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(54) **CLOTHING TREATMENT APPARATUS, CONTROL METHOD, CONTROL SYSTEM, AND READABLE STORAGE MEDIUM**

(57) A clothing treatment apparatus, a control method, a control system (700, 800), and a readable storage medium (702). The control method for a clothing treatment apparatus comprises: controlling the clothing treatment apparatus to allow water to enter therein, and acquiring a water level of an outer cylinder of the clothing treatment apparatus; and upon determining that the water level has reached a first water level, controlling the clothing treatment apparatus to enter a main washing stage in which beat washing and a cylinder rotation washing are performed alternately, wherein the main washing stage comprises a first beat washing process and a second beat washing process, and a motor of the clothing treatment apparatus is controlled to perform the first beat washing process at a first washing tempo, and to perform the second beat washing process at a second washing tempo, the first washing tempo being different from the second washing tempo. The invention performs multiple beat washing and high-speed cylinder rotation washing alternately, thereby effectively improving washing efficiency and a washing effect. In addition, washing water does not need to be heated during the whole washing process, thereby avoiding damage to clothing caused by high temperature, and reducing energy consumption.

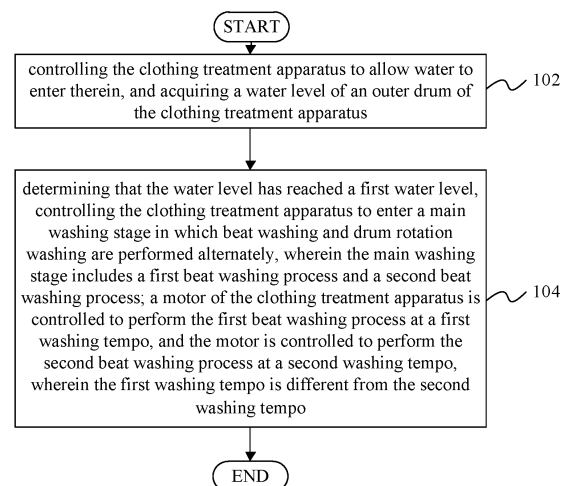


Figure 1

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Description

CROSS-REFERENCES TO RELATED APPLICATIONS

[0001] The present application claims the priority of Chinese Patent Application No. 201910237450.5, entitled "CLOTHING TREATMENT APPARATUS, CONTROL METHOD, CONTROL SYSTEM, AND READABLE STORAGE MEDIUM", filed with the Chinese Patent Office on March 27, 2019, the entire content of which is hereby incorporated herein as a reference.

FIELD

[0002] The present disclosure relates to the field of clothing treatment apparatus, and in particular to a control method for a clothing treatment apparatus, a computer-readable storage medium, a control system of a clothing treatment apparatus, a control system of a clothing treatment apparatus, and a clothing treatment apparatus.

BACKGROUND

[0003] In order to improve the washing effect, the existing drum washing machine usually heats the washing water. The heating not only increases energy consumption, but also easily causes damage to clothing. For example, it is more likely to cause fading and staining of light-colored clothing. As a result, clothing appears old and dirty after being washed several times.

[0004] Therefore, it is necessary to provide a washing method that can not only ensure the washing effect, but also protect clothing.

SUMMARY

[0005] The present disclosure aims to solve at least one of the technical problems existing in the prior art or related technologies.

[0006] To this end, an aspect of the present disclosure is to provide a control method for a clothing treatment apparatus.

[0007] The second aspect of the present disclosure is to provide a computer-readable storage medium.

[0008] The third aspect of the present disclosure is to provide a control system of a clothing treatment apparatus.

[0009] The fourth aspect of the present disclosure is to provide a control system of a clothing treatment apparatus.

[0010] The fifth aspect of the present disclosure is to provide a clothing treatment apparatus.

[0011] The sixth aspect of the present disclosure is to provide a clothing treatment apparatus.

[0012] In view of this, the first aspect of the present disclosure provides a control method for a clothing treatment apparatus, including: controlling the clothing treat-

ment apparatus to allow water to enter therein, and acquiring a water level of an outer drum of the clothing treatment apparatus; and determining that the water level has reached a first water level, controlling the clothing treatment apparatus to enter a main washing stage in which beat washing and drum rotation washing are performed alternately, wherein the main washing stage includes a first beat washing process and a second beat washing process, wherein a motor of the clothing treatment apparatus is controlled to perform the first beat washing process at a first washing tempo, and the motor is controlled to perform the second beat washing process at a second washing tempo, wherein the first washing tempo is different from the second washing tempo.

[0013] In the control method for a clothing treatment apparatus provided by the present disclosure, after controlling the clothing treatment apparatus to allow water to enter therein, the water level of the outer drum of the clothing treatment apparatus is monitored, and after the water level has reached a first water level, the clothing treatment apparatus is controlled to enter a main washing stage in which beat washing and drum rotation washing are performed alternately. In addition, the degree of variation of the washing tempo is increased, such that the motor is controlled to perform the first and second beat washing process in sequence at two different preset washing tempos (namely, the first washing tempo and the second washing tempo). With the control method for a clothing treatment apparatus, the present disclosure performs multiple beat washing and high-speed drum rotation washing alternately, thereby effectively improving the washing efficiency and washing effect. In addition, washing water does not need to be heated during the whole washing process, thereby avoiding damage to clothing caused by high temperature, and reducing energy consumption.

[0014] The first water level is a water inflow level, and is a preset value. When the water inflow has reached the first water level, the main washing program is started. The first water level may be specifically set according to the empirical value. The first beat washing process and the second beat washing process are the washing stage between the end of water inflow and the start of the drum rotation washing, or the washing stage between the end of the current drum rotation washing and the start of the next drum rotation washing.

[0015] The control method for a clothing treatment apparatus provided in the present disclosure may also have the following technical features.

[0016] In the above technical solution, the motor of the clothing treatment apparatus is controlled to perform the first beat washing process at the first washing tempo specifically by controlling the motor to operate at the first washing tempo and a first rotation speed; and the motor is controlled to perform the second beat washing process at the second washing tempo specifically by controlling the motor to operate at the second washing tempo and a second rotation speed.

[0017] In this technical solution, the clothing treatment apparatus is controlled to enter a main washing stage in which beat washing and drum rotation washing are performed alternately, wherein the main washing stage includes a first beat washing process and a second beat washing process, wherein the first beat washing process and the second beat washing process are the washing stage between the end of water inflow and the start of the drum rotation washing, or the washing stage between the end of the current drum rotation washing and the start of the next drum rotation washing. In addition, the degree of variation of the washing tempo is increased, such that the motor is controlled to perform the first and second beat washing processes in sequence at two different preset washing tempos (namely, the first washing tempo and the second washing tempo). With the control method for a clothing treatment apparatus, washing water does not need to be heated during the whole washing process, thereby avoiding damage to clothing caused by high temperature, and reducing energy consumption. In addition, the present disclosure performs multiple beat washing and high-speed drum rotation washing alternately, thereby effectively improving the washing efficiency and washing effect.

[0018] In any of the above technical solutions, the main washing stage further includes a third beat washing process, and the control method for a clothing treatment apparatus further includes controlling the motor to perform the third beat washing process at a third washing tempo and a third rotation speed, wherein third washing tempo is different from the first washing tempo and the second washing tempo.

[0019] In this technical solution, the main washing stage further includes a third beat washing process, during which, the motor is controlled to operate at a third washing tempo and a third rotation speed, wherein the third washing tempo is different from the first washing tempo and the second washing tempo. Therefore, the present disclosure may perform the first, second, and third beat washing processes at three different washing tempos respectively, to further increase the degree of variation of the washing tempo, thereby effectively improving the washing efficiency and washing effect.

[0020] The first washing tempo, the first rotation speed, the second washing tempo, the second rotation speed, the third washing tempo, and the third rotation speed are all preset values, and may be set as long as the first washing tempo, the second washing tempo and the third washing tempo are different such that the clothing treatment apparatus washes alternately with a variety of tempos. In any of the above technical solutions, the first washing tempo is rotating for a first duration and stationary for a second duration; the second washing tempo is rotating for a third duration and stationary for a fourth duration; and the third washing tempo is rotating for a fifth duration and stationary for a sixth duration.

[0021] In this technical solution, the first, second, and third washing tempos are limited. By setting different ro-

tation durations and stationary durations, different washing tempos can be obtained, thereby increasing the degree of variation of the washing tempos. In addition, the motor performs the main washing stage with multiple beat washing and high-speed drum rotation washing alternately, thereby effectively improving the washing efficiency and washing effect.

[0022] In any of the above technical solutions, the first rotation speed, the second rotation speed, and the third rotation speed are each not less than 30 revolutions per minute, and not more than 60 revolutions per minute.

[0023] In this technical solution, the first, second, and third rotation speeds are specifically limited, so that when the motor is running at the first, second, and third rotation speeds, the inner drum is driven to rotate to form a beat washing effect on clothing.

[0024] In any of the above technical solutions, a ratio of the first duration to the second duration is not less than 0.7 and not more than 7; a ratio of the third duration to the fourth duration is not less than 0.7 and not more than 7; and a ratio of the fifth duration to the sixth duration is not less than 0.7 and not more than 7.

[0025] In this technical solution, by limiting the rotation-to-stationary ratio of each preset washing tempo to ensure that the rotation-to-stationary ratio of each preset washing tempo is between 0.7 and 7, it can effectively improve the washing effect of clothing, and protect clothing from wear and tear.

[0026] In any of the above technical solutions, the control method for a clothing treatment apparatus further including: controlling the motor to rotate at a fourth preset rotation speed for a seventh duration each time during the drum rotation washing, wherein the fourth preset rotation speed is greater than the first rotation speed, the second rotation speed, and the third rotation speed.

[0027] In this technical solution, during the drum rotation washing of the main washing stage of the clothing treatment apparatus, the motor is controlled to rotate at a fourth preset rotation speed for a seventh duration each time, and the stationary duration is not limited here; wherein, the fourth preset rotation speed is greater than the first rotation speed, the second rotation speed, and the third rotation speed. In addition, the fourth preset rotation speed should meet the condition of the drum rotation washing, so that clothing are attached to the inner drum and washed through the drive of inner drum.

[0028] In any of the above technical solutions, the control method for a clothing treatment apparatus further includes: entering a rinsing stage after the main washing stage is completed, wherein the rinsing stage includes at least one drum rotation washing.

