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

(11) **EP 3 951 042 A1**

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

(43) Date of publication:
09.02.2022 Bulletin 2022/06

(21) Application number: **19921000.6**

(22) Date of filing: **14.05.2019**

(51) International Patent Classification (IPC):
D06F 33/00 *(2020.01)*

(52) Cooperative Patent Classification (CPC):
D06F 33/00

(86) International application number:
PCT/CN2019/086902

(87) International publication number:
WO 2020/191886 (01.10.2020 Gazette 2020/40)

(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: **27.03.2019 CN 201910237463**
27.03.2019 CN 201910237450

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(54) LAUNDRY TREATMENT DEVICE, CONTROL METHOD, CONTROL SYSTEM, AND READABLE STORAGE MEDIUM

(57) A laundry treatment device, a control method, a control system and a readable storage medium. The control method for a laundry treatment device comprises: controlling a motor of a laundry treatment device to operate in a washing cycle; acquiring an operating state of the motor, when it is determined that the motor stops rotating, acquiring a water level of an outer drum of the laundry treatment device; and when it is determined that the water level is lower than a first water level, controlling a water inlet valve of the laundry treatment device to open. The control method takes advantage of the phase in which the motor stops rotating in the washing process to detect the water level and refill the water, such that, a separate water-refill washing phase is canceled, reducing the washing time, and moreover, the time period when the motor stops rotating is rationally used, further reducing the washing time, and guaranteeing the washing operation time as much as possible; in addition, the water level sensing is accurate, avoiding frequent water refilling, thereby effectively improving the washing efficiency and the cleaning effect.

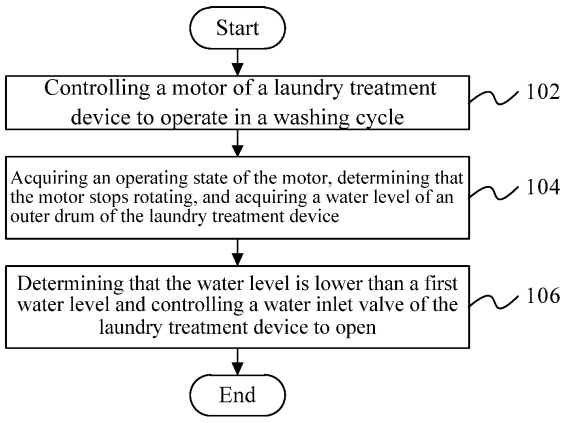

FIG. 1

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Description

[0001] The present application claims priority to Chinese Patent Application NO. 201910237463.2, filed on March 27, 2019 and entitled "LAUNDRY TREATMENT DEVICE, CONTROL METHOD, CONTROL SYSTEM, AND READABLE STORAGE MEDIUM", and Chinese Patent Application NO. 201910237450.5, filed on March 27, 2019 and entitled "LAUNDRY TREATMENT DEVICE, CONTROL METHOD, CONTROL SYSTEM, AND READABLE STORAGE MEDIUM", the disclosures of which are hereby incorporated by reference in its entirety.

TECHNICAL FIELD

[0002] The present application relates to the technical field of laundry treatment devices, and in particular to a control method for a laundry treatment device, a computer readable storage medium, a control system of a laundry treatment device, a control system for a laundry treatment device, and a laundry treatment device.

BACKGROUND

[0003] To improve the cleaning effect of an existing drum washing machine, a water-refill washing phase is generally added before main washing. If water refilling is actuated, the washing operation time can be certainly increased, but the water level sensing is inaccurate. The water refilling end time is determined according to a water level, and therefore, inaccurate water level sensing possibly causes stopping if water is not refilled sufficiently, resulting in frequent water refilling, which is not conducive to cleaning.

SUMMARY

[0004] The present application aims to solve at least one of the technical problems existing in the prior art or a related art.

[0005] According to a first aspect of the present application, a control method for a laundry treatment device is disclosed.

[0006] According to a second aspect of the present application, a computer readable storage medium is disclosed.

[0007] According to a third aspect of the present application, a control system for a laundry treatment device is disclosed.

[0008] According to a fourth aspect of the present application, a control system for a laundry treatment device is disclosed.

[0009] According to a fifth aspect of the present application, a laundry treatment device is disclosed.

[0010] According to a sixth aspect of the present application, a laundry treatment device is disclosed.

[0011] In view of this, a first aspect of the present application provides a control method for a laundry treatment device, including: controlling a motor of the laundry treatment device to operate in a washing cycle; acquiring an operating state of the motor, determining that the motor stops rotating, and acquiring a water level of an outer drum of the laundry treatment device; and determining that the water level is lower than a first water level, and controlling a water inlet valve of the laundry treatment device to open.

[0012] According to the control method for the laundry treatment device provided in the present application, the motor of the laundry treatment device is controlled to operate in the washing cycle, such that an inner drum of the laundry treatment device is driven to rotate for washing; in the washing process, the operating state of the motor is acquired, and when the motor stops rotating, the water level of the outer drum is acquired; when the motor stops rotating, whether the water level of the outer drum is lower than the first water level or not is judged; and when the water level of the outer drum is lower than the first water level, the water inlet valve of the laundry treatment device is controlled to open for refilling water. The control method in the present application takes advantage of the phase in which the motor stops rotating in the washing process to detect the water level and refill the water, such that, a separate water-refill washing phase is canceled, reducing the washing time, and moreover, the time period when the motor stops rotating is rationally used, further reducing the washing time, and guaranteeing the washing operation time as much as possible; in addition, the water level sensing is accurate, avoiding frequent water refilling, thereby effectively improving the washing efficiency and the cleaning effect.

[0013] The first water level is a preset value; when the water level in the outer drum is lower than the first water level, water refilling is needed, and the first water level can be specifically set according to an empirical value.

[0014] The control method for the laundry treatment device provided in the present application further has the following technical characteristics:

In the technical solution, in the process of controlling the water inlet valve to open until the water inlet valve is closed, the motor stops rotating.

[0015] In the technical solution, accuracy of water level detection can be improved by controlling the motor to be kept in a state of stopping rotating in a water refilling process, thereby avoiding stopping if the water is not refilled sufficiently and frequent water refilling.

[0016] In any of the technical solutions, the control method further includes: determining that the water level reaches a second water level, controlling the water inlet valve to close and controlling the motor to operate in the washing cycle, wherein the second water level is greater than or equal to the first water level.

[0017] In the technical solution, the second water level is a preset value, the motor is controlled to be kept in a state of stopping after the laundry treatment device starts refilling water, and the water level of the outer drum is monitored to control the water refilling process according

to the second water level. When the water level reaches the second water level, the water inlet valve is controlled to close for stopping water refilling. Meanwhile, the motor is controlled to operate in the washing cycle, such that the inner drum is driven to rotate for continuously washing. The second water level is a set water level at which water refilling is accomplished, the second water level is not smaller than the first water level, and the second water level is greater than the first water level, such that frequent water refilling can be avoided. The second water level can be specifically set according to the empirical value. According to the control method provided in the present application, washing operation is not performed during water refilling, such that water level sensing is accurate, thereby avoiding frequent water refilling and improving the cleaning effect. Meanwhile, a water-level-controlled water refilling process can be accomplished according to set water refilling, the control logics is simple and the water level of the outer drum is ensured to meet washing needs, thereby improving the washing efficiency and the cleaning effect.

[0018] In any of the technical solutions, the washing cycle is rotating for a first duration and stopping for a second duration.

[0019] In the technical solution, the washing cycle of the motor is limited, specifically, the motor rotates for the first duration (named as an on phase) and stops for the second duration (named as an off phase), which may be one washing cycle. In the washing process, the motor operates in the washing cycle. In the on phase of the washing cycle, the water level is not detected and water refilling is not performed; only in the off phase, the water level of the outer drum is detected, and the water inlet valve is controlled to open for water refilling when the water level is lower than the first water level.

[0020] In any of the technical solutions, controlling the motor of the laundry treatment device to operate in the washing cycle specifically includes: controlling the motor of the laundry treatment device to operate with an operation rotation speed in the washing cycle.

[0021] In the technical solution, the motor operates with the operation rotation speed in the washing cycle in the washing process, specifically, the motor rotates with the operation rotation speed and stops for the second duration while rotating for the first duration every time.

[0022] In any of the technical solutions, the operation rotation speed is not lower than 30 revolutions per minute and is not higher than 60 revolutions per minute.

[0023] In the technical solution, the operation rotation speed is limited, and specifically, the operation rotation speed is not lower than 30 revolutions per minute and is not higher than 60 revolutions per minute. Based on the operation rotation speed, the motor drives the inner drum to rotate for forming the lift-up and drop washing effect on the laundries. In the lift-up and drop washing process, the phase in which the motor stops rotating is used to detect the water level and refill the water. In the water refilling process, the motor is ensured to stop rotating, reducing the washing time and making water level sensing accurate, thereby avoiding frequent water refilling, guaranteeing the washing operation time as much as possible, and effectively improving the washing efficiency and the cleaning effect.

[0024] In any of the technical solutions, the control method for the laundry treatment device further includes: controlling the laundry treatment device to perform a main washing phase in an alternating mode of lift-up and drop washing and drum-rotating washing, wherein the main washing phase includes a first lift-up and drop washing process and a second lift-up and drop washing process. Controlling the motor to operate with the operation rotation speed in the washing cycle specifically includes: controlling the motor to perform the first lift-up and drop washing process with the first rotation speed in the first washing cycle, and controlling the motor to perform the second lift-up and drop washing process with the second rotation speed in the second washing cycle, wherein the first washing cycle is different from the second washing cycle.

[0025] In the technical solution, the laundry treatment device is controlled to perform the main washing phase in an alternating mode of lift-up and drop washing and drum-rotating washing, and the main washing phase includes a first lift-up and drop washing process and a second lift-up and drop washing process. The first lift-up and drop washing process and the second lift-up and drop washing process are a washing phase between a phase in which water feeding is ended and a phase in which drum-rotating washing starts, or a washing phase between a phase in which current drum-rotating washing is ended and a phase in which next drum-rotating washing starts. Meanwhile, the variation of the washing cycle is improved, such that the motor respectively performs the first lift-up and drop washing process and the second lift-up and drop washing process in different washing cycles (namely the first washing cycle and the second washing cycle). Through the control method for the laundry treatment device provided in the present application, the whole washing process does not need to heat washing water, thereby avoiding damages to the laundries of a high temperature and reducing energy consumption. Meanwhile, an alternating washing mode of multi-washing-cycle washing and high-speed drum-rotating washing is adopted, such that the washing efficiency and the cleaning effect are effectively improved.

[0026] In any of the technical solutions, the main washing phase further includes a third lift-up and drop washing process. Controlling the motor to operate with the operation rotation speed in the washing cycle specifically includes: controlling the motor to perform the third lift-up and drop washing process with the third rotation speed in the third washing cycle, wherein the third washing cycle is different from the first washing cycle and the second washing cycle.

[0027] In the technical solution, the main washing phase further includes the third lift-up and drop washing

process in which the motor operates with the third rotation speed in the third washing cycle, wherein the third washing cycle is different from the first washing cycle and the second washing cycle. As a result, three different washing cycles can be adopted to respectively perform the first, second and third lift-up and drop washing processes, such that the variation of the washing cycles is further improved, thereby improving the washing efficiency and the cleaning effect.

