implement the method in the embodiments of the disclosure, the embodiments of the disclosure further provide a washing device. FIG. 4 only illustrates an exemplary structure, rather than a whole structure, of the washing device. The whole structure or a part of the structure shown in FIG. 4 may be implemented as required.

[0103] As shown in FIG. 4, the washing device 400 provided by the embodiments of the disclosure may in-

clude: at least one processor 401, a memory 402 and a user interface 404. Elements in the washing device 400 are coupled together via a bus system 403. It may be appreciated that the bus system 403 is configured to implement connection and communication among these elements. In addition to a data bus, the bus system 403 may further include a power bus, a control bus and a state signal bus. For the purpose of clarity, each bus in FIG. 4 is labeled as the bus system 403.

[0104] A user interface 404 may include a display, a keypad, a mouse, a trackball, a click wheel, a key, a button, a touch panel or a touch screen, etc.

[0105] In the embodiment of the disclosure, the memory 402 is configured to store various types of data to support the operation of the washing device. Examples of such data include any computer program operated on the washing device.

[0106] The method for detecting the amount of laundry of the washing device disclosed in the embodiment of the disclosure may be applied to the processor 401, or may be implemented by the processor 401. The processor 401 may be an integrated circuit chip, and has a signal processing capability. During implementation, each step of the method for detecting the amount of laundry of the washing device may be completed by means of an instruction in a form of an integrated logic circuit of hardware in the processor 401 or in a form of software. The processor 401 may be a universal processor, a Digital Signal Processor (DSP), or another programmable logic device, a separate gate or transistor logic device, a separate hardware component and the like. The processor 401 may implement or execute methods, steps or logic block diagrams disclosed in the embodiments of the disclosure. The universal processor may be a microprocessor, or any conventional processor, etc. The steps of the method disclosed in combination with the embodiments of the disclosure may be directly performed by a hardware decoding processor, or by a combination of hardware and software modules in the decoding processor. The software module may be located in a storage medium. The storage medium is located in the memory 402. The processor 401 reads information in the memory 402, and completes the steps of the method for detecting the amount of laundry of the washing device provided by the embodiments of the disclosure in combination with hardware.

[0107] In an exemplary embodiment, the washing device may be implemented by one or more of an Application Specific Integrated Circuit (ASIC), a DSP, a Programmable Logic Device (PLD), a Complex Programmable Logic Device (CPLD), a Field Programmable Gate Array (FPGA), a universal processor, a controller, a Micro Controller Unit (MCU), a microprocessor, or other electronic components, to execute the above mentioned method.

[0108] It may be appreciated that the memory 402 may be a volatile memory or a nonvolatile memory, and may also include both the volatile memory and the nonvolatile

memory. The nonvolatile memory may be a Read Only Memory (ROM), a Programmable Read-Only Memory (PROM), an Erasable Programmable Read-Only Memory (EPROM), an Electrically Erasable Programmable Read-Only Memory (EEPROM), a Ferromagnetic Random Access Memory (FRAM), a flash memory, a magnetic surface memory, an optical disc or a Compact Disc Read-Only Memory (CD-ROM). The magnetic surface memory may be a magnetic disk memory or magnetic tape memory. The volatile memory may be a Random Access Memory (RAM), which serves as an external high-speed cache. By illustrative but not limited description, many forms of RAMs may be available, for example, a Static Random Access Memory (SRAM), a Synchronous Static Random Access Memory (SSRAM), a Dynamic Random Access Memory (DRAM), a Synchronous Dynamic Random Access Memory (SDRAM), a Double Data Rate Synchronous Dynamic Random Access Memory (DDRSDRAM), an Enhanced Synchronous Dynamic Random Access Memory (ESDRAM), a SyncLink Dynamic Random Access Memory (SLDRAM), and a Direct Rambus Random Access Memory (DRRAM). The memory described in the embodiment of the disclosure includes but not limited to these and any other appropriate types of memories.