[0029] In any of the above technical solutions, the control method for a clothing treatment apparatus further includes: controlling the motor to rotate at a fifth preset rotation speed during the drum rotation washing of the rinsing stage, wherein the fifth preset rotation speed is greater than the first rotation speed, the second rotation speed, and the third rotation speed, and is less than the

fourth preset rotation speed.

[0030] In this technical solution, after the main washing stage, a rinsing stage is started which includes at least one drum rotation washing to further improve the washing effect. For example, two rinse washings are performed, and a drum rotation washing is inserted therebetween. In the rinsing stage, the rotation speed of the drum rotation washing is slightly lower. Specifically, the motor is controlled to rotate at the fifth preset rotation speed, wherein the fifth preset rotation speed is greater than the first rotation speed, the second rotation speed, and the third rotation speed, and is less than the fourth preset rotation speed. In this way, it not only satisfies the washing condition of the drum rotation washing, but also avoids too high rotation speed which may weaken the penetration and exchange of washing water in clothing, further improving the washing effect.

[0031] In any of the above technical solutions, the fourth preset rotation speed is not less than 150 revolutions per minute; the seventh duration is not less than 15 seconds; and the fifth preset rotation speed is not less than 100 revolutions per minute and is not more than 150 revolutions per minute.

[0032] In this technical solution, the lower limits of the fourth preset rotation speed and the seventh duration are specifically limited to meet the needs of drum rotation washing and improve the clothing washing effect. Based on the value range of the fourth preset rotation speed and the seventh duration, the washing tempo of the motor may be set, for example, the motor rotates at 200 revolutions per minute for 20 seconds, and stationary duration is not specifically set. The fifth preset rotation speed is specifically limited, such that the fifth preset rotation speed is slightly lower than the fourth rotation speed. For example, the third rotation speed is 130 rpm. In this way, it not only satisfies the washing condition of the drum rotation washing, but also avoids too high rotation speed which may weaken the penetration and exchange of washing water in clothing, further improving the washing effect.

[0033] In any of the above technical solutions, the rinsing stage further includes rinse washing, and the control method for a clothing treatment apparatus further includes: acquiring an operating state of the motor during the first beat washing process, the second beat washing process, the third beat washing process and the rinse washing; determining that the motor has stopped rotating, acquiring the water level of the outer drum; and determining that the water level is lower than a second water level, controlling a water inlet valve of the clothing treatment apparatus to open, wherein the second water level is lower than the first water level.

[0034] In this technical solution, during the beat washing process of the main washing stage and the rinse washing process of the rinsing stage, water supplement monitoring is performed. After the motor has stopped, the water level of the outer drum is acquired for determining whether the water level of the outer drum is lower

than the second water level after the motor has stopped. If the water level of the outer drum is lower than the second water level, a water inlet valve of the clothing treatment apparatus is controlled to open for water supplement. This can ensure that the water level of the outer drum meets the washing demand, thereby improving the washing efficiency and washing effect. Further, when it is determined that the water level has reached the first water level, the water inlet valve is controlled to close to stop the water supplement. The second water level is a set water supplement level. When the water level in the outer drum is lower than the second water level, water supplement is required. The first water level is a set water inflow level. When the water level in the outer drum has reached the first water level, the water supplement is stopped. The first and second water levels may be specifically set based on empirical values.

[0035] In any of the above technical solutions, during controlling the clothing treatment apparatus to enter a main washing stage in which beat washing and drum rotation washing are performed alternately, a heating device of the clothing treatment apparatus is controlled to turn off.

[0036] In this technical solution, in the main washing stage, by controlling the heating device of the clothing treatment apparatus to turn off, the purpose of avoiding heating the washing water is achieved, thereby avoiding high temperature damage to clothing and reducing energy consumption. In addition, the present disclosure performs multiple beat washing and high-speed drum rotation washing alternately, thereby effectively improving the washing efficiency and washing effect.

[0037] The second aspect of the present disclosure provides a computer-readable storage medium with a computer program stored thereon, wherein the computer program, when executed by a processor, implements a control method for a clothing treatment apparatus according to any of the above technical solutions. Therefore, the computer-readable storage medium has all the beneficial effects of the control method for a clothing treatment apparatus according to any of the above technical solutions.

[0038] The third aspect of the present disclosure provides a control system of a clothing treatment apparatus, including: a memory, a processor, and a computer program stored on the memory and executable by the processor, wherein the processor, when executing the computer program, implements a control method for a clothing treatment apparatus according to any of the above technical solutions. Therefore, the control system of a clothing treatment apparatus has all the beneficial effects of the control method for a clothing treatment apparatus according to any of the above technical solutions.

[0039] The fourth aspect of the present disclosure provides a control system of a clothing treatment apparatus, including: a control unit, configured to control the clothing treatment apparatus to allow water to enter therein; an acquiring unit, configured to acquire a water level of an

outer drum of the clothing treatment apparatus; wherein the control unit is further configured to, determining that the water level has reached a first water level, control the clothing treatment apparatus to enter a main washing stage in which beat washing and drum rotation washing are performed alternately, wherein the main washing stage includes a first beat washing process and a second beat washing process; and to control a motor of the clothing treatment apparatus to perform the first beat washing process at a first washing tempo, and to control the motor of the clothing treatment apparatus to perform the second beat washing process at a second washing tempo, wherein the first washing tempo is different from the second washing tempo.

[0040] In the control system of a clothing treatment apparatus provided by the present disclosure, after controlling the clothing treatment apparatus to allow water to enter therein, the water level of the outer drum of the clothing treatment apparatus is monitored, and after the water level has reached a first water level, the clothing treatment apparatus is controlled to enter a main washing stage in which beat washing and drum rotation washing are performed alternately. In addition, the degree of variation of the washing tempo is increased, such that the motor is controlled to perform the first and second beat washing process in sequence at two different preset washing tempos (namely, the first washing tempo and the second washing tempo). With the control method for a clothing treatment apparatus, the present disclosure performs multiple beat washing and high-speed drum rotation washing alternately, thereby effectively improving the washing efficiency and washing effect. In addition, washing water does not need to be heated during the whole washing process, thereby avoiding damage to clothing caused by high temperature, and reducing energy consumption.

[0041] The first water level is a water inflow level. When the water inflow has reached the first water level, the main washing program is started. The first water level may be specifically set according to the empirical value. The first beat washing process and the second beat washing process are the washing stage between the end of water inflow and the start of the drum rotation washing, or the washing stage between the end of the current drum rotation washing and the start of the next drum rotation washing.

[0042] In the above technical solution, the control unit is configured to control the motor of the clothing treatment apparatus to perform the first beat washing process at the first washing tempo specifically by controlling the motor to operate at the first washing tempo and a first rotation speed; and the control unit is configured to control the motor to perform the second beat washing process at the second washing tempo specifically by controlling the motor to operate at the second washing tempo and a second rotation speed.

[0043] In this technical solution, the clothing treatment apparatus is controlled to enter a main washing stage in

which beat washing and drum rotation washing are performed alternately, wherein the main washing stage includes a first beat washing process and a second beat washing process, wherein the first beat washing process and the second beat washing process are the washing stage between the end of water inflow and the start of the drum rotation washing, or the washing stage between the end of the current drum rotation washing and the start of the next drum rotation washing. In addition, the degree of variation of the washing tempo is increased, such that the motor is controlled to perform the first and second beat washing processes in sequence at two different preset washing tempos (namely, the first washing tempo and the second washing tempo). With the control method for a clothing treatment apparatus, washing water does not need to be heated during the whole washing process, thereby avoiding damage to clothing caused by high temperature, and reducing energy consumption. In addition, the present disclosure performs multiple beat washing and high-speed drum rotation washing alternately, thereby effectively improving the washing efficiency and washing effect.

[0044] In any of the above technical solutions, the main washing stage further includes a third beat washing process, and the control unit is further configured to control the motor to perform the third beat washing process at a third washing tempo and a third rotation speed, wherein third washing tempo is different from the first washing tempo and the second washing tempo.

[0045] In this technical solution, the main washing stage further includes a third beat washing process, during which, the motor is controlled to operate at a third washing tempo and a third rotation speed, wherein the third washing tempo is different from the first washing tempo and the second washing tempo. Therefore, the present disclosure may perform the first, second, and third beat washing processes at three different washing tempos respectively, to further increase the degree of variation of the washing tempo, thereby effectively improving the washing efficiency and washing effect.

[0046] The first washing tempo, the first rotation speed, the second washing tempo, the second rotation speed, the third washing tempo, and the third rotation speed are all preset values, and may be set as long as the first washing tempo, the second washing tempo and the third washing tempo are different such that the clothing treatment apparatus washes alternately with a variety of tempos.

[0047] In any of the above technical solutions, the first washing tempo is rotating for a first duration and stationary for a second duration; the second washing tempo is rotating for a third duration and stationary for a fourth duration; and the third washing tempo is rotating for a fifth duration and stationary for a sixth duration.

[0048] In this technical solution, the first, second, and third washing tempos are limited. By setting different rotation durations and stationary durations, different washing tempos can be obtained, thereby increasing the de-

gree of variation of the washing tempos. In addition, the motor performs the main washing stage with multiple beat washing and high-speed drum rotation washing alternately, thereby effectively improving the washing efficiency and washing effect.

[0049] In any of the above technical solutions, the first rotation speed, the second rotation speed, and the third rotation speed are each not less than 30 revolutions per minute, and not more than 60 revolutions per minute.

[0050] In this technical solution, the first, second, and third rotation speeds are specifically limited, so that when the motor is running at the first, second, and third rotation speeds, the inner drum is driven to rotate to form a beat washing effect on clothing.

[0051] In any of the above technical solutions, a ratio of the first duration to the second duration is not less than 0.7 and not more than 7; a ratio of the third duration to the fourth duration is not less than 0.7 and not more than 7; and a ratio of the fifth duration to the sixth duration is not less than 0.7 and not more than 7.

[0052] In this technical solution, by limiting the rotation-to-stationary ratio of each preset washing tempo to ensure that the rotation-to-stationary ratio of each preset washing tempo is between 0.7 and 7, it can effectively improve the washing effect of clothing, and protect clothing from wear and tear.

[0053] In any of the above technical solutions, the control unit is further configured to control the motor to rotate at the fourth preset rotation speed for a seventh duration each time during the drum rotation washing.