[0028] The first washing cycle, the first rotation speed, the second washing cycle, the second rotation speed, the third washing cycle and the third rotation speed are all preset value; as long as the first washing cycle, the second washing cycle and the third washing cycle are different, the laundry treatment device alternatively washes in multiple nodes, which can be realized.

[0029] In any of the technical solutions, the control method for the laundry treatment device further includes: acquiring an operating state of the motor when the first lift-up and drop washing process, the second lift-up and drop washing process and the third lift-up and drop washing process are performed, and determining that the motor stops rotating; acquiring a water level of an outer drum, determining that the water level is lower than a first water level, and controlling a water inlet valve to open.

[0030] In the technical solution, water-refill monitoring is performed in the lift-up and drop washing processes of the main washing phase, and specifically, the water level of the outer drum is obtained when the motor stops rotating; when the motor stops rotating, whether the water level of the outer drum is lower than the first water level or not is judged; and when the water level of the outer drum is lower than the first water level, the water inlet valve of the laundry treatment device is controlled to open for refilling water. In such a manner, the water level of the outer drum can be ensured to meet the washing needs, such that the washing efficiency and the cleaning effect are improved.

[0031] In any of the technical solutions, the control method for the laundry treatment device further includes: controlling a heating device of the laundry treatment device to switch off in a process of controlling the laundry treatment device to perform the main washing phase in an alternating mode of lift-up and drop washing and drum-rotating washing.

[0032] In the technical solution, the purpose of not heating washing water is achieved by controlling the heating device of the laundry treatment device to switch off in the main washing phase, thereby avoiding damages to the laundries of the high temperature and reducing energy consumption; and meanwhile, an alternating washing mode of multi-washing-cycle washing and high-speed drum-rotating washing is adopted, such that the washing efficiency and the cleaning effect are effectively improved.

[0033] A second aspect of the present application provides a computer readable storage medium having stored therein a computer program. When executed by a processor, the computer program performs the control method for the laundry treatment device according to any of the technical solutions. As a result, the computer readable storage medium achieves all beneficial effects of the control method for the laundry treatment device according to any of the technical solutions.

[0034] A third aspect of the present application provides a control system of a laundry treatment device, including a memory, a processor and a computer program stored in the memory and configured to be capable of running on the processor, and when executed by the processor, the computer program performs the control method for the laundry treatment device according to any of the technical solutions. As a result, the control system for the laundry treatment device achieves all beneficial effects of the control method for the laundry treatment device according to any of the technical solutions.

[0035] A fourth aspect of the present application provides a control system for a laundry treatment device, including: a control unit configured to control a motor of the laundry treatment device to operate in a washing cycle; an acquisition unit configured to acquire an operating state of the motor, determine that the motor stops rotating and acquire a water level of an outer drum of the laundry treatment device; and a control unit configured to determine that the water level is lower than a first water level and control a water inlet valve of the laundry treatment device to open.

[0036] According to the control system for the laundry treatment device provided in the present application, the motor of the laundry treatment device is controlled to operate in the washing cycle, such that an inner drum of the laundry treatment device is driven to rotate for washing; in the washing process, the operating state of the motor is acquired, and when the motor stops rotating, the water level of the outer drum is acquired; when the motor stops rotating, whether the water level of the outer drum is lower than the first water level or not is judged; and when the water level of the outer drum is lower than the first water level, the water inlet valve of the laundry treatment device is controlled to open for refilling water. The control system for the laundry treatment device in the present application takes advantage of the phase in which the motor stops rotating in the washing process to detect the water level and refill the water, such that, a separate water-refill washing phase is canceled, reducing the washing time, and moreover, the time period when the motor stops rotating is rationally used, further reducing the washing time, and guaranteeing the washing operation time as much as possible; and meanwhile, the water level sensing is accurate, avoiding frequent water refilling, thereby effectively improving the washing efficiency and the cleaning effect.

[0037] The first water level is a preset value; when the water level in the outer drum is lower than the first water level, water refilling is needed, and the first water level can be specifically set according to an empirical value.

[0038] In the technical solution, in the process of con-

trolling the water inlet valve to open until the water inlet valve is closed, the motor stops rotating.

[0039] In the technical solution, accuracy of water level detection can be improved by controlling the motor to be kept in a state of stopping rotating in a water refilling process, thereby avoiding stopping if the water is not refilled sufficiently and frequent water refilling.

[0040] In the technical solution, the control unit is further configured to determine that the water level reaches the second water level, control the water inlet valve to close and control the motor to drive the inner drum to wash in the washing cycle, wherein the second water level is greater than or equal to the first water level.

[0041] In the technical solution, the second water level is a preset value, the motor is controlled to be kept in a state of stopping after the laundry treatment device starts refilling water, and the water level of the outer drum is monitored to control the water refilling process according to the second water level. When the water level reaches the second water level, the water inlet valve is controlled to close for stopping water refilling. Meanwhile, the motor is controlled to operate in the washing cycle, such that the inner drum is driven to rotate for continuously washing. The second water level is a set water level at which water refilling is accomplished, the second water level is not smaller than the first water level, and the second water level is greater than the first water level, such that frequent water refilling can be avoided. The second water level can be specifically set according to the empirical value. According to the control method provided in the present application, washing operation is not performed during water refilling, such that water level sensing is accurate, thereby avoiding frequent water refilling and improving the cleaning effect. Meanwhile, a water-level-controlled water refilling process can be accomplished according to set water refilling, the control logics is simple and the water level of the outer drum is ensured to meet washing needs, thereby improving the washing efficiency and the cleaning effect.

[0042] In any of the technical solutions, the washing cycle is rotating for a first duration and stopping for a second duration.

[0043] In the technical solution, the washing cycle of the motor is limited, specifically, the motor rotates for the first duration (named as an on phase) and stops for the second duration (named as an off phase), which may be one washing cycle. In the washing process, the motor operates in the washing cycle. In the on phase of the washing cycle, the water level is not detected and water refilling is not performed; only in the off phase, the water level of the outer drum is detected, and the water inlet valve is controlled to open for water refilling when the water level is lower than the first water level.

[0044] In any of the technical solutions, the operation that the control unit is configured to control the motor of the laundry treatment device to operate in the washing cycle specifically includes: controlling the motor of the laundry treatment device to operate with an operation rotation speed in the washing cycle.

[0045] In the technical solution, the motor operates with the operation rotation speed in the washing cycle in the washing process, specifically, the motor rotates with the operation rotation speed and stops for the second duration while rotating for the first duration every time.

[0046] In any of the technical solutions, the operation rotation speed is not lower than 30 revolutions per minute and is not higher than 60 revolutions per minute.

[0047] In the technical solution, the operation rotation speed is limited, and specifically, the operation rotation speed is not lower than 30 revolutions per minute and is not higher than 60 revolutions per minute. Based on the operation rotation speed, the motor drives the inner drum to rotate for forming the lift-up and drop washing effect on the laundries. In the lift-up and drop washing process, the phase in which the motor stops rotating is used to detect the water level and refill the water. In the water refilling process, the motor is ensured to stop rotating, reducing the washing time and making water level sensing accurate, thereby avoiding frequent water refilling, guaranteeing the washing operation time as much as possible, and effectively improving the washing efficiency and the cleaning effect.

[0048] In any of the technical solutions, the control unit is further configured to control the laundry treatment device to perform a main washing phase in an alternating mode of lift-up and drop washing and drum-rotating washing, and the main washing phase includes a first lift-up and drop washing process and a second lift-up and drop washing process; the control unit is specifically configured to control the motor to perform the first lift-up and drop washing process with the first rotation speed in the first washing cycle, and control the motor to perform the second lift-up and drop washing process with the second rotation speed in the second washing cycle, and the first washing cycle is different from the second washing cycle.

[0049] In the technical solution, the laundry treatment device is controlled to perform the main washing phase in an alternating mode of lift-up and drop washing and drum-rotating washing, and the main washing phase includes a first lift-up and drop washing process and a second lift-up and drop washing process. The first lift-up and drop washing process and the second lift-up and drop washing process are a washing phase between a phase in which water feeding is ended and a phase in which drum-rotating washing starts, or a washing phase between a phase in which current drum-rotating washing is ended and a phase in which next drum-rotating washing starts. Meanwhile, the variation of the washing cycle is improved, such that the motor respectively performs the first lift-up and drop washing process and the second lift-up and drop washing process in different washing cycles (namely the first washing cycle and the second washing cycle). Through the control method for the laundry treatment device provided in the present application, the whole washing process does not need to heat washing water, thereby avoiding damages to the laundries of

a high temperature and reducing energy consumption. Meanwhile, an alternating washing mode of multi-washing-cycle washing and high-speed drum-rotating washing is adopted, such that the washing efficiency and the cleaning effect are effectively improved.

[0050] In any of the technical solutions, the main washing phase further includes a third lift-up and drop washing process. The control unit is specifically configured to control the motor to operate with the third rotation speed in the third washing cycle, and the third washing cycle is different from the first washing cycle and the second washing cycle.

[0051] In the technical solution, the main washing phase further includes the third lift-up and drop washing process in which the motor operates with the third rotation speed in the third washing cycle, wherein the third washing cycle is different from the first washing cycle and the second washing cycle. As a result, three different washing cycles can be adopted to respectively perform the first, second and third lift-up and drop washing processes, such that the variation of the washing cycles is further improved, thereby improving the washing efficiency and the cleaning effect.

[0052] The first washing cycle, the first rotation speed, the second washing cycle, the second rotation speed, the third washing cycle and the third rotation speed are all preset value; as long as the first washing cycle, the second washing cycle and the third washing cycle are different, the laundry treatment device alternatively washes in multiple nodes, which can be realized.

[0053] In any of the technical solutions, the acquisition unit is specifically configured to acquire an operating state of the motor when the first lift-up and drop washing process, the second lift-up and drop washing process and the third lift-up and drop washing process are performed, determine that the motor stops rotating, and acquire a water level of an outer drum; and the control unit is configured to determine that the water level is lower than a first water level and control the water inlet valve to open.

[0054] In the technical solution, water-refill monitoring is performed in the lift-up and drop washing processes of the main washing phase, and specifically, the water level of the outer drum is obtained when the motor stops rotating; when the motor stops rotating, whether the water level of the outer drum is lower than the first water level or not is judged; and when the water level of the outer drum is lower than the first water level, the water inlet valve of the laundry treatment device is controlled to open for refilling water. In such a manner, the water level of the outer drum can be ensured to meet the washing needs, such that the washing efficiency and the cleaning effect are improved.

[0055] In any of the technical solutions, the control unit is further configured to control a heating device of the laundry treatment device to switch off in a process of controlling the laundry treatment device to perform the main washing phase in an alternating mode of lift-up and drop washing and drum-rotating washing.

[0056] In the technical solution, the purpose of not heating washing water is achieved by controlling the heating device of the laundry treatment device to switch off in the main washing phase, thereby avoiding damages to the laundries of the high temperature and reducing energy consumption; and meanwhile, an alternating washing mode of multi-washing-cycle washing and high-speed drum-rotating washing is adopted, such that the washing efficiency and the cleaning effect are effectively improved.