[0109] In an exemplary embodiment, the embodiments of the disclosure further provide a storage medium, for example, a computer storage medium, which in particular may be a computer readable storage medium including, for example, the memory 402 for storing a computer program. The computer program may be processed by the processor 401 of the washing device to complete the steps of the method in the embodiments of the disclosure. The computer readable storage medium may be memories such as an ROM, a PROM, an EPROM, an EEPROM, a Flash Memory, a magnetic surface memory, an optical disk, or a D-ROM.

[0110] It is to be noted that, the terms such as "first" and "second" are only used to distinguish similar objects, rather than to describe a special order or a precedence order.

[0111] Additionally, the technical solutions described in the embodiments of the disclosure may be freely combined without conflicts.

Claims

1. A method for detecting an amount of laundry of a washing device, comprising:

controlling (101) the washing device to be supplied with water to reach a first set water level; controlling (102) the washing device to perform a water supplement washing, and acquiring a number of times of water supplementing and/or an accumulated water supplementing duration during the water supplement washing; and

determining (103) a load level corresponding to an amount of laundry of the washing device, based on whether the number of times of water supplementing and/or the accumulated water supplementing duration are zero;

wherein the first set water level is configured such that when the amount of laundry of the washing device is at a first load level, no water supplementation is required during the water supplement washing, and when the amount of laundry of the washing device is at a second load level, a water supplementation is required during the water supplement washing; the amount of laundry corresponding to the second load level being greater than the amount of laundry corresponding to the first load level.

2. The method of claim 1, wherein controlling the washing device to be supplied with water to reach a first set water level comprises:

controlling the washing device to be supplied with water to reach an amount of water supply corresponding to the first set water level, the amount of water supply corresponding to the first set water level being greater than an amount of water required by a primary washing at the first load level, and the amount of water supply corresponding to the first set water level being smaller than an amount of water required by the primary washing at the second load level.

3. The method of claim 1, wherein determining the load level corresponding to the amount of laundry of the washing device based on whether the number of times of water supplementing and/or the accumulated water supplementing duration are zero comprises:

determining (204) that the amount of laundry of the washing device is at the first load level in response to a determination that the number of times of water supplementing and/or the accumulated water supplementing duration are zero.

4. The method of claim 1, wherein the determining the load level corresponding to the amount of laundry of the washing device based on whether the number of times of water supplementing and/or the accumulated water supplementing duration are zero comprises:

determining a load level corresponding to the amount of laundry of the washing device based on the times of number of water supplementing and/or the accumulated water supplementing duration and a set threshold, in response to a determination that the number of times of water supplementing and/or the accumulated water supplementing duration are not zero.