[0054] In this technical solution, during the drum rotation washing of the main washing stage of the clothing treatment apparatus, the motor is controlled to rotate at a fourth preset rotation speed for a seventh duration each time, and the stationary duration is not limited here; wherein, the fourth preset rotation speed is greater than the first rotation speed, the second rotation speed, and the third rotation speed. In addition, the fourth preset rotation speed should meet the condition of the drum rotation washing, so that clothing are attached to the inner drum and washed through the drive of inner drum.

[0055] In any of the above technical solutions, the control unit is further configured to control the clothing treatment apparatus to enter a rinsing stage after the main washing stage is completed, wherein the rinsing stage includes at least one drum rotation washing.

[0056] In any of the above technical solutions, the control unit is further configured to control the motor to rotate at a seventh preset rotation speed during the drum rotation washing of the rinsing stage, wherein the seventh preset rotation speed is greater than the first rotation speed and is less than the fourth preset rotation speed.

[0057] In any of the above technical solutions, the control unit is further configured to control the motor to rotate at a fifth preset rotation speed during the drum rotation washing of the rinsing stage, wherein the fifth preset rotation speed is greater than the first rotation speed, the second rotation speed, and the third rotation speed, and

is less than the fourth preset rotation speed.

[0058] In this technical solution, after the main washing stage, a rinsing stage is started which includes at least one drum rotation washing to further improve the washing effect. For example, two rinse washings are performed, and a drum rotation washing is inserted therebetween. In the rinsing stage, the rotation speed of the drum rotation washing is slightly lower. Specifically, the motor is controlled to rotate at the fifth preset rotation speed, wherein the fifth preset rotation speed is greater than the first rotation speed, the second rotation speed, and the third rotation speed, and is less than the fourth preset rotation speed. In this way, it not only satisfies the washing condition of the drum rotation washing, but also avoids too high rotation speed which may weaken the penetration and exchange of washing water in clothing, further improving the washing effect.

[0059] In any of the above technical solutions, the fourth preset rotation speed is not less than 150 revolutions per minute; the seventh duration is not less than 15 seconds; and the fifth preset rotation speed is not less than 100 revolutions per minute and is not more than 150 revolutions per minute.

[0060] In this technical solution, the lower limits of the fourth preset rotation speed and the seventh duration are specifically limited to meet the needs of drum rotation washing and improve the clothing washing effect. Based on the value range of the fourth preset rotation speed and the seventh duration, the washing tempo of the motor may be set, for example, the motor rotates at 200 revolutions per minute for 20 seconds, and stationary duration is not specifically set. The fifth preset rotation speed is specifically limited, such that the fifth preset rotation speed is slightly lower than the fourth rotation speed. For example, the third rotation speed is 130 rpm. In this way, it not only satisfies the washing condition of the drum rotation washing, but also avoids too high rotation speed which may weaken the penetration and exchange of washing water in clothing, further improving the washing effect.

[0061] In any of the above technical solutions, the rinsing stage further includes rinse washing, and the control unit is further configured to acquire an operating state of the motor during the first beat washing process, the second beat washing process, the third beat washing process and the rinse washing; determining that the motor has stopped rotating, acquire the water level of the outer drum of the clothing treatment apparatus; and determining that the water level is lower than a second water level, control a water inlet valve of the clothing treatment apparatus to open, wherein the second water level is lower than the first water level.

[0062] In this technical solution, during the beat washing process of the main washing stage and the rinse washing process of the rinsing stage, water supplement monitoring is performed. After the motor has stopped, the water level of the outer drum is acquired for determining whether the water level of the outer drum is lower

than the second water level after the motor has stopped. If the water level of the outer drum is lower than the second water level, a water inlet valve of the clothing treatment apparatus is controlled to open for water supplement. This can ensure that the water level of the outer drum meets the washing demand, thereby improving the washing efficiency and washing effect. Further, when it is determined that the water level has reached the first water level, the water inlet valve is controlled to close to stop the water supplement.

[0063] The second water level is a water supplement level. When the water level in the outer drum is lower than the second water level, water supplement is required. The first water level is a set water inflow level. When the water level in the outer drum has reached the first water level, the water supplement is stopped. The first and second water levels may be specifically set based on empirical values.

[0064] In any of the above technical solutions, during controlling the clothing treatment apparatus to enter a main washing stage in which beat washing and drum rotation washing are performed alternately, the control unit is further configured to control a heating device of the clothing treatment apparatus to turn off.

[0065] In this technical solution, in the main washing stage, by controlling the heating device of the clothing treatment apparatus to turn off, the purpose of avoiding heating the washing water is achieved, thereby avoiding high temperature damage to clothing and reducing energy consumption. In addition, the present disclosure performs multiple beat washing and high-speed drum rotation washing alternately, thereby effectively improving the washing efficiency and washing effect.

[0066] The fifth aspect of the present disclosure provides a clothing treatment apparatus, including a control system of a clothing treatment apparatus according to any of above technical solutions. Therefore, the clothing treatment apparatus has all the beneficial effects of the control system of a clothing treatment apparatus according to any of above technical solutions.

[0067] The sixth aspect of the present disclosure provides a clothing treatment device including: a memory, a processor, and a computer program stored on the memory and executable by the processor, wherein the processor, when executing the computer program, implements a control method for a clothing treatment apparatus according to any of the above technical solutions. Therefore, the clothing treatment apparatus has all the beneficial effects of the control method for a clothing treatment apparatus according to any of the above technical solutions.

[0068] The additional aspects and advantages of the present disclosure will become apparent in the following description, or be understood through the practice of the present disclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

[0069] The above and/or additional aspects and advantages of the present disclosure will become obvious and easy to understand from the description of the embodiments in conjunction with the following drawings, in which:

Fig. 1 is a schematic flowchart of a control method for a clothing treatment apparatus according to an embodiment of the present disclosure;

Fig. 2 is a schematic flowchart of a control method for a clothing treatment apparatus according to another embodiment of the present disclosure;

Fig. 3 is a schematic flowchart of a control method for a clothing treatment apparatus according to a further embodiment of the present disclosure;

Fig. 4 is a schematic flowchart of a control method for a clothing treatment apparatus according to still a further embodiment of the present disclosure;

Fig. 5 is a schematic flowchart of a control method for a clothing treatment apparatus according to still a further embodiment of the present disclosure;

Fig. 6 is a schematic flowchart of a control method for a clothing treatment apparatus according to still a further embodiment of the present disclosure;

Fig. 7 is a schematic block diagram of a control system of a clothing treatment apparatus according to an embodiment of the present disclosure;

Fig. 8 is a schematic block diagram for a control system of a clothing treatment apparatus according to an embodiment of the present disclosure;

Fig. 9 is a schematic flowchart of a control method for a clothing treatment apparatus according to a specific embodiment of the present disclosure;

Fig. 10 is a schematic flowchart of a control method for a clothing treatment apparatus according to a specific embodiment of the present disclosure;

Fig. 11 is a schematic flowchart of a control method for a clothing treatment apparatus according to a specific embodiment of the present disclosure; and Fig. 12 is a schematic flowchart of a control method for a clothing treatment apparatus according to a specific embodiment of the present disclosure.

DETAILED DESCRIPTION

[0070] In order to understand the above objectives, features and advantages of the present disclosure more clearly, the present disclosure will be further described in detail below with reference to the accompanying drawings and specific implementations. It should be noted that, unless there is a conflict, the embodiments of the present disclosure and the features in the embodiments can be combined with each other.

[0071] Many specific details are set forth in the following description to facilitate a full understanding of the present disclosure. However, the present disclosure can

also be implemented in other ways different from those described herein. Therefore, the scope of protection of the present disclosure is not limited by the specific embodiments disclosed below.

[0072] An embodiment of the first aspect of the present disclosure provides a control method for a clothing treatment apparatus.

[0073] Fig. 1 is a schematic flowchart of a control method for a clothing treatment apparatus according to an embodiment of the present disclosure. The control method for a clothing treatment apparatus includes the following steps 102 and 104:

Step 102: controlling the clothing treatment apparatus to allow water to enter therein, and acquiring a water level of an outer drum of the clothing treatment apparatus;

Step 104: determining that the water level has reached a first water level, controlling the clothing treatment apparatus to enter a main washing stage in which beat washing and drum rotation washing are performed alternately, wherein the main washing stage includes first beat washing process and a second beat washing process, wherein a motor of the clothing treatment apparatus is controlled to perform the first beat washing process at a first washing tempo, and the motor is controlled to perform the second beat washing process at a second washing tempo, wherein the first washing tempo is different from the second washing tempo.

[0074] In the control method for a clothing treatment apparatus provided by the present disclosure, after controlling the clothing treatment apparatus to allow water to enter therein, the water level of the outer drum of the clothing treatment apparatus is monitored, and after the water level has reached a first water level, the clothing treatment apparatus is controlled to enter a main washing stage in which beat washing and drum rotation washing are performed alternately. In addition, the degree of variation of the washing tempo is increased, such that the motor is controlled to perform the first and second beat washing process in sequence at two different preset washing tempos (namely, the first washing tempo and the second washing tempo). With the control method for a clothing treatment apparatus, the present disclosure performs multiple beat washing and high-speed drum rotation washing alternately, thereby effectively improving the washing efficiency and washing effect. In addition, washing water does not need to be heated during the whole washing process, thereby avoiding damage to clothing caused by high temperature, and reducing energy consumption.

[0075] The first water level is a water inflow level. When the water inflow has reached the first water level, the main washing program is started. The first water level may be specifically set according to the empirical value. The first beat washing process and the second beat

washing process are the washing stage between the end of water inflow and the start of the drum rotation washing, or the washing stage between the end of the current drum rotation washing and the start of the next drum rotation washing.

[0076] In an embodiment of the present disclosure, the motor of the clothing treatment apparatus is controlled to perform the first beat washing process at the first washing tempo specifically by controlling the motor to operate at the first washing tempo and a first rotation speed; and the motor is configured to perform the second beat washing process at the second washing tempo specifically by controlling the motor to operate at the second washing tempo and a second rotation speed.