[0057] A fifth aspect of the present application provides a laundry treatment device, including: the control system for the laundry treatment device in any of the technical solutions; and a water level detecting device which is respectively connected with a control system for the laundry treatment device and an outer drum of the laundry treatment device, and is configured to detect a water level of the outer drum. As a result, the laundry treatment device achieves all beneficial effects of the control system for the laundry treatment device according to any of the technical solutions.

[0058] A sixth aspect of the present application provides a laundry treatment device, including a memory, a processor, and a computer program stored in the memory and configured to be capable of running on the processor, and when executed by the processor, the computer program performs the control method for the laundry treatment device according to any of the technical solutions. As a result, the control system for the laundry treatment device achieves all beneficial effects of the control method for the laundry treatment device according to any of the technical solutions.

[0059] Additional aspects and advantages of the present application will be obvious from the description below, or be learned by practice of the present application.

BRIEF DESCRIPTION OF THE DRAWINGS

[0060] The above and/or additional aspects and advantages of the present application will become obvious and easy to understand from the description of the embodiments in conjunction with the following drawings, in which:

FIG. 1 shows a flow chart of a control method for a laundry treatment device according to one embodiment of the present application.

FIG. 2 shows a flow chart of a control method for a laundry treatment device according to the other embodiment of the present application.

FIG. 3 shows a flow chart of a control method for a laundry treatment device according to another embodiment of the present application.

FIG. 4 shows a flow chart of a control method for a laundry treatment device according to another embodiment of the present application.

FIG. 5 shows a flow chart of a control method for a laundry treatment device according to another embodiment of the present application.

FIG. 6 shows a schematic block diagram of a control system for a laundry treatment device according to one embodiment of the present application.

FIG. 7 shows a schematic block diagram of a control system for a laundry treatment device according to one embodiment of the present application.

FIG. 8 shows a schematic diagram of a control method for a laundry treatment device according to one specific embodiment of the present application.

FIG. 9 shows a schematic diagram of a control method for a laundry treatment device according to one specific embodiment of the present application.

FIG. 10 shows a schematic diagram of a control method for a laundry treatment device according to another specific embodiment of the present application.

DETAILED DESCRIPTION OF EMBODIMENTS

[0061] To understand above purposes, features and advantages of the present application more clearly, the present application is further detailed below in combination with drawings and specific embodiments. It should be explained that if there is no conflict, embodiments in the present application and the features in the embodiments can be mutually combined.

[0062] In the following description, many specific details are set forth in order to fully understand the present application. However, the present application can also be implemented in other ways than described herein. Therefore, the protection scope of the present application is not limited by the following specific embodiments disclosed.

[0063] A first aspect of the present application provides a control method for a laundry treatment device.

[0064] FIG. 1 shows a flow chart of a control method for a laundry treatment device according to one embodiment of the present application. The control method for the laundry treatment device includes:

step 102, controlling a motor of the laundry treatment device to operate in a washing cycle;

step 104, acquiring an operating state of the motor, determining that the motor stops rotating, and acquiring a water level of an outer drum of the laundry treatment device; and

step 106, determining that the water level is lower than a first water level and controlling a water inlet valve of the laundry treatment device to open.

[0065] According to the control method for the laundry treatment device provided in the present application, the motor of the laundry treatment device is controlled to operate in the washing cycle, such that an inner drum of the laundry treatment device is driven to rotate for washing; in the washing process, the operating state of the motor is acquired, and when the motor stops rotating, the water level of the outer drum is acquired; when the motor stops rotating, whether the water level of the outer drum is lower than the first water level or not is judged; and when the water level is lower than the first water level, the water inlet valve of the laundry treatment device is controlled to open for refilling water. The control method takes advantage of the phase in which the motor stops rotating in the washing process to detect the water level and refill the water, such that, a separate water-refill washing phase is canceled, reducing the washing time, and moreover, the time period when the motor stops rotating is rationally used, further reducing the washing time, and guaranteeing the washing operation time as much as possible; in addition, the water level sensing is accurate, avoiding frequent water refilling, thereby effectively improving the washing efficiency and the cleaning effect.

[0066] The first water level is a preset value; when the water level in the outer drum is lower than the first water level, water refilling is needed, and the first water level can be specifically set according to an empirical value.

[0067] FIG. 2 shows a flow chart of a control method for a laundry treatment device according to another one embodiment of the present application. The control method for the laundry treatment device includes:

step 202, controlling a motor of the laundry treatment device to operate in a washing cycle;

step 204, acquiring an operating state of the motor, determining that the motor stops rotating, and acquiring a water level of an outer drum of the laundry treatment device; and

step 206, determining that the water level is lower than a first water level, controlling a water inlet valve of the laundry treatment device to open, and enabling the motor to stop rotating in the process of controlling the water inlet valve to open until the water inlet valve is closed.

[0068] In the embodiment, accuracy of water level detection can be improved by controlling the motor to be kept in a state of stopping rotating in a water refilling process, thereby avoiding stopping if water is not refilled sufficiently and frequent water refilling.

[0069] FIG. 3 shows a flow chart of a control method for a laundry treatment device according to another embodiment of the present application. The control method for the laundry treatment device includes:

step 302, controlling a motor of the laundry treatment device to operate in a washing cycle;

step 304, acquiring an operating state of the motor, determining that the motor stops rotating, and acquiring a water level of an outer drum of the laundry treatment device;

step 306, determining that the water level is lower

than a first water level, controlling a water inlet valve of the laundry treatment device to open, and enabling the motor to stop rotating in the process of controlling the water inlet valve to open until the water inlet valve is closed; and

step 308, determining that the water level reaches a second water level, controlling the water inlet valve to close and controlling the motor to operate in the washing cycle.

[0070] In the embodiment, the motor is controlled to be kept in a state of stopping after the laundry treatment device starts refilling water, and the water level of the outer drum is monitored to control the water refilling process according to the second water level. When the water level reaches the second water level, the water inlet valve is controlled to close for stopping water refilling. Meanwhile, the motor is controlled to operate in the washing cycle, such that the inner drum is driven to rotate for continuously washing. The second water level is a set water level at which water refilling is accomplished, the second water level is not smaller than the first water level, and the second water level is greater than the first water level, such that frequent water refilling can be avoided. The second water level can be specifically set according to the empirical value. According to the control method provided in the present application, washing operation is not performed during water refilling, such that water level sensing is accurate, thereby avoiding frequent water refilling and improving the cleaning effect. Meanwhile, a water-level-controlled water refilling process can be accomplished according to set water refilling, the control logics is simple and the water level of the outer drum is ensured to meet washing needs, thereby improving the washing efficiency and the cleaning effect.

[0071] In any of the embodiments, the washing cycle is rotating for a first duration and stopping for a second duration.

[0072] In the embodiment, the washing cycle of the motor is limited, specifically, the motor rotates for the first duration (named as an on phase) and stops for the second duration (named as an off phase), which may be one washing cycle. In the washing process, the motor operates in the washing cycle. In the on phase of the washing cycle, the water level is not detected and water refilling is not performed; only in the off phase, the water level of the outer drum is detected, and the water inlet valve is controlled to open for water refilling when the water level is lower than the first water level.

[0073] In any of the embodiments, controlling the motor of the laundry treatment device to operate in the washing cycle specifically includes: controlling the motor of the laundry treatment device to operate in the washing cycle with operation rotation speed.

[0074] In the technical solution, the motor operates with the operation rotation speed in the washing cycle in the washing process. Specifically, the motor rotates with the operation rotation speed and stops for the second duration while rotating for the first duration every time.

[0075] In one specific embodiment of the present application, a water level sensor configured to detect the water level of the outer drum is controlled to detect the water level of the outer drum in the off phase of each washing cycle; or the water level sensor detects every set duration which is set according to the first duration and the second duration, such that the detection operation is only performed in the off phase of the washing cycle; or the water level sensor detects every washing cycle.

[0076] In any of the embodiments, the operation rotation speed is not lower than 30 revolutions per minute and is not higher than 60 revolutions per minute.

[0077] In the embodiment, the operation rotation speed is limited, and specifically, the operation rotation speed is not lower than 30 revolutions per minute and is not higher than 60 revolutions per minute. Based on the operation rotation speed, the motor drives the inner drum to rotate for forming the lift-up and drop washing effect on the laundries. In the lift-up and drop washing process, the phase in which the motor stops rotating is used to detect the water level and refill the water. In the water refilling process, the motor is ensured to stop rotating, reducing the washing time and making water level sensing accurate, thereby avoiding frequent water refilling, guaranteeing the washing operation time as much as possible, and effectively improving the washing efficiency and the cleaning effect.

[0078] FIG. 4 shows a flow chart of a control method for a laundry treatment device according to another embodiment of the present application. The control method for the laundry treatment device includes:

step 402, controlling the laundry treatment device to perform a main washing phase in an alternating mode of lift-up and drop washing and drum-rotating washing, wherein the main washing phase includes a first lift-up and drop washing process and a second lift-up and drop washing process, the motor is controlled to perform the first lift-up and drop washing process with the first rotation speed in the first washing cycle, and the motor is controlled to perform the second lift-up and drop washing process with the second rotation speed in the second washing cycle, and the first washing cycle is different from the second washing cycle;

step 404, acquiring an operating state of the motor in the first lift-up and drop washing process and the second lift-up and drop washing process, determining that the motor stops rotating, and acquiring a water level of an outer drum of the laundry treatment device; and

step 406, determining that the water level is lower than a first water level, controlling a water inlet valve of the laundry treatment device to open, and enabling the motor to stop rotating in the process of controlling the water inlet valve to open until the water inlet valve

is closed; and

step 408, determining that the water level reaches a second water level, controlling the water inlet valve to close and controlling the motor to perform the first lift-up and drop washing process with the first rotation speed in the first washing cycle or perform the second lift-up and drop washing process with the second rotation speed in the second washing cycle.

[0079] In the embodiment, the laundry treatment device is controlled to perform the main washing phase in an alternating mode of lift-up and drop washing and drum-rotating washing, and the main washing phase includes a first lift-up and drop washing process and a second lift-up and drop washing process. The first lift-up and drop washing process and the second lift-up and drop washing process are a washing phase between a phase in which water feeding is ended and a phase in which drum-rotating washing starts, or a washing phase between a phase in which current drum-rotating washing is ended and a phase in which next drum-rotating washing starts. Meanwhile, the variation of the washing cycle is improved, such that the motor respectively performs the first lift-up and drop washing process and the second lift-up and drop washing process in different washing cycles (namely the first washing cycle and the second washing cycle). Through the control method for the laundry treatment device provided in the present application, the whole washing process does not need to heat washing water, thereby avoiding damages to the laundries of a high temperature and reducing energy consumption. Meanwhile, an alternating washing mode of multi-washing-cycle washing and high-speed drum-rotating washing is adopted, such that the washing efficiency and the cleaning effect are effectively improved.