5. The method of claim 4, wherein determining the load level corresponding to the amount of laundry of the washing device based on the number of times of water supplementing and/or the accumulated water supplementing duration and the set threshold comprises:
- determining (206) that the amount of laundry of the washing device is at the second load level, in response to a determination that the number of times of water supplementing is smaller than a first number-of-times threshold and/or the accumulated water supplementing duration is smaller than a first duration threshold.
6. The method of claim 4, wherein determining the load level corresponding to the amount of laundry of the washing device based on the number of times of water supplementing and/or the accumulated water supplementing duration and the set threshold further comprises:
- determining (208) that the amount of laundry of the washing device is at a third load level, in response to a determination that the number of times of water supplementing is greater than or equal to a first number-of-times threshold and/or the accumulated water supplementing duration is greater than or equal to a first duration threshold; and
- wherein the amount of laundry corresponding to the third load level is greater than the amount of laundry corresponding to the second load level.
7. The method of claim 4, wherein determining the load level corresponding to the amount of laundry of the washing device based on the number of times of water supplementing and/or the accumulated water supplementing duration and the set threshold further comprises:
- determining (209) that the amount of laundry of the washing device is at a fourth load level, in response to a determination that the number of times of water supplementing is greater than or equal to a first number-of-times threshold and/or the accumulated water supplementing duration is greater than or equal to a first duration threshold, and to a determination that the number of times of water supplementing is greater than or equal to a second number-of-times threshold and/or the accumulated water supplementing duration is greater than or equal to a second duration threshold; and
- wherein the second number-of-times threshold is greater than the first number-of-times threshold, the second duration threshold is greater than the first duration threshold, the amount of laundry corresponding to the third load level is greater than the amount of laundry corresponding to the second load level, and the amount of laundry corresponding to the fourth load level is greater than the amount of laundry corresponding to the third load level.
8. The method of claim 1, wherein controlling the washing device to perform the water supplement washing and acquiring the number of times of water supplementing and/or the accumulated water supplementing duration during the water supplement washing comprise:
- controlling the washing device to supplement water until a target supplementing water level is reached, in response to a determination that a water level of the washing device is lowered to a second set water level; and
- counting the number of times of water supplementing and/or the accumulated water supplementing duration during the water supplement washing, in response to a determination that the water supplement washing is performed for a set duration; and
- wherein the second set water level is smaller than the first set water level, and the target supplementing water level is greater than or equal to the first set water level.
9. The method of claim 1, wherein the method further comprises:
- controlling the washing device to operate a corresponding washing control procedure based on a determined load level.
10. An apparatus for detecting an amount of laundry of a washing device, comprising:
- an initial water supply module (301), configured to control the washing device to be supplied with water to reach a first set water level;
- a water supplement washing module (302), configured to control the washing device to perform a water supplement washing, and acquire a number of times of water supplementing and/or an accumulated water supplementing duration during the water supplement washing; and
- a determination module (303), configured to determine, based on whether the number of time of water supplementing and/or the accumulated water supplementing duration are zero, a load level corresponding to an amount of laundry of the washing device,
- wherein the first set water level is configured such that when the amount of laundry of the washing device is at a first load level, no water supplementation is required during the water supplement washing, and when the amount of

laundry of the washing device is at a second load level, a water supplementation is required during the water supplement washing; and wherein the amount of laundry corresponding to the second load level is greater than the amount of laundry corresponding to the first load level.

11. A washing device (400), comprising a processor (401), and a memory (402) configured to store a computer program executable by the processor, wherein the processor configured to execute steps of the method of any one of claims 1 to 9 when the computer program is executed by the processor.
12. A storage medium (402) having a computer program stored thereon, wherein steps of the method of any one of claims 1 to 9 are implemented when the computer program is executed by a processor.

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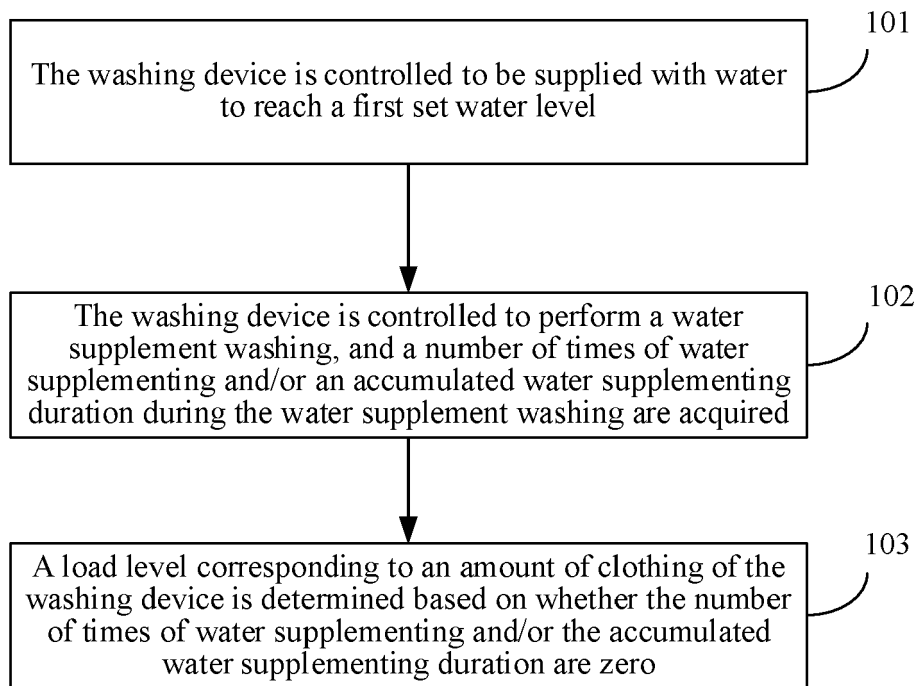