[0077] In this technical solution, the clothing treatment apparatus is controlled to enter a main washing stage in which beat washing and drum rotation washing are performed alternately, wherein the main washing stage includes a first beat washing process and a second beat washing process, wherein the first beat washing process and the second beat washing process are the washing stage between the end of water inflow and the start of the drum rotation washing, or the washing stage between the end of the current drum rotation washing and the start of the next drum rotation washing. In addition, the degree of variation of the washing tempo is increased, such that the motor is controlled to perform the first and second beat washing processes in sequence at two different preset washing tempos (namely, the first washing tempo and the second washing tempo). With the control method for a clothing treatment apparatus, washing water does not need to be heated during the whole washing process, thereby avoiding damage to clothing caused by high temperature, and reducing energy consumption. In addition, the present disclosure performs multiple beat washing and high-speed drum rotation washing alternately, thereby effectively improving the washing efficiency and washing effect.

[0078] Fig. 2 is a schematic flowchart of a control method for a clothing treatment apparatus according to another embodiment of the present disclosure. The control method for a clothing treatment apparatus includes the following steps 202 and 204:

Step 202: controlling the clothing treatment apparatus to allow water to enter therein, and acquiring a water level of an outer drum of the clothing treatment apparatus;

Step 204: determining that the water level has reached a first water level, controlling the clothing treatment apparatus to enter a main washing stage in which beat washing and drum rotation washing are performed alternately, wherein the main washing stage includes a first beat washing process, a second beat washing process and a third beat washing process, wherein a motor of the clothing treatment apparatus is controlled to perform the first beat washing process at a first washing tempo and a first rota-

tion speed; the motor is controlled to perform the second beat washing process at a second washing tempo and a second rotation speed; and the motor is controlled to perform the third beat washing process at a third washing tempo and a third rotation speed, wherein first washing tempo, the second washing tempo, and the third washing tempo are all different.

[0079] In this embodiment, the main washing stage further includes a third beat washing process, during which, the motor is controlled to operate at a third washing tempo and a third rotation speed, wherein the third washing tempo is different from the first washing tempo and the second washing tempo. Therefore, the present disclosure may perform the first, second, and third beat washing processes at three different washing tempos respectively, to further increase the degree of variation of the washing tempo, thereby effectively improving the washing efficiency and washing effect.

[0080] The first washing tempo, the first rotation speed, the second washing tempo, the second rotation speed, the third washing tempo, and the third rotation speed are all preset values, and may be set as long as the first washing tempo, the second washing tempo and the third washing tempo are different such that the clothing treatment apparatus washes alternately with a variety of tempos.

[0081] In any of the above embodiments, the first washing tempo is rotating for a first duration and stationary for a second duration; the second washing tempo is rotating for a third duration and stationary for a fourth duration; and the third washing tempo is rotating for a fifth duration and stationary for a sixth duration.

[0082] In this embodiment, the first, second, and third washing tempos are limited. By setting different rotation durations and stationary durations, different washing tempos can be obtained, thereby increasing the degree of variation of the washing tempos. In addition, the motor performs the main washing stage with multiple beat washing and high-speed drum rotation washing alternately, thereby effectively improving the washing efficiency and washing effect.

[0083] In any of the above embodiments, the first rotation speed, the second rotation speed, and the third rotation speed are each not less than 30 revolutions per minute, and not more than 60 revolutions per minute.

[0084] In this embodiment, the first, second, and third rotation speeds are specifically limited, so that when the motor is running at the first, second, and third rotation speeds, the inner drum is driven to rotate to form a beat washing effect on clothing.

[0085] In any of the above embodiments, a ratio of the first duration to the second duration is not less than 0.7 and not more than 7; a ratio of the third duration to the fourth duration is not less than 0.7 and not more than 7; and a ratio of the fifth duration to the sixth duration is not less than 0.7 and not more than 7.

[0086] In this embodiment, by limiting the rotation-to-stationary ratio of each preset washing tempo to ensure that the rotation-to-stationary ratio of each preset washing tempo is between 0.7 and 7, it can effectively improve the washing effect of clothing, and protect clothing from wear and tear.

[0087] FIG. 3 is a schematic flowchart of a control method for a clothing treatment apparatus according to a further embodiment of the present disclosure. The control method for a clothing treatment apparatus includes the following steps 302 and 304:

Step 302: controlling the clothing treatment apparatus to allow water to enter therein, and acquiring a water level of an outer drum of the clothing treatment apparatus;

Step 304: determining that the water level has reached a first water level, controlling the clothing treatment apparatus to enter a main washing stage in which beat washing and drum rotation washing are performed alternately, wherein the main washing stage includes a first beat washing process, a second beat washing process and a third beat washing process, wherein a motor of the clothing treatment apparatus is controlled to perform the first beat washing process at a first washing tempo and a first rotation speed; the motor is controlled to perform the second beat washing process at a second washing tempo and a second rotation speed; and the motor is controlled to perform the third beat washing process at a third washing tempo and a third rotation speed, wherein first washing tempo, the second washing tempo, and the third washing tempo are all different; and

controlling the motor to rotate at a fourth preset rotation speed for a seventh duration each time during the drum rotation washing, wherein the fourth preset rotation speed is greater than the first rotation speed, the second rotation speed, and the third rotation speed.

[0088] In this embodiment, during the drum rotation washing of the main washing stage of the clothing treatment apparatus, the motor is controlled to rotate at a fourth preset rotation speed for a seventh duration each time, and the stationary duration is not limited here; wherein, the fourth preset rotation speed is greater than the first rotation speed, the second rotation speed, and the third rotation speed. In addition, the fourth preset rotation speed should meet the condition of the drum rotation washing, so that clothing are attached to the inner drum and washed through the drive of inner drum.

[0089] FIG. 4 is a schematic flowchart of a control method for a clothing treatment apparatus according to a further embodiment of the present disclosure. The control method for a clothing treatment apparatus includes the following steps 402, 404 and 406:

Step 402: controlling the clothing treatment apparatus to allow water to enter therein, and acquiring a water level of an outer drum of the clothing treatment apparatus;

Step 404: determining that the water level has reached a first water level, controlling the clothing treatment apparatus to enter a main washing stage in which beat washing and drum rotation washing are performed alternately, wherein the main washing stage includes a first beat washing process, a second beat washing process and a third beat washing process, wherein a motor of the clothing treatment apparatus is controlled to perform the first beat washing process at a first washing tempo and a first rotation speed; the motor is controlled to perform the second beat washing process at a second washing tempo and a second rotation speed; and the motor is controlled to perform the third beat washing process at a third washing tempo and a third rotation speed, wherein first washing tempo, the second washing tempo, and the third washing tempo are all different; and

controlling the motor to rotate at a fourth preset rotation speed for a seventh duration each time during the drum rotation washing, wherein the fourth preset rotation speed is greater than the first rotation speed, the second rotation speed, and the third rotation speed;

Step 406: entering a rinsing stage after the main washing stage is completed, wherein the rinsing stage includes at least one drum rotation washing; during the drum rotation washing of the rinsing stage, controlling the motor to rotate at a fifth preset rotation speed, wherein the fifth preset rotation speed is greater than the first rotation speed, the second rotation speed, and the third rotation speed, and is less than the fourth preset rotation speed.

[0090] In this embodiment, after the main washing stage, a rinsing stage is started which includes at least one drum rotation washing to further improve the washing effect. For example, two rinse washings are performed, and a drum rotation washing is inserted therebetween. In the rinsing stage, the rotation speed of the drum rotation washing is slightly lower. Specifically, the motor is controlled to rotate at the fifth preset rotation speed, wherein the fifth preset rotation speed is greater than the first rotation speed, the second rotation speed, and the third rotation speed, and is less than the fourth preset rotation speed. In this way, it not only satisfies the washing condition of the drum rotation washing, but also avoids too high rotation speed which may weaken the penetration and exchange of washing water in clothing, further improving the washing effect.

[0091] In an embodiment of the present disclosure, the fourth preset rotation speed is not less than 150 revolutions per minute; the seventh duration is not less than 15 seconds; and the fifth preset rotation speed is not less

than 100 revolutions per minute and is not more than 150 revolutions per minute.

[0092] In this embodiment, the lower limits of the fourth preset rotation speed and the seventh duration are specifically limited to meet the needs of drum rotation washing and improve the clothing washing effect. Based on the value range of the fourth preset rotation speed and the seventh duration, the washing tempo of the motor may be set, for example, the motor rotates at 200 revolutions per minute for 20 seconds, and stationary duration is not specifically set. The fifth preset rotation speed is specifically limited, such that the fifth preset rotation speed is slightly lower than the fourth rotation speed. For example, the third rotation speed is 130 rpm. In this way, it not only satisfies the washing condition of the drum rotation washing, but also avoids too high rotation speed which may weaken the penetration and exchange of washing water in clothing, further improving the washing effect.

[0093] FIG. 5 is a schematic flowchart of a control method for a clothing treatment apparatus according to a further embodiment of the present disclosure. The control method for a clothing treatment apparatus includes the following steps 502, 504, 506, 508, 510 and 512.

Step 502: controlling the clothing treatment apparatus to allow water to enter therein, and acquiring a water level of an outer drum of the clothing treatment apparatus;

Step 504: determining that the water level has reached a first water level, controlling a motor of the clothing treatment apparatus to perform the first beat washing process at the first washing tempo; acquiring an operating state of the motor during the first beat washing process; determining that the motor has stopped rotating, acquiring the water level of the outer drum; and determining that the water level of the outer drum is lower than a second water level by comparing the water level of the outer drum to the second water level, controlling a water inlet valve of the clothing treatment apparatus to open;

Step 506: controlling the clothing treatment apparatus to perform a drum rotation washing;

Step 508: controlling the motor to perform the second beat washing process at the second washing tempo; acquiring an operating state of the motor during the second beat washing process; determining that the motor has stopped rotating, acquiring the water level of the outer drum; and determining that the water level of the outer drum is lower than a second water level by comparing the water level of the outer drum to the second water level, controlling the water inlet valve to open;

Step 510: controlling the clothing treatment apparatus to perform a drum rotation washing;

Step 512: entering a rinsing stage after the main washing stage is completed, wherein the rinsing stage includes at least one drum rotation washing.

[0094] The first washing tempo is rotating for a first duration and stationary for a second duration; the second washing tempo is rotating for a third duration and stationary for a fourth duration.

[0095] During the drum rotation, the motor is controlled to rotate at a fourth preset rotation speed for a seventh duration each time, wherein the fourth preset rotation speed is greater than the first, second, and third rotation speeds.