[0080] FIG. 5 shows a flow chart of a control method for a laundry treatment device according to another embodiment of the present application. The control method for the laundry treatment device includes:

step 502, controlling the laundry treatment device to perform a main washing phase in an alternating mode of lift-up and drop washing and drum-rotating washing, wherein the main washing phase includes a first lift-up and drop washing process and a second lift-up and drop washing process, the motor is controlled to perform the first lift-up and drop washing process with the first rotation speed in the first washing cycle, the motor is controlled to perform the second lift-up and drop washing process with the second rotation speed in the second washing cycle, and the motor is controlled to perform the third lift-up and drop washing process with the third rotation speed in the third washing cycle;

wherein the first washing cycle, the second washing cycle and the third washing cycle are all different.

step 504, acquiring an operating state of the motor in the first lift-up and drop washing process, the second lift-up and drop washing process and the third lift-up and drop washing process, determining that the motor stops rotating, and acquiring a water level of an outer drum of the laundry treatment device;

step 506, determining that the water level is lower than a first water level, controlling a water inlet valve of the laundry treatment device to open, and enabling the motor to stop rotating in the process of controlling the water inlet valve to open until the water inlet valve is closed; and

step 508, determining that the water level reaches a second water level, controlling the water inlet valve to close and controlling the motor to perform the first lift-up and drop washing process with the first rotation speed in the first washing cycle or perform the second lift-up and drop washing process with the second rotation speed in the second washing cycle or the third lift-up and drop washing process with the third rotation speed in the third washing cycle.

[0081] In the embodiment, the main washing phase further includes the third lift-up and drop washing process in which the motor operates with the third rotation speed in the third washing cycle, wherein the third washing cycle is different from the first washing cycle and the second washing cycle. As a result, three different washing cycles can be adopted to respectively perform the first, second and third lift-up and drop washing processes, such that the variation of the washing cycles is further improved, thereby improving the washing efficiency and the cleaning effect.

[0082] Water-refill monitoring is performed in the lift-up and drop washing processes of the main washing phase, and specifically, the water level of the outer drum is obtained when the motor stops rotating; when the motor stops rotating, whether the water level of the outer drum is lower than the first water level or not is judged; and when the water level of the outer drum is lower than the first water level, the water inlet valve of the laundry treatment device is controlled to open for refilling water. In such a manner, the water level of the outer drum can be ensured to meet the washing needs, such that the washing efficiency and the cleaning effect are improved.

[0083] The first washing cycle, the first rotation speed, the second washing cycle, the second rotation speed, the third washing cycle and the third rotation speed are all preset value; as long as the first washing cycle, the second washing cycle and the third washing cycle are different, the laundry treatment device alternatively washes in multiple nodes, which can be realized.

[0084] In some embodiments of the present application, the control method for the laundry treatment device further includes: controlling a heating device of the laundry treatment device to switch off in a process of controlling the laundry treatment device to perform the main washing phase in an alternating mode of lift-up and drop washing and drum-rotating washing.

[0085] In the embodiment, the purpose of not heating

washing water is achieved by controlling the heating device of the laundry treatment device to switch off in the main washing phase, thereby avoiding damages to the laundries of the high temperature and reducing energy consumption; and meanwhile, an alternating washing mode of multi-washing-cycle washing and high-speed drum-rotating washing is adopted, such that the washing efficiency and the cleaning effect are effectively improved.

[0086] A second aspect of the present application provides a computer readable storage medium having stored therein a computer program. When executed by a processor, the computer program performs the control method for the laundry treatment device according to any of the technical solutions. As a result, the computer readable storage medium achieves all beneficial effects of the laundry treatment device according to any of the technical solutions.

[0087] A third aspect of the present application provides a control system for a laundry treatment device.

[0088] FIG. 6 shows a schematic block diagram of a control system 600 of a laundry treatment device according to one embodiment of the present application. The control system 600 for the laundry treatment device includes a memory 602, a processor 604 and a computer program stored in the memory 602 and configured to be capable of running on the processor 604, and the processor 604 being configured to perform the control method for the laundry treatment device according to any of the technical solutions when executing the computer program. As a result, the control system 600 for the laundry treatment device achieves all beneficial effects of the control method for the laundry treatment device according to any of the technical solutions.

[0089] A fourth aspect of the present application provides a control system for a laundry treatment device.

[0090] FIG. 7 shows a schematic block diagram of a control system 700 for a laundry treatment device according to one embodiment of the present application. The control system 700 for the laundry treatment device includes:

a control unit 702 configured to control a motor of a laundry treatment device to operate in a washing cycle; and

an acquisition unit 704 configured to acquire an operating state of the motor determine that the motor stops rotating and acquire a water level of an outer drum of the laundry treatment device.

[0091] The control unit 702 is further configured to determine that the water level is lower than a first water level and control a water inlet valve of the laundry treatment device to open.

[0092] According to the control system 700 for the laundry treatment device provided in the present application, the motor of the laundry treatment device is controlled to operate in the washing cycle, such that an inner drum of the laundry treatment device is driven to rotate for washing; in the washing process, the operating state of the motor is acquired, and when the motor stops rotating, the water level of the outer drum is acquired; when the motor stops rotating, whether the water level of the outer drum is lower than the first water level or not is judged; and when the water level of the outer drum is lower than the first water level, the water inlet valve of the laundry treatment device is controlled to open for refilling water. The control system 700 for the laundry treatment device in the present application takes advantage of the phase in which the motor stops rotating in the washing process to detect the water level and refill the water, such that, a separate water-refill washing phase is canceled, reducing the washing time, and moreover, the time period when the motor stops rotating is rationally used, further reducing the washing time, and guaranteeing the washing operation time as much as possible; and meanwhile, the water level sensing is accurate, avoiding frequent water refilling, thereby effectively improving the washing efficiency and the cleaning effect.

[0093] The first water level is a preset value; when the water level in the outer drum is lower than the first water level, water refilling is needed, and the first water level can be specifically set according to an empirical value.

[0094] In one embodiment of the present application, in the process of controlling the water inlet valve to open until the water inlet valve is closed, the motor stops rotating.

[0095] In the embodiment, accuracy of water level detection can be improved by controlling the motor to be kept in a state of stopping rotating in a water refilling process, thereby avoiding stopping if water is not refilled sufficiently and frequent water refilling.

[0096] In one embodiment of the present application, the control unit 702 is further configured to determine that the water level reaches the second water level, control the water inlet valve to close and control the motor to drive the inner drum to wash in the washing cycle, wherein the second water level is greater than or equal to the first water level.

[0097] In the embodiment, the motor is controlled to be kept in a state of stopping after the laundry treatment device starts refilling water, and the water level of the outer drum is monitored to control the water refilling process according to the second water level. When the water level reaches the second water level, the water inlet valve is controlled to close for stopping water refilling. Meanwhile, the motor is controlled to operate in the washing cycle, such that the inner drum is driven to rotate for continuously washing. The second water level is a set water level at which water refilling is accomplished, the second water level is not smaller than the first water level, and the second water level is greater than the first water level, such that frequent water refilling can be avoided. The second water level can be specifically set according to the empirical value. According to the control method provided in the present application, washing operation is not

performed during water refilling, such that water level sensing is accurate, thereby avoiding frequent water refilling and improving the cleaning effect. Meanwhile, a water-level-controlled water refilling process can be accomplished according to set water refilling, the control logics is simple and the water level of the outer drum is ensured to meet washing needs, thereby improving the washing efficiency and the cleaning effect.

[0098] In one embodiment of the present application, the washing cycle is rotating for a first duration and stopping for a second duration.

[0099] In the embodiment, the washing cycle of the motor is limited, specifically, the motor rotates for the first duration (named as an on phase) and stops for the second duration (named as an off phase), which may be one washing cycle. In the washing process, the motor operates in the washing cycle. In the on phase of the washing cycle, the water level is not detected and water refilling is not performed; only in the off phase, the water level of the outer drum is detected, and the water inlet valve is controlled to open for water refilling when the water level is lower than the first water level.

[0100] In one embodiment of the present application, the operation that the control unit 702 is configured to control the motor of the laundry treatment device to operate in the washing cycle specifically includes: controlling the motor of the laundry treatment device to operate with an operation rotation speed in the washing cycle.

[0101] In the embodiment, the motor operates with the operation rotation speed in the washing cycle in the washing process, specifically, the motor rotates with the operation rotation speed and stops for the second duration while rotating for the first duration every time.

[0102] In one embodiment of the present application, the operation rotation speed is not lower than 30 revolutions per minute and is not higher than 60 revolutions per minute.

[0103] In the embodiment, the operation rotation speed is limited, and specifically, the operation rotation speed is not lower than 30 revolutions per minute and is not higher than 60 revolutions per minute. Based on the operation rotation speed, the motor drives the inner drum to rotate for forming the lift-up and drop washing effect on the laundries. In the lift-up and drop washing process, the phase in which the motor stops rotating is used to detect the water level and refill the water. In the water refilling process, the motor is ensured to stop rotating, reducing the washing time and making water level sensing accurate, thereby avoiding frequent water refilling, guaranteeing the washing operation time as much as possible, and effectively improving the washing efficiency and the cleaning effect.

[0104] In one embodiment of the present application, the control unit 702 is further configured to control the laundry treatment device to perform a main washing phase in an alternating mode of lift-up and drop washing and drum-rotating washing, and the main washing phase includes a first lift-up and drop washing process and a second lift-up and drop washing process; the control unit 702 is specifically configured to control the motor to perform the first lift-up and drop washing process with the first rotation speed in the first washing cycle, and control the motor to perform the second lift-up and drop washing process with the second rotation speed in the second washing cycle, and the first washing cycle is different from the second washing cycle.

[0105] In the embodiment, the laundry treatment device is controlled to perform the main washing phase in an alternating mode of lift-up and drop washing and drum-rotating washing, and the main washing phase includes a first lift-up and drop washing process and a second lift-up and drop washing process. The first lift-up and drop washing process and the second lift-up and drop washing process are a washing phase between a phase in which water feeding is ended and a phase in which drum-rotating washing starts, or a washing phase between a phase in which current drum-rotating washing is ended and a phase in which next drum-rotating washing starts. Meanwhile, the variation of the washing cycle is improved, such that the motor respectively performs the first lift-up and drop washing process and the second lift-up and drop washing process in different washing cycles (namely the first washing cycle and the second washing cycle). Through the control method for the laundry treatment device provided in the present application, the whole washing process does not need to heat washing water, thereby avoiding damages to the laundries of a high temperature and reducing energy consumption. Meanwhile, an alternating washing mode of multi-washing-cycle washing and high-speed drum-rotating washing is adopted, such that the washing efficiency and the cleaning effect are effectively improved.

[0106] In one embodiment of the present application, the main washing phase further includes a third lift-up and drop washing process. The control unit 702 is specifically configured to control the motor to operate with the third rotation speed in the third washing cycle, and the third washing cycle is different from the first washing cycle and the second washing cycle.

[0107] In the embodiment, the main washing phase further includes the third lift-up and drop washing process in which the motor operates with the third rotation speed in the third washing cycle, wherein the third washing cycle is different from the first washing cycle and the second washing cycle. As a result, three different washing cycles can be adopted to respectively perform the first, second and third lift-up and drop washing processes, such that the variation of the washing cycles is further improved, thereby improving the washing efficiency and the cleaning effect.