FIG. 1

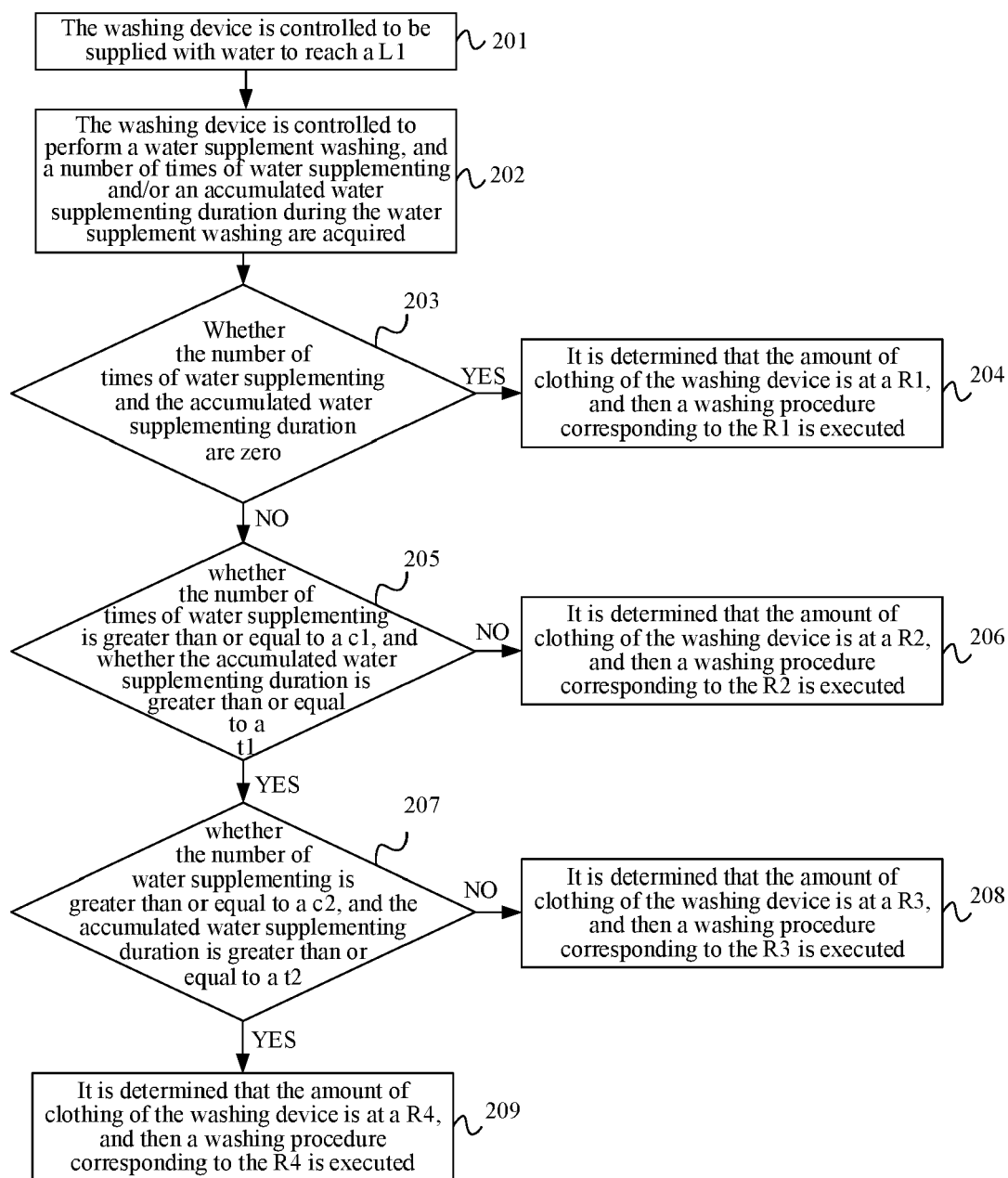


FIG. 2

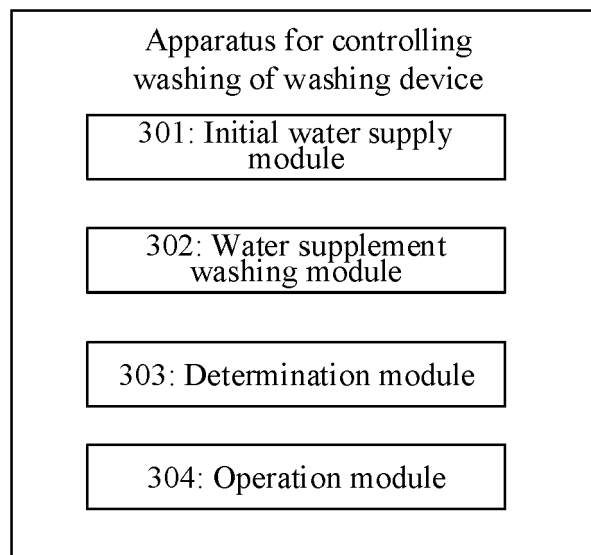


FIG. 3

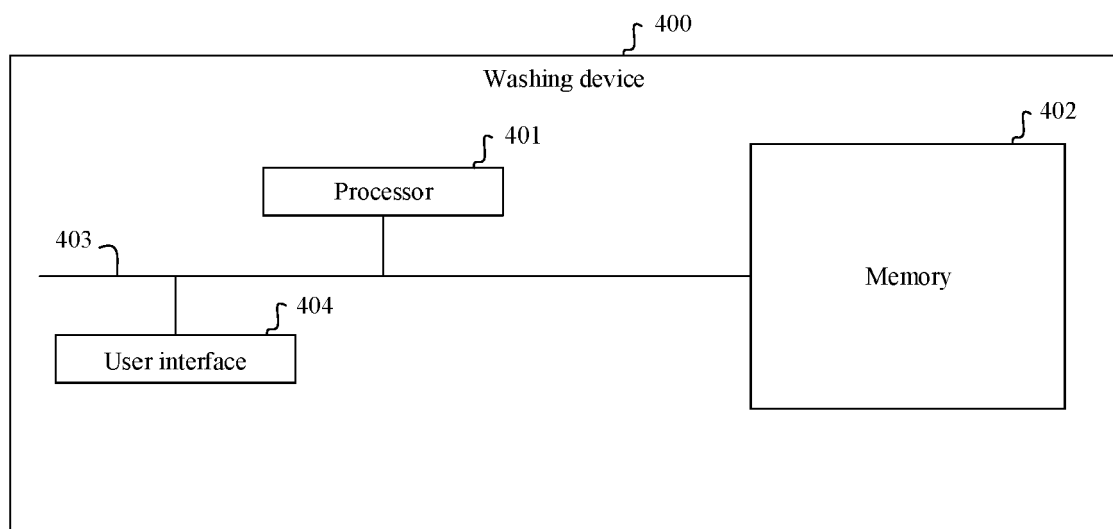


FIG. 4



EUROPEAN SEARCH REPORT

 Application Number
 EP 20 19 2662

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Place of search Munich		Date of completion of the search 22 January 2021	Examiner Werner, Christopher
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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