[0096] During the drum rotation washing of the rinsing stage, the motor is controlled to rotate at a fifth preset rotation speed, wherein the fifth preset rotation speed is greater than the first, second, and third rotation speeds, and less than the fourth preset rotation speed.

[0097] In this embodiment, when the clothing treatment apparatus performs the beat washing and rinse washing, the motor is controlled to operate at a corresponding preset washing tempo to drive the outer drum of the clothing treatment apparatus to rotate for washing. By acquiring the operating state of the motor, the time when the motor stops rotating is determined. When the motor has stopped rotating, the water level of the outer drum is acquired for determining whether the water level of the outer drum is lower than the second water level. If the water level of the outer drum is lower than the second water level, the water inlet valve of clothing treatment device is controlled to open for water supplement. Through the control method of the present disclosure, the detection of the water level and water supplement is performed at the stage when the motor is stationary during the washing process, and a separate water supplement washing stage can be eliminated, which saves washing time and makes the water level sensing accurate, avoiding frequent water supplement, and ensuring the washing action time as much as possible, and thereby effectively improving the washing efficiency and washing effect.

[0098] The second water level is a set water supplement level. When the water level in the outer drum is lower than the second water level, water supplement is required. The first water level is a set water inflow level. When the water level in the outer drum has reached the first water level, the water supplement is stopped. The first and second water levels may be specifically set based on empirical values.

[0099] In an embodiment of the present disclosure, the rinsing stage further includes rinse washing, and the control method for a clothing treatment apparatus further includes: acquiring an operating state of the motor during the first beat washing process, the second beat washing process, the third beat washing process and the rinse washing; determining that the motor has stopped rotating, acquiring the water level of the outer drum; and determining that the water level is lower than a second water level, controlling a water inlet valve to open, wherein the second water level is lower than the first water level.

[0100] In this embodiment, during the beat washing process of the main washing stage and the rinse washing

process of the rinsing stage, water supplement monitoring is performed. After the motor has stopped, the water level of the outer drum is acquired for determining whether the water level of the outer drum is lower than the second water level after the motor has stopped. If the water level of the outer drum is lower than the second water level, a water inlet valve of the clothing treatment apparatus is controlled to open for water supplement. This can ensure that the water level of the outer drum meets the washing demand, thereby improving the washing efficiency and washing effect. Further, when it is determined that the water level has reached the first water level, the water inlet valve is controlled to close to stop the water supplement.

[0101] FIG. 6 is a schematic flowchart of a control method for a clothing treatment apparatus according to a further embodiment of the present disclosure. The control method for a clothing treatment apparatus includes the following steps 602, 604, and 606:

Step 602: controlling the clothing treatment apparatus to allow water to enter therein, and acquiring a water level of an outer drum of the clothing treatment apparatus;

Step 604: determining that the water level has reached a first water level, controlling the clothing treatment apparatus to enter a main washing stage in which beat washing and drum rotation washing are performed alternately, and controlling the heating device of the clothing treatment device to turn off, wherein the main washing stage includes a first beat washing process, a second beat washing process and a third beat washing process, wherein a motor of the clothing treatment apparatus is controlled to perform the first beat washing process at a first washing tempo and a first rotation speed; the motor is controlled to perform the second beat washing process at a second washing tempo and a second rotation speed; and the motor is controlled to perform the third beat washing process at a third washing tempo and a third rotation speed, wherein first washing tempo, the second washing tempo, and the third washing tempo are all different, controlling the motor to rotate at a fourth preset rotation speed for a seventh duration each time during the drum rotation washing, wherein the fourth preset rotation speed is greater than the first rotation speed, the second rotation speed, and the third rotation speed;

acquiring an operating state of the motor during the first beat washing process, the second beat washing process, the third beat washing process; determining that the motor has stopped rotating, acquiring the water level of the outer drum; and determining that the water level is lower than a second water level, controlling a water inlet valve of the clothing treatment apparatus to open, wherein the second water level is lower than the first water level;

Step 606: entering a rinsing stage after the main washing stage is completed, wherein the rinsing stage includes at least one drum rotation washing; during the drum rotation washing of the rinsing stage, controlling the motor to rotate at a fifth preset rotation speed, wherein the fifth preset rotation speed is greater than the first rotation speed, the second rotation speed, and the third rotation speed, and is less than the fourth preset rotation speed; during the rinse washing process, acquiring an operating state of the motor; determining that the motor has stopped rotating, acquiring the water level of the outer drum; and determining that the water level is lower than a second water level, controlling a water inlet valve to open, wherein the second water level is lower than the first water level.

[0102] In this embodiment, in the main washing stage, by controlling the heating device of the clothing treatment apparatus to turn off, the purpose of avoiding heating the washing water is achieved, thereby avoiding high temperature damage to clothing and reducing energy consumption. In addition, the present disclosure performs multiple beat washing and high-speed drum rotation washing alternately, thereby effectively improving the washing efficiency and washing effect.

[0103] An embodiment of the second aspect of the present disclosure provides a computer-readable storage medium with a computer program stored thereon, wherein the computer program, when executed by a processor, implements a control method for a clothing treatment apparatus according to any of the above embodiments. Therefore, the computer-readable storage medium has all the beneficial effects of the control method for a clothing treatment apparatus according to any of the above embodiments.

[0104] An embodiment of the third aspect of the present disclosure provides a control system of a clothing treatment apparatus.

[0105] Fig. 7 is a schematic block diagram of a control system of a clothing treatment apparatus 700 according to an embodiment of the present disclosure. The control system of a clothing treatment apparatus 700 includes: a memory 702, a processor 704, and a computer program stored on the memory 702 and executable by the processor 704, wherein the processor 704, when executing the computer program, implements a control method for a clothing treatment apparatus according to any of the above embodiments. Therefore, the control system of a clothing treatment apparatus has all the beneficial effects of the control method for a clothing treatment apparatus according to any of the above embodiments.

[0106] An embodiment of the fourth aspect of the present disclosure provides a control system of a clothing treatment apparatus.

[0107] Fig. 8 is a schematic block diagram of a control system of a clothing treatment apparatus 800 according to an embodiment of the present disclosure. The control

system of a clothing treatment apparatus 800 includes:

a control unit 802, configured to control the clothing treatment apparatus to allow water to enter therein; an acquiring unit 804, configured to acquire a water level of an outer drum of the clothing treatment apparatus; wherein the control unit 802 is further configured to, determining that the water level has reached a first water level, control the clothing treatment apparatus to enter a main washing stage in which beat washing and drum rotation washing are performed alternately, wherein the main washing stage includes a first beat washing process and a second beat washing process; and to control a motor of the clothing treatment apparatus to perform the first beat washing process at a first washing tempo, and to control the motor of the clothing treatment apparatus to perform the second beat washing process at a second washing tempo, wherein the first washing tempo is different from the second washing tempo.

[0108] In the control system of a clothing treatment apparatus 800 provided by the present disclosure, after controlling the clothing treatment apparatus to allow water to enter therein, the water level of the outer drum of the clothing treatment apparatus is monitored, and after the water level has reached a first water level, the clothing treatment apparatus is controlled to enter a main washing stage in which beat washing and drum rotation washing are performed alternately. In addition, the degree of variation of the washing tempo is increased, such that the motor is controlled to perform the first and second beat washing process in sequence at two different preset washing tempos (namely, the first washing tempo and the second washing tempo). With the control system of a clothing treatment apparatus 800, the present disclosure performs multiple beat washing and high-speed drum rotation washing alternately, thereby effectively improving the washing efficiency and washing effect. In addition, washing water does not need to be heated during the whole washing process, thereby avoiding damage to clothing caused by high temperature, and reducing energy consumption.

[0109] The first water level is a water inflow level. When the water inflow has reached the first water level, the main washing program is started. The first water level may be specifically set according to the empirical value. The first beat washing process and the second beat washing process are the washing stage between the end of water inflow and the start of the drum rotation washing, or the washing stage between the end of the current drum rotation washing and the start of the next drum rotation washing.

[0110] In an embodiment of the present disclosure, the control unit 802 is configured to control the motor of the clothing treatment apparatus to perform the first beat washing process at the first washing tempo specifically

by controlling the motor to operate at the first washing tempo and a first rotation speed; and the control unit 802 is configured to control the motor to perform the second beat washing process at the second washing tempo specifically by controlling the motor to operate at the second washing tempo and a second rotation speed.

[0111] In this embodiment, the clothing treatment apparatus is controlled to enter a main washing stage in which beat washing and drum rotation washing are performed alternately, wherein the main washing stage includes a first beat washing process and a second beat washing process, wherein the first beat washing process and the second beat washing process are the washing stage between the end of water inflow and the start of the drum rotation washing, or the washing stage between the end of the current drum rotation washing and the start of the next drum rotation washing. In addition, the degree of variation of the washing tempo is increased, such that the motor is controlled to perform the first and second beat washing processes in sequence at two different preset washing tempos (namely, the first washing tempo and the second washing tempo). With the control method for a clothing treatment apparatus, washing water does not need to be heated during the whole washing process, thereby avoiding damage to clothing caused by high temperature, and reducing energy consumption. In addition, the present disclosure performs multiple beat washing and high-speed drum rotation washing alternately, thereby effectively improving the washing efficiency and washing effect.

[0112] In an embodiment of the present disclosure, the main washing stage further includes a third beat washing process, and the control unit 802 is further configured to control the motor to perform the third beat washing process at a third washing tempo and a third rotation speed, wherein third washing tempo is different from the first washing tempo and the second washing tempo.

[0113] In this embodiment, the main washing stage further includes a third beat washing process, during which, the motor is controlled to operate at a third washing tempo and a third rotation speed, wherein the third washing tempo is different from the first washing tempo and the second washing tempo. Therefore, the present disclosure may perform the first, second, and third beat washing processes at three different washing tempos respectively, to further increase the degree of variation of the washing tempo, thereby effectively improving the washing efficiency and washing effect.

[0114] The first washing tempo, the first rotation speed, the second washing tempo, the second rotation speed, the third washing tempo, and the third rotation speed are all preset values, and may be set as long as the first washing tempo, the second washing tempo and the third washing tempo are different such that the clothing treatment apparatus washes alternately with a variety of tempos.

[0115] In an embodiment of the present disclosure, the first washing tempo is rotating for a first duration and

stationary for a second duration; the second washing tempo is rotating for a third duration and stationary for a fourth duration; and the third washing tempo is rotating for a fifth duration and stationary for a sixth duration.