[0108] In one embodiment of the present application, the acquisition unit 704 is specifically configured to acquire an operating state of the motor when the first lift-up and drop washing process, the second lift-up and drop washing process and the third lift-up and drop washing process are performed, determine that the motor stops

rotating, and acquire a water level of an outer drum; and the control unit is configured to determine that the water level is lower than a first water level and control the water inlet valve to open.

[0109] In the embodiment, water-refill monitoring is performed in the lift-up and drop washing processes of the main washing phase, and specifically, the water level of the outer drum is obtained when the motor stops rotating; when the motor stops rotating, whether the water level of the outer drum is lower than the first water level or not is judged; and when the water level of the outer drum is lower than the first water level, the water inlet valve of the laundry treatment device is controlled to open for refilling water. In such a manner, the water level of the outer drum can be ensured to meet the washing needs, such that the washing efficiency and the cleaning effect are improved.

[0110] In one embodiment of the present application, the control unit 702 is further configured to control a heating device of the laundry treatment device to switch off in a process of controlling the laundry treatment device to perform the main washing phase in an alternating mode of lift-up and drop washing and drum-rotating washing.

[0111] In the embodiment, the purpose of not heating washing water is achieved by controlling the heating device of the laundry treatment device to switch off in the main washing phase, thereby avoiding damages to the laundries of the high temperature and reducing energy consumption; and meanwhile, an alternating washing mode of multi-washing-cycle washing and high-speed drum-rotating washing is adopted, such that the washing efficiency and the cleaning effect are effectively improved.

[0112] A fifth aspect of the present application provides a laundry treatment device, including: the control system for the laundry treatment device in any of the embodiments; and a water level detecting device which is respectively connected with a control system for the laundry treatment device and an outer drum of the laundry treatment device, and is configured to detect a water level of the outer drum. As a result, the laundry treatment device achieves all beneficial effects of the control system for the laundry treatment device according to any of the embodiments.

[0113] A sixth aspect of the present application provides a laundry treatment device, including a memory, a processor and a computer program stored in the memory and configured to be capable of running on the processor, and when executed by the processor, the computer program performs the control method for the laundry treatment device according to any of the embodiments. As a result, the laundry treatment device achieves all beneficial effects of the control method for the laundry treatment device according to any of the embodiments.

[0114] A specific embodiment provides a control method for a laundry treatment device, which is used for a drum washing machine. The washing process includes main washing and rinsing, wherein the main washing includes water feeding and detergent adding as well as lift-up and drop washing. As shown in FIG. 8, the control method for the laundry treatment device cancels a separate water-refill washing phase and directly performs lift-up and drop washing after water feeding is accomplished; and the water level is detected and the water is refilled in the off phase of the lift-up and drop washing, thereby guaranteeing the washing operation time as much as possible and effectively improving the washing efficiency and the cleaning effect.

[0115] In addition, in the rinsing phase, as shown in FIG. 9, the control method for the laundry treatment device detects the water level and refills the water level in the off phase of the rinsing phase, and cancels a separate water-refill washing phase, thereby guaranteeing the washing operation time as much as possible and effectively improving the washing efficiency and the cleaning effect.

[0116] FIG. 10 shows a flow chart of a control method for a laundry treatment device according to another specific embodiment of the present application. The control method for the laundry treatment device includes:

step 802, feeding water and adding a detergent;
step 804, performing a first lift-up and drop washing process with a rotation speed of 37 revolutions per minute in a washing cycle of 9 on/9off, wherein water is automatically refilled within 2 minutes;
step 806, performing high-speed drum-rotating washing;
step 808, performing a second lift-up and drop washing process with a rotation speed of 48 revolutions per minute in a washing cycle of 22 on/5off, wherein water is automatically refilled within 2 minutes;
step 810, performing high-speed drum-rotating washing;
step 812, performing a third lift-up and drop washing process with a rotation speed of 52 revolutions per minute in a washing cycle of 18 on/8off, wherein water is automatically refilled within 2 minutes;
step 814, performing high-speed drum-rotating washing;
step 816, repeatedly performing step 804 to step 814 in sequence;
step 818, discharging water to an empty position; and
step 820, dewatering, wherein the highest rotation speed is 600 revolutions per minute.

[0117] In the embodiment, water-refill monitoring is performed in the lift-up and drop washing phases in the main washing process, and specifically, the operating state of the motor is acquired and the water level of the outer drum is acquired when the motor stops rotating; when the motor stops rotating, whether the water level of the outer drum is lower than the first water level or not is judged; and when the water level of the outer drum is

lower than the first water level, the water inlet valve of the laundry treatment device is controlled to open for refilling water, and the motor is kept in the state of stopping in the water refilling process; and when the water level reaches the second water level, the water inlet valve is controlled to close for stopping water refilling, wherein the second water level is greater than the first water level. The control method provided in the present application takes advantage of the phase in which the motor stops rotating in the washing process to detect the water level and refill the water, such that, a separate water-refill washing phase is canceled, reducing the washing time, and moreover, the time period when the motor stops rotating is rationally used, further reducing the washing time, and guaranteeing the washing operation time as much as possible; and in addition, the water level sensing is accurate, avoiding frequent water refilling, thereby effectively improving the washing efficiency and the cleaning effect.

[0118] A computer readable storage medium may include any medium capable of storing or transmitting information. Examples of the computer-readable storage medium include electronic circuits, semiconductor memory devices, ROM, flash memory, erasable ROM (EROM), floppy disks, CD-ROMs, optical disks, hard disks, optical fiber media, radio frequency (RF) links, and so on. A code segment can be downloaded via a computer network such as the Internet, an intranet, and so on.

[0119] In the illustration of this description, the terms such as "first" and "second" are only used for the purpose of illustration, rather than being understood to indicate or imply relative importance, unless otherwise clearly specified and limited. Terms such as "connecting", "installing", "fixation" and the like shall be understood in broad sense, and for example, "connecting" may refer to fixed connection or detachable connection or integral connection, and may refer to direct connection or indirect connection through an intermediate medium. For those ordinary skilled in the art, the specific meanings of the above terms in the present application may be understood according to concrete conditions.

[0120] The above only describes preferred embodiments of the present application and is not intended to limit the present application. For those skilled in the art, various variations and changes can be made to the present application. Any modification, equivalent replacement, improvement, etc. made within the spirit and the principle of the present application shall be included within the protection scope of the present application.

Claims

1. A control method for a laundry treatment device, comprising:

   controlling a motor of the laundry treatment device to operate in a washing cycle;

   acquiring an operating state of the motor, determining that the motor stops rotating and acquiring a water level of an outer drum of the laundry treatment device; and

   determining that the water level is lower than a first water level and controlling a water inlet valve of the laundry treatment device to open.

2. The control method for the laundry treatment device according to claim 1, wherein in the process of controlling the water inlet valve to open until the water inlet valve is closed, the motor stops rotating.

3. The control method for the laundry treatment device according to claim 1, further comprising:
   determining that the water level reaches a second water level, controlling the water inlet valve to close and controlling the motor to operate in the washing cycle, wherein the second water level is greater than or equal to the first water level.

4. The control method for the laundry treatment device according to claim 1, wherein
   the washing cycle is rotating for a first duration and stopping for a second duration.

5. The control method for the laundry treatment device according to claim 1, wherein controlling the motor of the laundry treatment device to operate in the washing cycle specifically comprises: controlling the motor to operate with an operation rotation speed in the washing cycle.

6. The control method for the laundry treatment device according to claim 5, wherein
   the operation rotation speed is not lower than 30 revolutions per minute and is not higher than 60 revolutions per minute.

7. The control method for the laundry treatment device according to claim 5, further comprising:

   controlling the laundry treatment device to perform a main washing phase in an alternating mode of lift-up and drop washing and drum-rotating washing, wherein the main washing phase comprises a first lift-up and drop washing process and a second lift-up and drop washing process;

   controlling the motor to operate with the operation rotation speed in the washing cycle specifically comprises: controlling the motor to perform the first lift-up and drop washing process with the first rotation speed in the first washing cycle, and controlling the motor to perform the second lift-up and drop washing process with the second rotation speed in the second washing cycle,

wherein the first washing cycle is different from the second washing cycle.

8. The control method for the laundry treatment device according to claim 7, wherein the main washing phase further comprises a third lift-up and drop washing process;

the controlling the motor to operate with the operation rotation speed in the washing cycle specifically comprises: controlling the motor to perform the third lift-up and drop washing process with the third rotation speed in the third washing cycle;
the third washing cycle is different from the first washing cycle and the second washing cycle.

9. The control method for the laundry treatment device according to claim 8, further comprising:

acquiring an operating state of the motor when the first lift-up and drop washing process, the second lift-up and drop washing process and the third lift-up and drop washing process are performed, and determining that the motor stops rotating;
acquiring a water level of the outer drum, determining that the water level is lower than a first water level, and controlling the water inlet valve to open.

10. The control method for the laundry treatment device according to any one of claims 7 to 9, further comprising:
controlling a heating device of the laundry treatment device to switch off in a process of controlling the laundry treatment device to perform the main washing phase in an alternating mode of lift-up and drop washing and drum-rotating washing.

11. A computer readable storage medium, having stored therein a computer programthat, when executed by a processor, perform a control method for a laundry treatment device according to any one of claims 1to 10.

12. A control system of a laundry treatment device, comprising:

a memory,
a processor, and
a computer program, stored in the memory and configured to be capable of running on the processor, wherein when executed by the processor, the computer program performs a control method for a laundry treatment device according to any one of claims 1 to 10.

13. A control system for a laundry treatment device, comprising:

a control unit, configured to control a motor of the laundry treatment device to operate in a washing cycle; and
an acquisition unit, configured to acquire an operating state of the motor, determine that the motor stops rotating and acquire a water level of an outer drum of the laundry treatment device;
wherein the control unit is further configured to determine that the water level is lower than a first water level and control a water inlet valve of the laundry treatment device to open.

14. The control system for the laundry treatment device according to claim 13, wherein in the process of controlling the water inlet valve to open until the water inlet valve is closed, the motor stops rotating.

15. The control system for the laundry treatment device according to claim 13, wherein

the control unit is further configured to determine that the water level reaches the second water level, control the water inlet valve to close and control the motor to operate in the washing cycle;
wherein the second water level is greater than or equal to the first water level.

16. The control system for the laundry treatment device according to claim 13, wherein
the washing cycle is rotating for a first duration and stopping for a second duration.

17. The control system for the laundry treatment device according to claim 13, wherein
that the control unit is configured to control the motor to operate in the washing cycle specifically comprises: controlling the motor to operate with an operation rotation speed in the washing cycle.

18. The control system for the laundry treatment device according to claim 17, wherein
the operation rotation speed is not lower than 30 revolutions per minute and is not higher than 60 revolutions per minute.

19. The control system for the laundry treatment device according to claim 17, wherein

the control unit is further configured to control the laundry treatment device to perform a main washing phase in an alternating mode of lift-up and drop washing and drum-rotating washing, and the main washing phase comprises a first lift-up and drop washing process and a second

lift-up and drop washing process;
the control unit is specifically configured to control the motor to perform the first lift-up and drop washing process with the first rotation speed in the first washing cycle, and control the motor to perform the second lift-up and drop washing process with the second rotation speed in the second washing cycle;
wherein the first washing cycle is different from the second washing cycle.