[0116] In this embodiment, the first, second, and third washing tempos are limited. By setting different rotation durations and stationary durations, different washing tempos can be obtained, thereby increasing the degree of variation of the washing tempos. In addition, the motor performs the main washing stage with multiple beat washing and high-speed drum rotation washing alternately, thereby effectively improving the washing efficiency and washing effect.

[0117] In an embodiment of the present disclosure, the first rotation speed, the second rotation speed, and the third rotation speed are each not less than 30 revolutions per minute, and not more than 60 revolutions per minute.

[0118] In this embodiment, the first, second, and third rotation speeds are specifically limited, so that when the motor is running at the first, second, and third rotation speeds, the inner drum is driven to rotate to form a beat washing effect on clothing.

[0119] In an embodiment of the present disclosure, a ratio of the first duration to the second duration is not less than 0.7 and not more than 7; a ratio of the third duration to the fourth duration is not less than 0.7 and not more than 7; and a ratio of the fifth duration to the sixth duration is not less than 0.7 and not more than 7.

[0120] In this embodiment, by limiting the rotation-to-stationary ratio of each preset washing tempo to ensure that the rotation-to-stationary ratio of each preset washing tempo is between 0.7 and 7, it can effectively improve the washing effect of clothing, and protect clothing from wear and tear.

[0121] In an embodiment of the present disclosure, the control unit 802 is further configured to control the motor to rotate at the fourth preset rotation speed for a seventh duration each time during the drum rotation washing.

[0122] In this embodiment, during the drum rotation washing of the main washing stage of the clothing treatment apparatus, the motor is controlled to rotate at a fourth preset rotation speed for a seventh duration each time, and the stationary duration is not limited here; wherein, the fourth preset rotation speed is greater than the first rotation speed, the second rotation speed, and the third rotation speed. In addition, the fourth preset rotation speed should meet the condition of the drum rotation washing, so that clothing are attached to the inner drum and washed through the drive of inner drum.

[0123] In an embodiment of the present disclosure, the control unit 802 is further configured to control the clothing treatment apparatus to enter a rinsing stage after the main washing stage is completed, wherein the rinsing stage includes at least one drum rotation washing.

[0124] In an embodiment of the present disclosure, the control unit 802 is further configured to control the motor to rotate at a seventh preset rotation speed during the drum rotation washing of the rinsing stage, wherein the

seventh preset rotation speed is greater than the first rotation speed and is less than the fourth preset rotation speed.

[0125] In an embodiment of the present disclosure, the control unit 802 is further configured to control the motor to rotate at a fifth preset rotation speed during the drum rotation washing of the rinsing stage, wherein the fifth preset rotation speed is greater than the first rotation speed, the second rotation speed, and the third rotation speed, and is less than the fourth preset rotation speed.

[0126] In this embodiment, after the main washing stage, a rinsing stage is started which includes at least one drum rotation washing to further improve the washing effect. For example, two rinse washings are performed, and a drum rotation washing is inserted therebetween. In the rinsing stage, the rotation speed of the drum rotation washing is slightly lower. Specifically, the motor is controlled to rotate at the fifth preset rotation speed, wherein the fifth preset rotation speed is greater than the first rotation speed, the second rotation speed, and the third rotation speed, and is less than the fourth preset rotation speed. In this way, it not only satisfies the washing condition of the drum rotation washing, but also avoids too high rotation speed which may weaken the penetration and exchange of washing water in clothing, further improving the washing effect.

[0127] In an embodiment of the present disclosure, the fourth preset rotation speed is not less than 150 revolutions per minute; the seventh duration is not less than 15 seconds; and the fifth preset rotation speed is not less than 100 revolutions per minute and is not more than 150 revolutions per minute.

[0128] In this embodiment, the lower limits of the fourth preset rotation speed and the seventh duration are specifically limited to meet the needs of drum rotation washing and improve the clothing washing effect. Based on the value range of the fourth preset rotation speed and the seventh duration, the washing tempo of the motor may be set, for example, the motor rotates at 200 revolutions per minute for 20 seconds, and stationary duration is not specifically set. The fifth preset rotation speed is specifically limited, such that the fifth preset rotation speed is slightly lower than the fourth rotation speed. For example, the third rotation speed is 130 rpm. In this way, it not only satisfies the washing condition of the drum rotation washing, but also avoids too high rotation speed which may weaken the penetration and exchange of washing water in clothing, further improving the washing effect.

[0129] In an embodiment of the present disclosure, the rinsing stage further includes rinse washing, and the control unit 802 is further configured to acquire an operating state of the motor during the first beat washing process, the second beat washing process, the third beat washing process and the rinse washing; determining that the motor has stopped rotating, acquire the water level of the outer drum of the clothing treatment apparatus; and determining that the water level is lower than a second water

level, control a water inlet valve to open, wherein the second water level is lower than the first water level.

[0130] In this embodiment, during the beat washing process of the main washing stage and the rinse washing process of the rinsing stage, water supplement monitoring is performed. After the motor has stopped, the water level of the outer drum is acquired for determining whether the water level of the outer drum is lower than the second water level after the motor has stopped. If the water level of the outer drum is lower than the second water level, a water inlet valve of the clothing treatment apparatus is controlled to open for water supplement. This can ensure that the water level of the outer drum meets the washing demand, thereby improving the washing efficiency and washing effect. Further, when it is determined that the water level has reached the first water level, the water inlet valve is controlled to close to stop the water supplement.

[0131] The second water level is a water supplement level and is a preset value. When the water level in the outer drum is lower than the second water level, water supplement is required. The first water level is a set water inflow level. When the water level in the outer drum has reached the first water level, the water supplement is stopped. The first and second water levels may be specifically set based on empirical values.

[0132] In an embodiment of the present disclosure, during controlling the clothing treatment apparatus to enter a main washing stage in which beat washing and drum rotation washing are performed alternately, the control unit 802 is further configured to control a heating device of the clothing treatment apparatus to turn off.

[0133] In this embodiment, in the main washing stage, by controlling the heating device of the clothing treatment apparatus to turn off, the purpose of avoiding heating the washing water is achieved, thereby avoiding high temperature damage to clothing and reducing energy consumption. In addition, the present disclosure performs multiple beat washing and high-speed drum rotation washing alternately, thereby effectively improving the washing efficiency and washing effect.

[0134] An embodiment of the fifth aspect of the present disclosure provides a clothing treatment apparatus, including a control system of a clothing treatment apparatus according to any of above embodiments. Therefore, the clothing treatment apparatus has all the beneficial effects of the control system of a clothing treatment apparatus according to any of above embodiments.

[0135] An embodiment of the sixth aspect of the present disclosure provides a clothing treatment device including: a memory, a processor, and a computer program stored on the memory and executable by the processor, wherein the processor, when executing the computer program, implements a control method for a clothing treatment apparatus according to any of the above embodiments. Therefore, the clothing treatment apparatus has all the beneficial effects of the control method for a clothing treatment apparatus according to any of the

above embodiments.

[0136] A specific embodiment provides a control method for a clothing treatment apparatus, for a drum washing machine. The washing process of the drum washing machine is shown in Figure 9, including the following stages: weighing; main washing; rinsing 1; rinsing 2; dewater, maximum rotation speed 800 rpm; shaking loose, 15 on/10off, 45 rpm, duration 50 seconds. The main washing process is shown in Figure 10, and specifically includes the following steps:

Step 1002, water inflow + detergent addition;
 Step 1004, beat washing, 8on/8off, 35 revolutions per minute, duration 2 minutes, with automatic water supplement;
 Step 1006, drum rotation washing, 200 revolutions per minute, 20 seconds at maximum drum rotation speed, duration 2 minutes;
 Step 1008, beat washing, 20on/3off, 48 revolutions per minute, duration 2 minutes, with automatic water supplement;
 Step 1010, drum rotation washing, 200 revolutions per minute, 20 seconds at maximum drum rotation speed, duration 2 minutes;
 Step 1012, beat washing, 18on/7off, 52 revolutions per minute, duration 2 minutes, with automatic water supplement;
 Step 1014, drum rotation washing, 200 revolutions per minute, 20 seconds at maximum drum rotation speed, duration 2 minutes;
 Step 1016, beat washing, 8on/8off, 35 revolutions per minute, duration 2 minutes, with automatic water supplement;
 Step 1018, drum rotation washing, 200 revolutions per minute, 20 seconds at maximum drum rotation speed, duration 2 minutes;
 Step 1020, beat washing, 20on/3off, 48 revolutions per minute, duration 2 minutes, with automatic water supplement;
 Step 1022, drum rotation washing, 200 revolutions per minute, 20 seconds at maximum drum rotation speed, duration 2 minutes;
 Step 1024, beat washing, 18on/7off, 52 revolutions per minute, duration 2 minutes, with automatic water supplement;
 Step 1026, drum rotation washing, 200 revolutions per minute, 20 seconds at maximum drum rotation speed, duration 2 minutes;
 Step 1028, drain to empty;
 Step 1030, dewater, maximum rotation speed 600 rpm.

[0137] The process of rinsing 1 is shown in Figure 11, and specifically includes the following steps:

Step 1102, water inflow;
 Step 1104, rinse washing, 20on/3off, 48 revolutions per minute, duration 1 minute, with automatic water

supplement;

Step 1106, drum rotation washing, 130 revolutions per minute, 20 seconds at maximum drum rotation speed, duration 2 minutes;
 Step 1108, rinse washing, 20on/3off, 48 revolutions per minute, duration 1 minute;
 Step 1110, drain to empty;
 Step 1112, dewater, maximum rotation speed 800 rpm.

[0138] The process of rinsing 2 is shown in Figure 12, and specifically includes the following steps:

Step 1202, water inflow + softener addition;
 Step 1204, rinse washing, 8on/8off, 35 revolutions per minute, duration 2 minutes;
 Step 1206, drain to empty.

[0139] Through the clothing treatment apparatus, the control method, the control system, and the computer readable storage medium provided by the embodiments of the present disclosure, the following beneficial technical effects are achieved. The washing water is not heated, avoiding high temperature damage to clothing; the degree of variation of the washing tempo is increased, three different washing tempos of different strengths are performed in sequence, and a high-speed drum rotation is inserted therebetween, effectively improving the washing effect; a separate water supplement washing stage is canceled, instead, detection of water level and water supplement during the off stage of beat washing are used to ensure the washing action time as much as possible, improving the washing efficiency and washing effect; the motor does not operate during water supplement, which makes the water level sensing more accurate, avoiding frequent water supplements, and improving the washing effect; the high-speed drum rotation in the rinsing stage is slightly lower, avoiding too high rotation speed which may weaken the penetration and exchange of washing water in clothing.

[0140] The computer-readable storage medium may include any medium that can store or transmit information. Examples of computer-readable storage media include electronic circuits, semiconductor memory devices, ROM, flash memory, erasable ROM (EROM), floppy disks, CD-ROMs, optical disks, hard disks, fiber optic media, radio frequency (RF) links, and so on. The code segment can be downloaded via a computer network such as the Internet, an intranet, and so on.

[0141] In the description of this specification, the terms "first" and "second" are only used for descriptive purposes, and cannot be understood as indicating or implying relative importance, unless otherwise clearly specified and limited. The terms "connected", "installed", "fixed", etc. should be understood in a broad sense. For example, "connected" may be a fixed connection, a detachable connection, or an integral connection; it may be directly connected or indirectly connected through an intermedi-

ate medium. For those of ordinary skill in the art, the specific meanings of the above-mentioned terms in the present disclosure can be understood according to specific circumstances.

[0142] The foregoing descriptions are only preferred embodiments of the present disclosure, and are not intended to limit the present disclosure. For those skilled in the art, the present disclosure can have various modifications and changes. Any modification, equivalent replacement, improvement, etc. made within the spirit and principles of the present disclosure shall be included in the scope of protection of the present disclosure.

Claims

1. A control method for a clothing treatment apparatus, comprising:

controlling the clothing treatment apparatus to allow water to enter therein,
acquiring a water level of an outer drum of the clothing treatment apparatus; and
determining that the water level has reached a first water level, controlling the clothing treatment apparatus to enter a main washing stage in which beat washing and drum rotation washing are performed alternately, wherein the main washing stage comprises a first beat washing process and a second beat washing process; wherein a motor of the clothing treatment apparatus is controlled to perform the first beat washing process at a first washing tempo, and the motor is controlled to perform the second beat washing process at a second washing tempo, wherein the first washing tempo is different from the second washing tempo.

2. The control method for a clothing treatment apparatus according to claim 1, wherein

the motor of the clothing treatment apparatus is controlled to perform the first beat washing process at the first washing tempo specifically by controlling the motor to operate at the first washing tempo and a first rotation speed; and
the motor is controlled to perform the second beat washing process at the second washing tempo specifically by controlling the motor to operate at the second washing tempo and a second rotation speed.

3. The control method for a clothing treatment apparatus according to claim 2, wherein the main washing stage further comprises a third beat washing process; and
the control method for a clothing treatment apparatus further comprises controlling the motor to perform

the third beat washing process at a third washing tempo and a third rotation speed, wherein the third washing tempo is different from the first washing tempo and the second washing tempo.

4. The control method for a clothing treatment apparatus according to claim 3, wherein

the first washing tempo is rotating for a first duration and stationary for a second duration;
the second washing tempo is rotating for a third duration and stationary for a fourth duration; and
the third washing tempo is rotating for a fifth duration and stationary for a sixth duration.

5. The control method for a clothing treatment apparatus according to claim 3, wherein
the first rotation speed, the second rotation speed, and the third rotation speed are each not less than 30 revolutions per minute and not more than 60 revolutions per minute.

6. The control method for a clothing treatment apparatus according to claim 4, wherein

a ratio of the first duration to the second duration is not less than 0.7 and not more than 7;
a ratio of the third duration to the fourth duration is not less than 0.7 and not more than 7; and
a ratio of the fifth duration to the sixth duration is not less than 0.7 and not more than 7.

7. The control method for a clothing treatment apparatus according to claim 3, further comprising:
during the drum rotation washing, controlling the motor to rotate at a fourth preset rotation speed for a seventh duration each time, wherein the fourth preset rotation speed is greater than the first rotation speed, the second rotation speed, and the third rotation speed.

8. The control method for a clothing treatment apparatus according to claim 7, further comprising:
entering a rinsing stage after the main washing stage is completed, wherein the rinsing stage comprises at least one drum rotation washing.

9. The control method for a clothing treatment apparatus according to claim 8, comprising:
during the drum rotation washing of the rinsing stage, controlling the motor to rotate at a fifth preset rotation speed, wherein the fifth preset rotation speed is greater than the first rotation speed, the second rotation speed, and the third rotation speed, and is less than the fourth preset rotation speed.

10. The control method for a clothing treatment apparatus according to claim 9, wherein

- the fourth preset rotation speed is not less than 150 revolutions per minute;
the seventh duration is not less than 15 seconds;
and
the fifth preset rotation speed is not less than 100 revolutions per minute and is not more than 150 revolutions per minute. 5
11. The control method for a clothing treatment apparatus according to claim 8, wherein the rinsing stage further comprises rinse washing; and the control method for a clothing treatment apparatus further comprises: 10
- acquiring an operating state of the motor during the first beat washing process, the second beat washing process, the third beat washing process and the rinse washing; 15
- determining that the motor has stopped rotating, acquiring the water level of the outer drum; and determining that the water level is lower than a second water level, controlling a water inlet valve of the clothing treatment apparatus to open, wherein the second water level is lower than the first water level. 20 25
12. The control method for a clothing treatment apparatus according to any one of claims 1 to 11, further comprising: 30
- during controlling the clothing treatment apparatus to enter the main washing stage in which the beat washing and the drum rotation washing are performed alternately, controlling a heating device of the clothing treatment apparatus to turn off. 35
13. A computer-readable storage medium with a computer program stored thereon, wherein the computer program, when executed by a processor, implements a control method for a clothing treatment apparatus according to any one of claims 1 to 12. 40
14. A control system of a clothing treatment apparatus, comprising: a memory, a processor, and a computer program stored on the memory and executable by the processor, wherein the processor, when executing the computer program, implements a control method for a clothing treatment apparatus according to any one of claims 1 to 12. 45
15. A control system of a clothing treatment apparatus, comprising: 50
- a control unit, configured to control the clothing treatment apparatus to allow water to enter therein; 55
- an acquiring unit, configured to acquire a water level of an outer drum of the clothing treatment apparatus;
- wherein the control unit is further configured, to determine that the water level has reached a first water level, and to control the clothing treatment apparatus to enter a main washing stage in which beat washing and drum rotation washing are performed alternately, wherein the main washing stage comprises a first beat washing process and a second beat washing process; and to control a motor of the clothing treatment apparatus to perform the first beat washing process at a first washing tempo, and to control the motor of the clothing treatment apparatus to perform the second beat washing process at a second washing tempo, wherein the first washing tempo is different from the second washing tempo.
16. A clothing treatment apparatus, comprising a control system of a clothing treatment apparatus according to claim 15.
17. A clothing treatment apparatus, comprising:
- a memory;
- a processor; and
- a computer program stored on the memory and executable by the processor;
- wherein the processor, when executing the computer program, implements a control method for a clothing treatment apparatus according to any one of claims 1 to 12.