20. The control system for the laundry treatment device according to claim 19, wherein

the main washing phase further comprises a third lift-up and drop washing process;
the control unit is specifically configured to control the motor to perform the third lift-up and drop washing process with the third rotation speed in the third washing cycle;
the third washing cycle is different from the first washing cycle and the second washing cycle.

21. The control system for the laundry treatment device according to claim 20, wherein

the acquisition unit is specifically configured to acquire an operating state of the motor when the first lift-up and drop washing process, the second lift-up and drop washing process and the third lift-up and drop washing process are performed, determine that the motor stops rotating, and acquire a water level of the outer drum; and
the control unit is configured to determine that the water level is lower than a first water level and control the water inlet valve to open.

22. The control system for the laundry treatment device according to any one of claims 7 to 9, wherein
the control unit is further configured to control a heating device of the laundry treatment device to switch off in a process of controlling the laundry treatment device to perform the main washing phase in an alternating mode of lift-up and drop washing and drum-rotating washing.

23. A laundry treatment device, comprising:

a control system for a laundry treatment device of any one of claims 13 to 21; and
a water-level detecting device, connected to the control system for the laundry treatment device and an outer drum of the laundry treatment device respectively, and configured to detect a water level of the outer drum.

24. A laundry treatment device, comprising:

a memory,
a processor, and
a computer program, stored in the memory and configured to be capable of running on the processor;
wherein when executed by the processor, the computer program performs a control method for a laundry treatment device according to any one of claims 1 to 10.

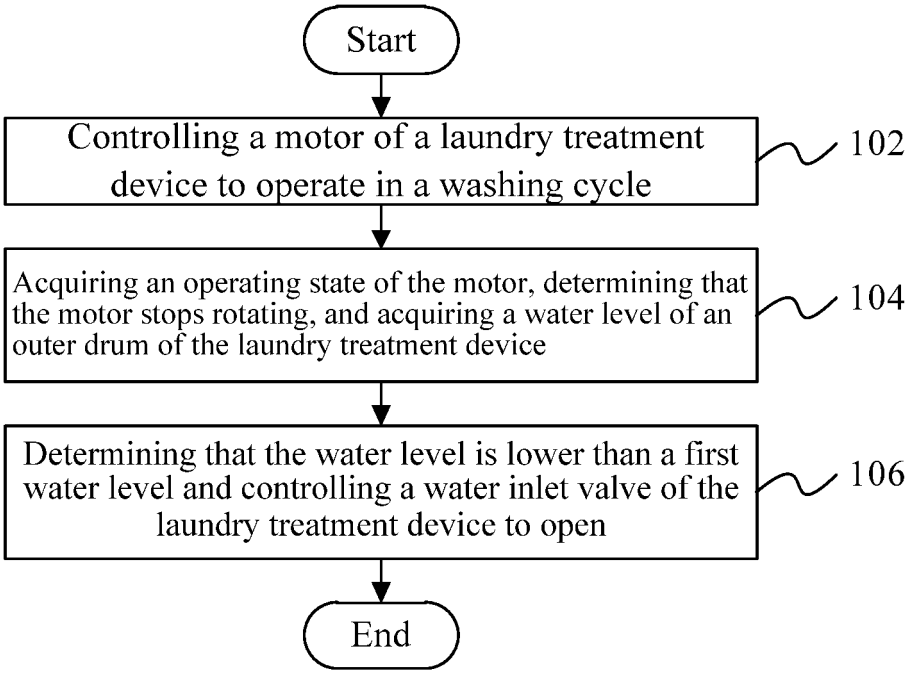
Start
Controlling a motor of a laundry treatment device to operate in a washing cycle
102
Acquiring an operating state of the motor, determining that the motor stops rotating, and acquiring a water level of an outer drum of the laundry treatment device
104
Determining that the water level is lower than a first water level and controlling a water inlet valve of the laundry treatment device to open
106
End

FIG. 1

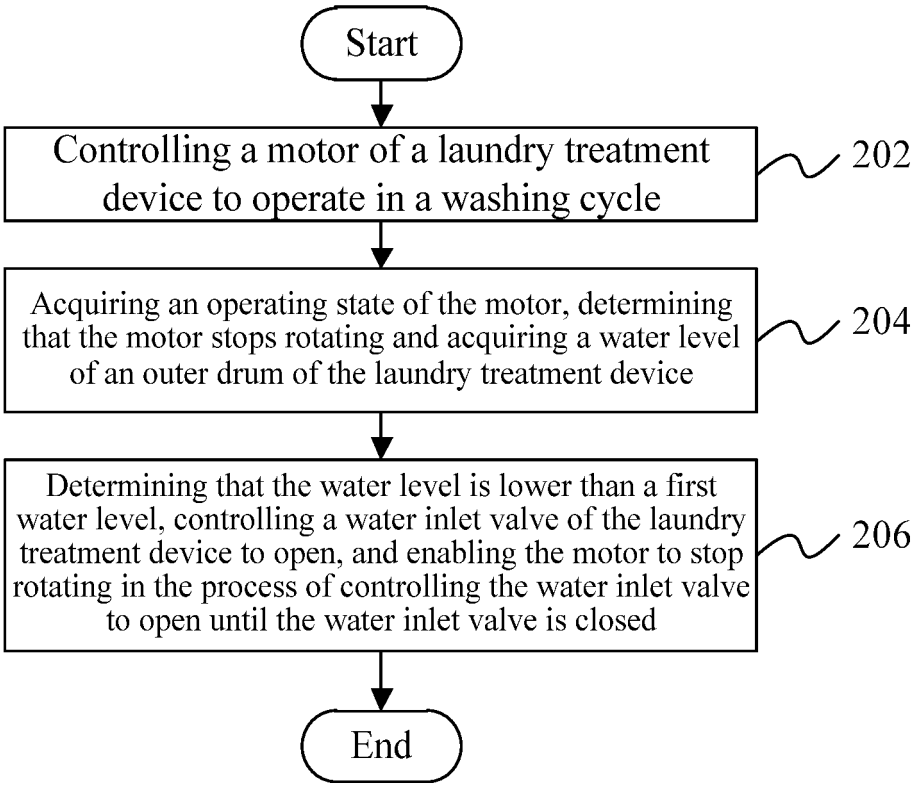
Start
Controlling a motor of a laundry treatment device to operate in a washing cycle
202
Acquiring an operating state of the motor, determining that the motor stops rotating and acquiring a water level of an outer drum of the laundry treatment device
204
Determining that the water level is lower than a first water level, controlling a water inlet valve of the laundry treatment device to open, and enabling the motor to stop rotating in the process of controlling the water inlet valve to open until the water inlet valve is closed
206
End

FIG. 2

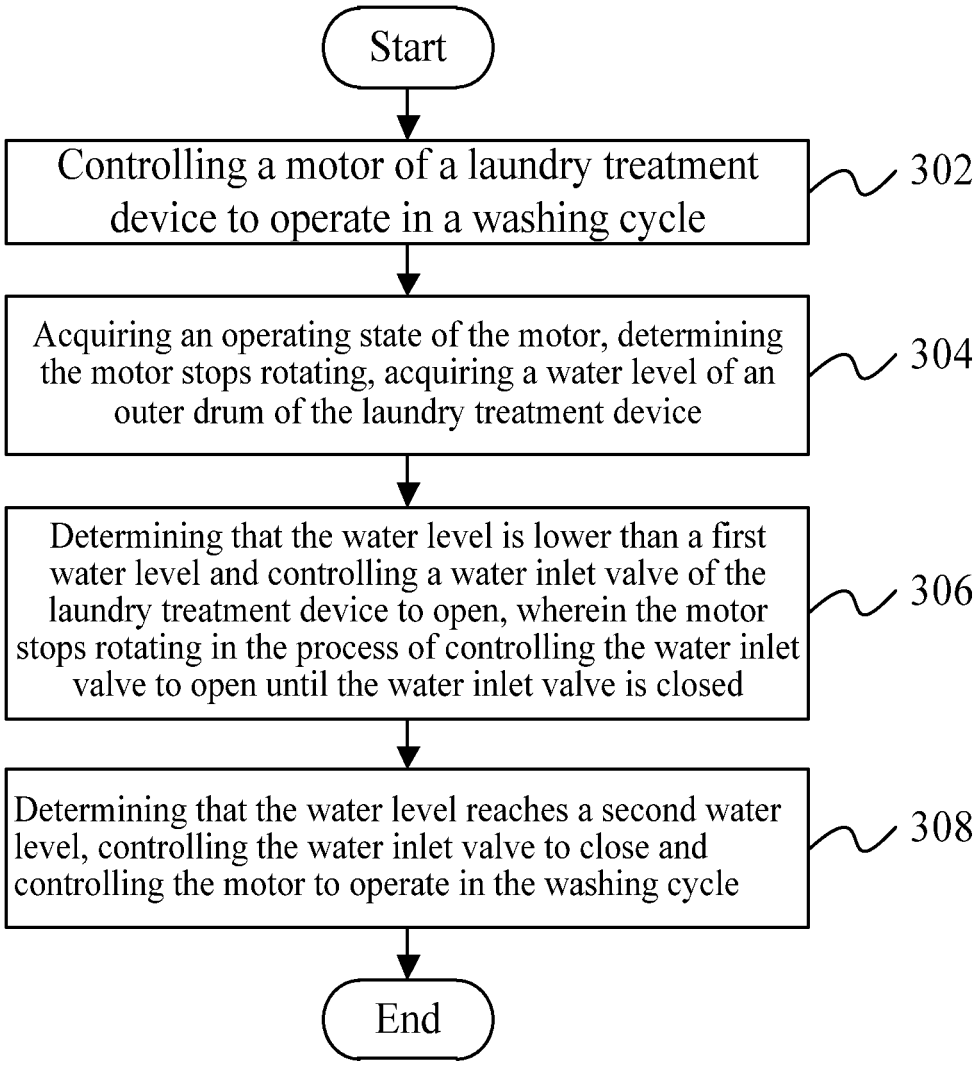
Start
Controlling a motor of a laundry treatment device to operate in a washing cycle
302
Acquiring an operating state of the motor, determining the motor stops rotating, acquiring a water level of an outer drum of the laundry treatment device
304
Determining that the water level is lower than a first water level and controlling a water inlet valve of the laundry treatment device to open, wherein the motor stops rotating in the process of controlling the water inlet valve to open until the water inlet valve is closed
306
Determining that the water level reaches a second water level, controlling the water inlet valve to close and controlling the motor to operate in the washing cycle
308
End

FIG. 3

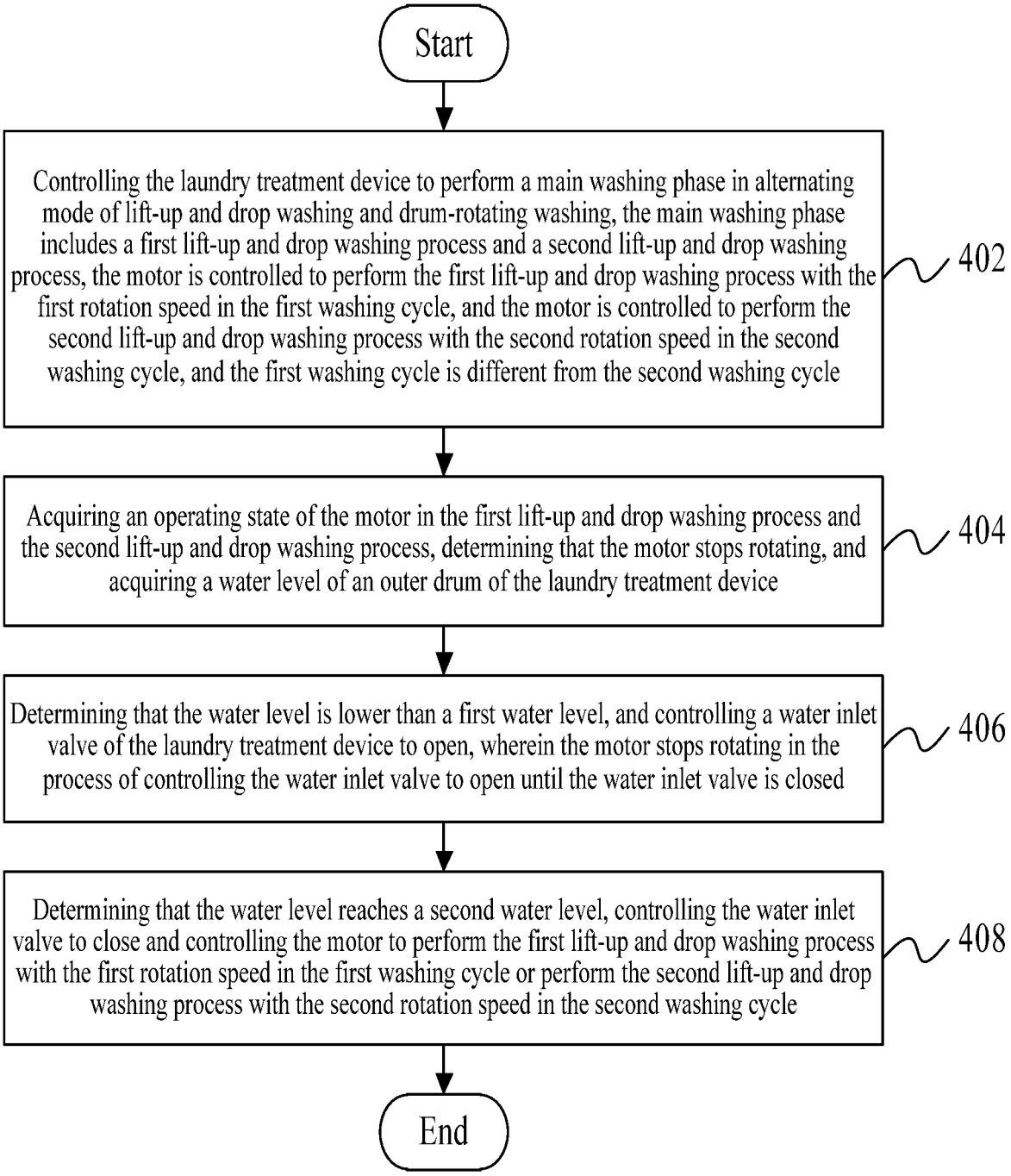
Start
Controlling the laundry treatment device to perform a main washing phase in alternating mode of lift-up and drop washing and drum-rotating washing, the main washing phase includes a first lift-up and drop washing process and a second lift-up and drop washing process, the motor is controlled to perform the first lift-up and drop washing process with the first rotation speed in the first washing cycle, and the motor is controlled to perform the second lift-up and drop washing process with the second rotation speed in the second washing cycle, and the first washing cycle is different from the second washing cycle
402
Acquiring an operating state of the motor in the first lift-up and drop washing process and the second lift-up and drop washing process, determining that the motor stops rotating, and acquiring a water level of an outer drum of the laundry treatment device
404
Determining that the water level is lower than a first water level, and controlling a water inlet valve of the laundry treatment device to open, wherein the motor stops rotating in the process of controlling the water inlet valve to open until the water inlet valve is closed
406
Determining that the water level reaches a second water level, controlling the water inlet valve to close and controlling the motor to perform the first lift-up and drop washing process with the first rotation speed in the first washing cycle or perform the second lift-up and drop washing process with the second rotation speed in the second washing cycle
408
End

FIG. 4

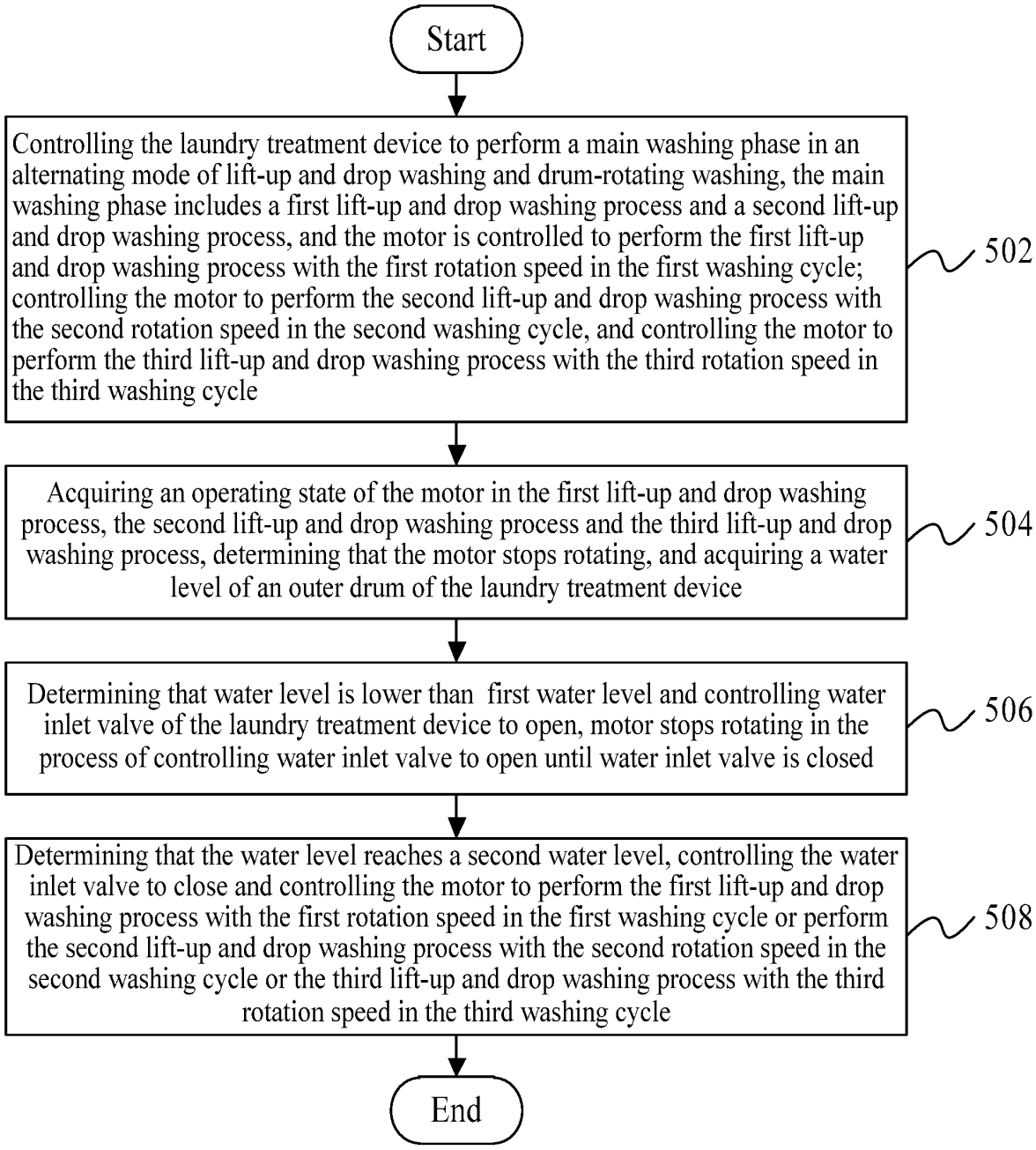
Start
Controlling the laundry treatment device to perform a main washing phase in an alternating mode of lift-up and drop washing and drum-rotating washing, the main washing phase includes a first lift-up and drop washing process and a second lift-up and drop washing process, and the motor is controlled to perform the first lift-up and drop washing process with the first rotation speed in the first washing cycle; controlling the motor to perform the second lift-up and drop washing process with the second rotation speed in the second washing cycle, and controlling the motor to perform the third lift-up and drop washing process with the third rotation speed in the third washing cycle
502
Acquiring an operating state of the motor in the first lift-up and drop washing process, the second lift-up and drop washing process and the third lift-up and drop washing process, determining that the motor stops rotating, and acquiring a water level of an outer drum of the laundry treatment device
504
Determining that water level is lower than first water level and controlling water inlet valve of the laundry treatment device to open, motor stops rotating in the process of controlling water inlet valve to open until water inlet valve is closed
506
Determining that the water level reaches a second water level, controlling the water inlet valve to close and controlling the motor to perform the first lift-up and drop washing process with the first rotation speed in the first washing cycle or perform the second lift-up and drop washing process with the second rotation speed in the second washing cycle or the third lift-up and drop washing process with the third rotation speed in the third washing cycle
508
End

FIG. 5

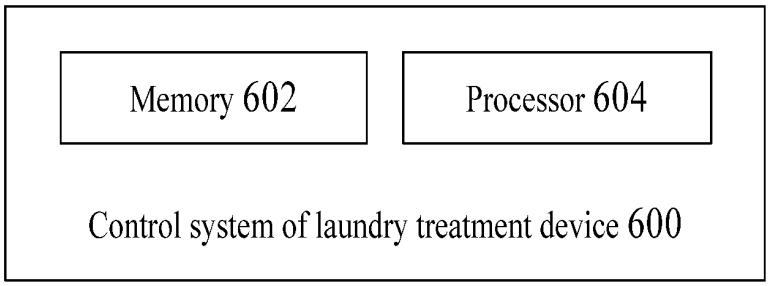
Memory 602
Processor 604
Control system of laundry treatment device 600

FIG. 6

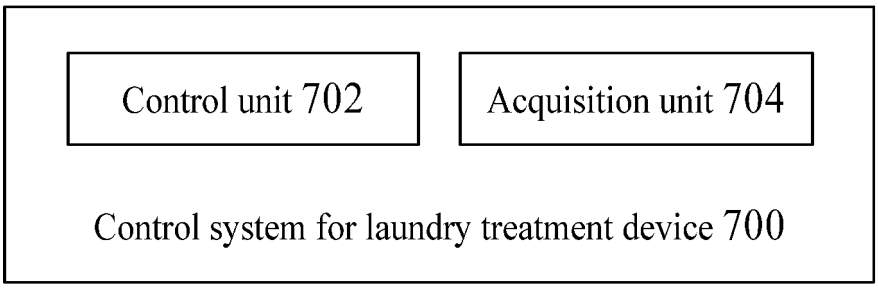

FIG. 7

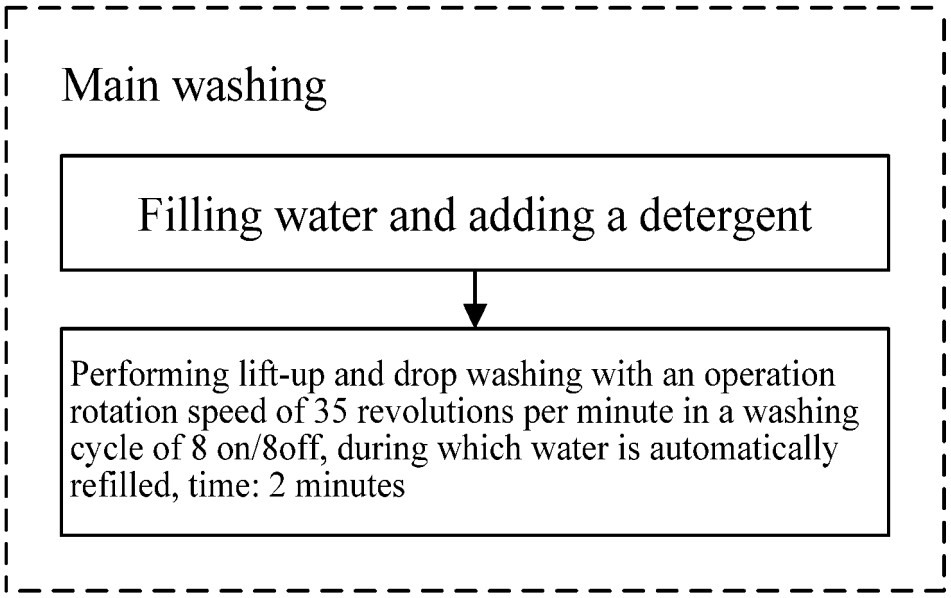

FIG. 8

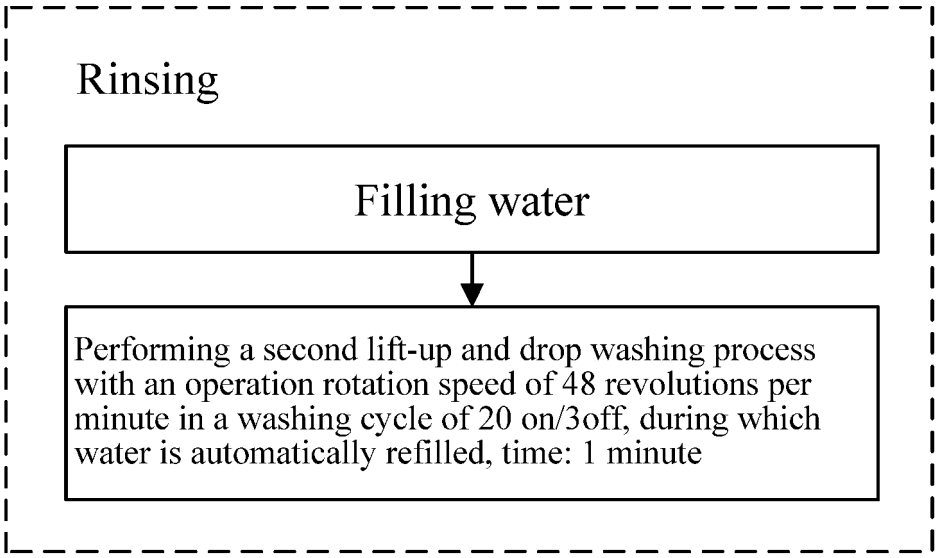

FIG. 9

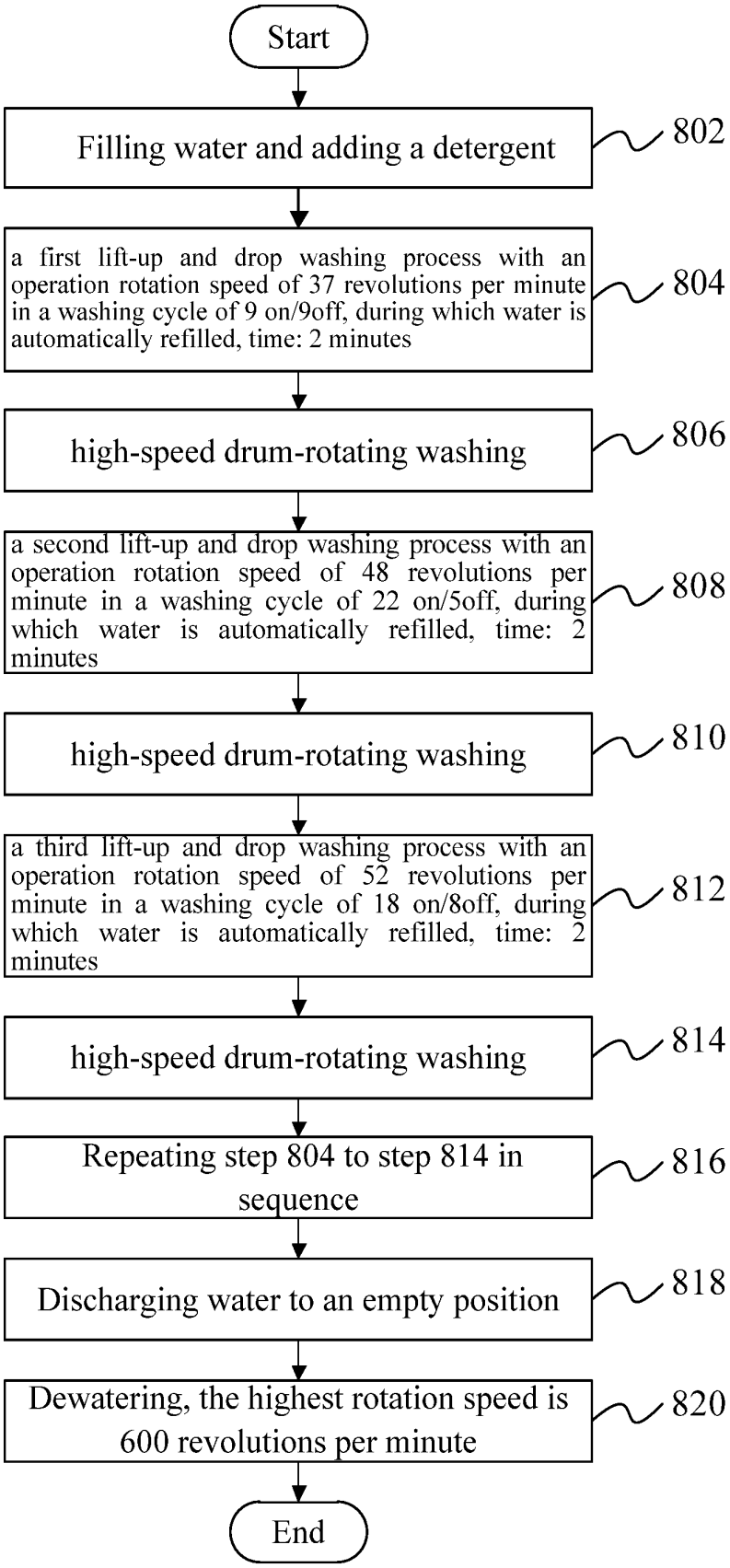
Start
Filling water and adding a detergent
802
a first lift-up and drop washing process with an operation rotation speed of 37 revolutions per minute in a washing cycle of 9 on/9off, during which water is automatically refilled, time: 2 minutes
804
high-speed drum-rotating washing
806
a second lift-up and drop washing process with an operation rotation speed of 48 revolutions per minute in a washing cycle of 22 on/5off, during which water is automatically refilled, time: 2 minutes
808
high-speed drum-rotating washing
810
a third lift-up and drop washing process with an operation rotation speed of 52 revolutions per minute in a washing cycle of 18 on/8off, during which water is automatically refilled, time: 2 minutes
812
high-speed drum-rotating washing
814
Repeating step 804 to step 814 in sequence
816
Discharging water to an empty position
818
Dewatering, the highest rotation speed is 600 revolutions per minute
820
End

FIG. 10

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2019/086902

A. CLASSIFICATION OF SUBJECT MATTER

D06F 33/00(2006.01)i; D06F 33/02(2006.01)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)

WPI, EPODOC, CNPAT, CNKI: 摔打, 旋桶, 洗涤, 补水, 水位, 停止, 停机, 间歇, 节拍, 时长, 周期, beat, water, supply, stop, level, rinse, step, time, detect+

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 105088633 A (WUXI LITTLE SWAN COMPANY LIMITED) 25 November 2015 (2015-11-25) description, paragraphs 51-73 and 102	1-6, 13-18
Y	CN 105088633 A (WUXI LITTLE SWAN COMPANY LIMITED) 25 November 2015 (2015-11-25) description, paragraphs 51-73 and 102	7-12, 19-24
Y	CN 108660682 A (WUXI LITTLE SWAN COMPANY LIMITED) 16 October 2018 (2018-10-16) description, paragraph 25	7-12, 19-24
A	CN 105088616 A (WUXI LITTLE SWAN CO., LTD.) 25 November 2015 (2015-11-25) entire document	1-24
A	CN 105088638 A (WUXI LITTLE SWAN CO., LTD.) 25 November 2015 (2015-11-25) entire document	1-24
A	CN 105088635 A (WUXI LITTLE SWAN CO., LTD.) 25 November 2015 (2015-11-25) entire document	1-24
A	CN 105088640 A (WUXI LITTLE SWAN CO., LTD.) 25 November 2015 (2015-11-25) entire document	1-24

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

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"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
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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
16 December 2019	**02 January 2020**

Name and mailing address of the ISA/CN	Authorized officer
China National Intellectual Property Administration (ISA/CN) **No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088** **China**	
Facsimile No. **(86-10)62019451**	Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2019/086902

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN 1439763 A (SAMSUNG ELECTRONICS CO., LTD.) 03 September 2003 (2003-09-03) entire document	1-24
A	CN 104878561 A (WUXI LITTLE SWAN CO., LTD.) 02 September 2015 (2015-09-02) entire document	1-24
A	JP H06327881 A (SANYO ELECTRIC CO., LTD.) 29 November 1994 (1994-11-29) entire document	1-24

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2019/086902

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
CN 105088633 A	25 November 2015	WO 2015165240 A1	05 November 2015
CN 108660682 A	16 October 2018	None	
CN 105088616 A	25 November 2015	WO 2015165239 A1	05 November 2015
CN 105088638 A	25 November 2015	WO 2015165241 A1	05 November 2015
CN 105088635 A	25 November 2015	WO 2015165242 A1	05 November 2015
CN 105088640 A	25 November 2015	WO 2015165238 A1	05 November 2015
CN 1439763 A	03 September 2003	KR 20030069348 A	27 August 2003
		JP 2003236292 A	26 August 2003
		US 2003154559 A1	21 August 2003
CN 104878561 A	02 September 2015	None	
JP H06327881 A	29 November 1994	None	

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- CN 201910237463 **[0001]**
- CN 201910237450 **[0001]**