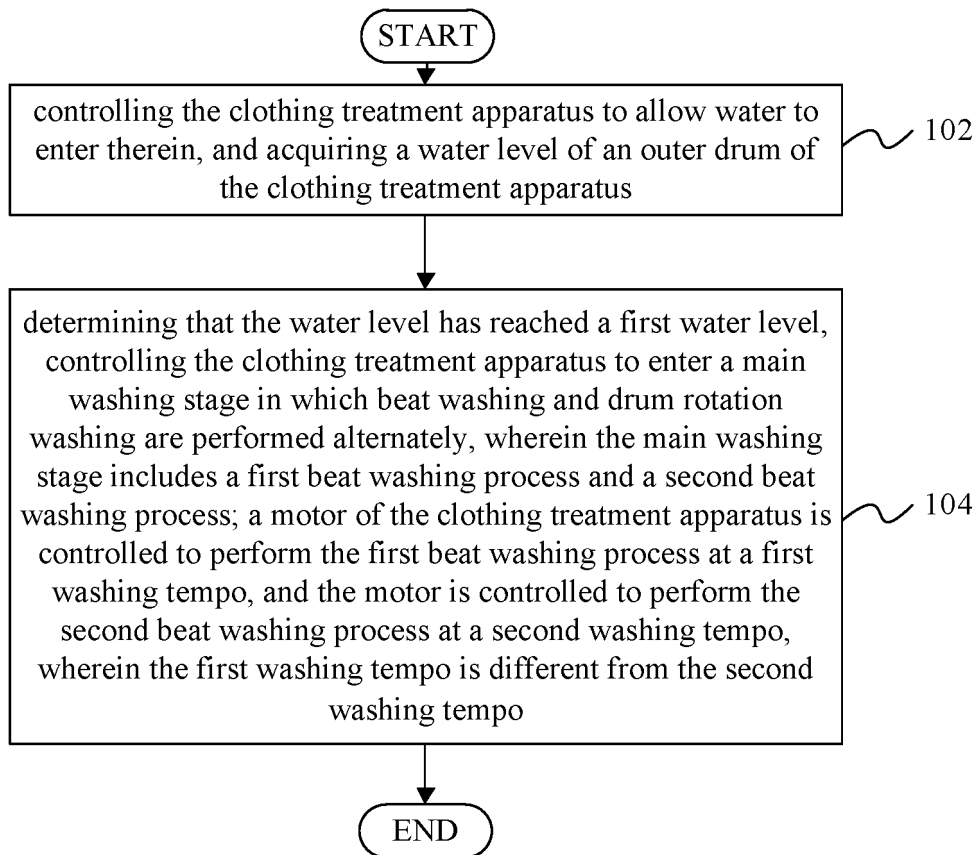


Figure 1

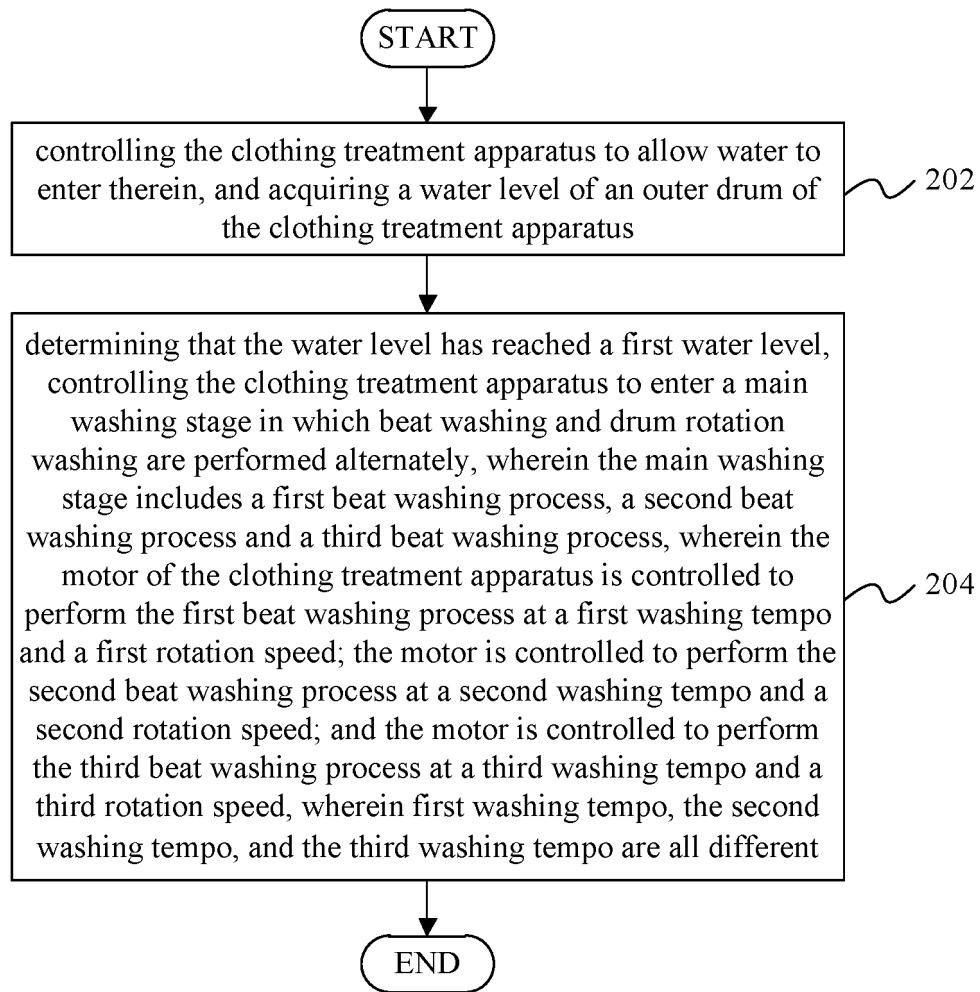


Figure 2

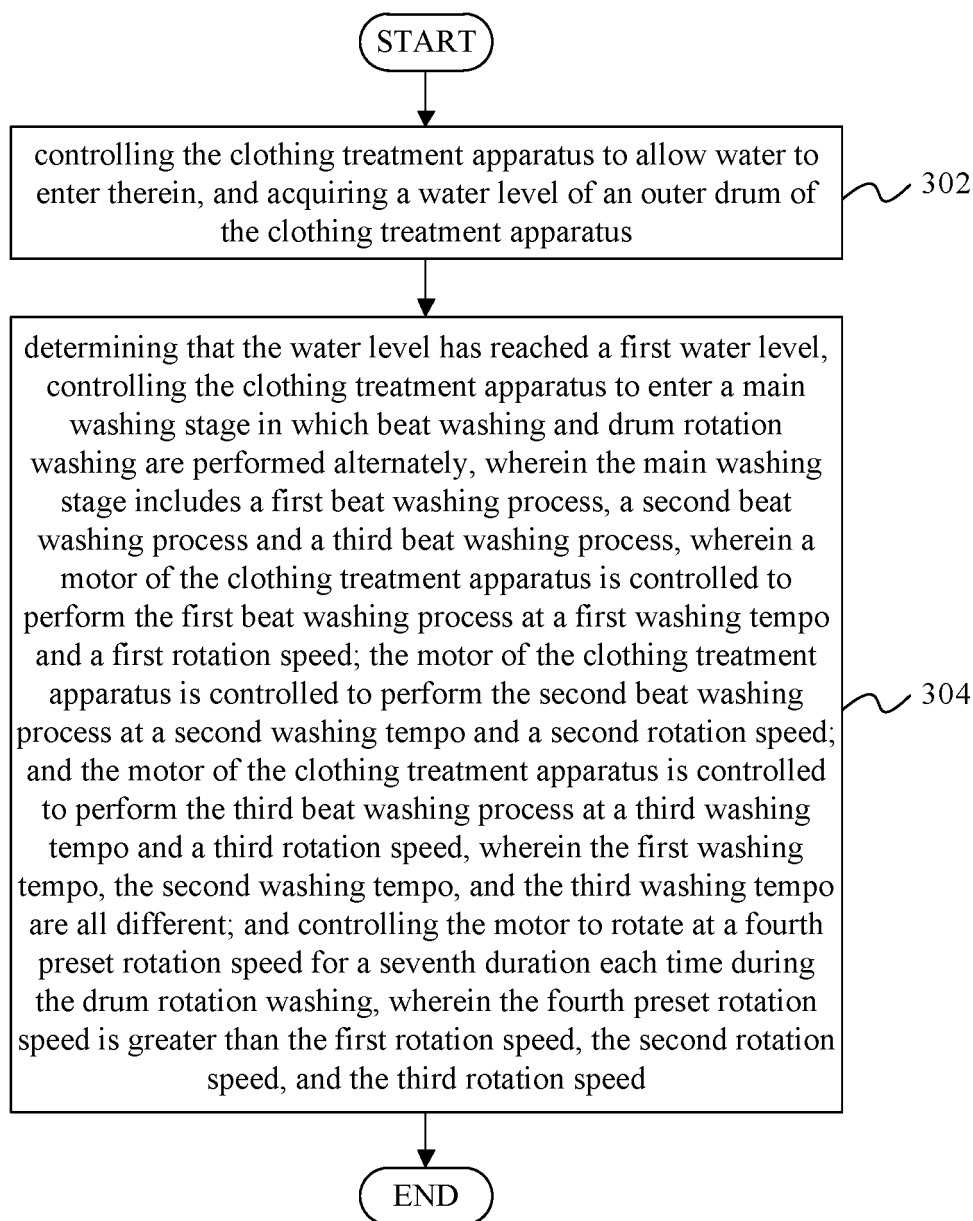


Figure 3

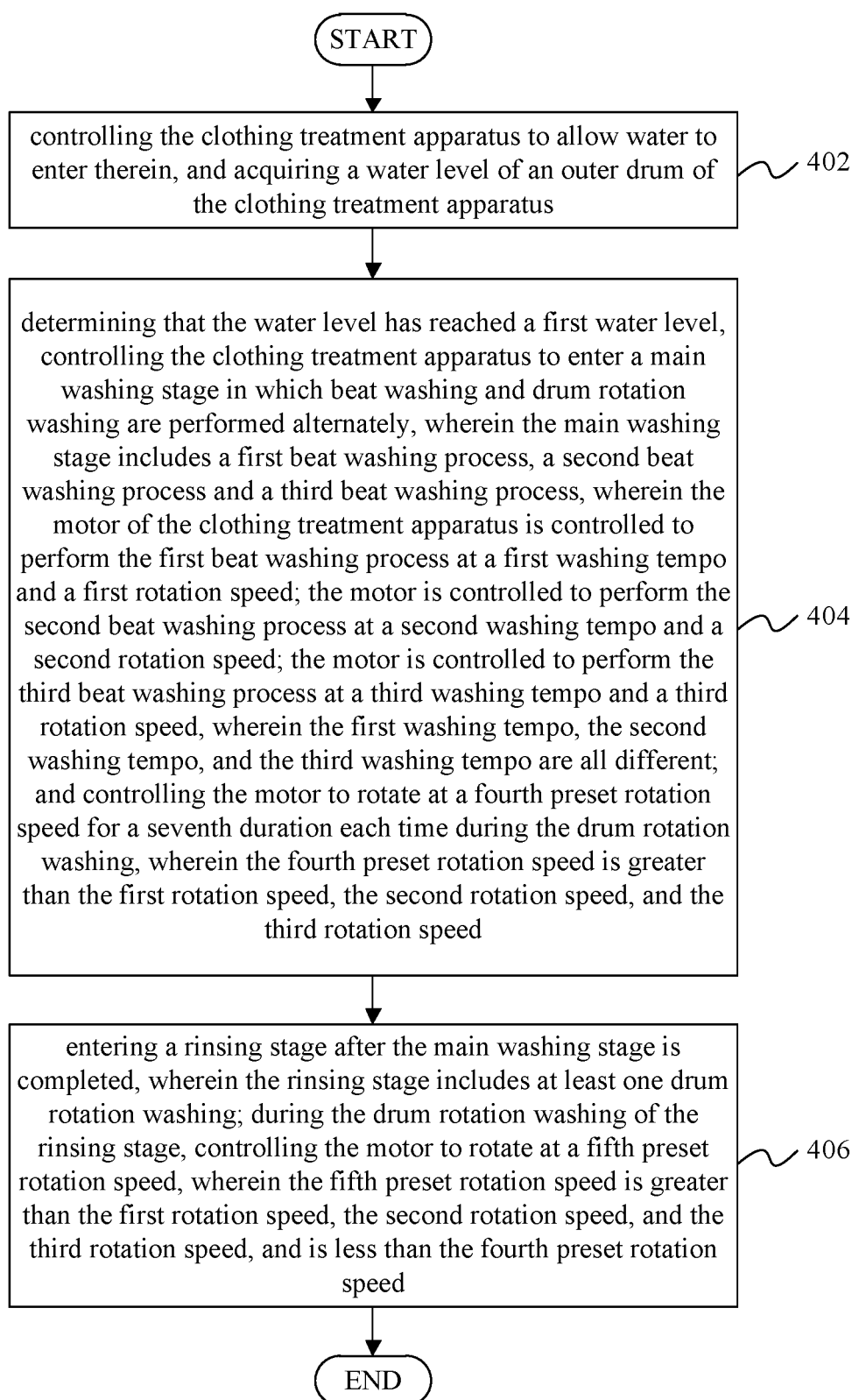


Figure 4

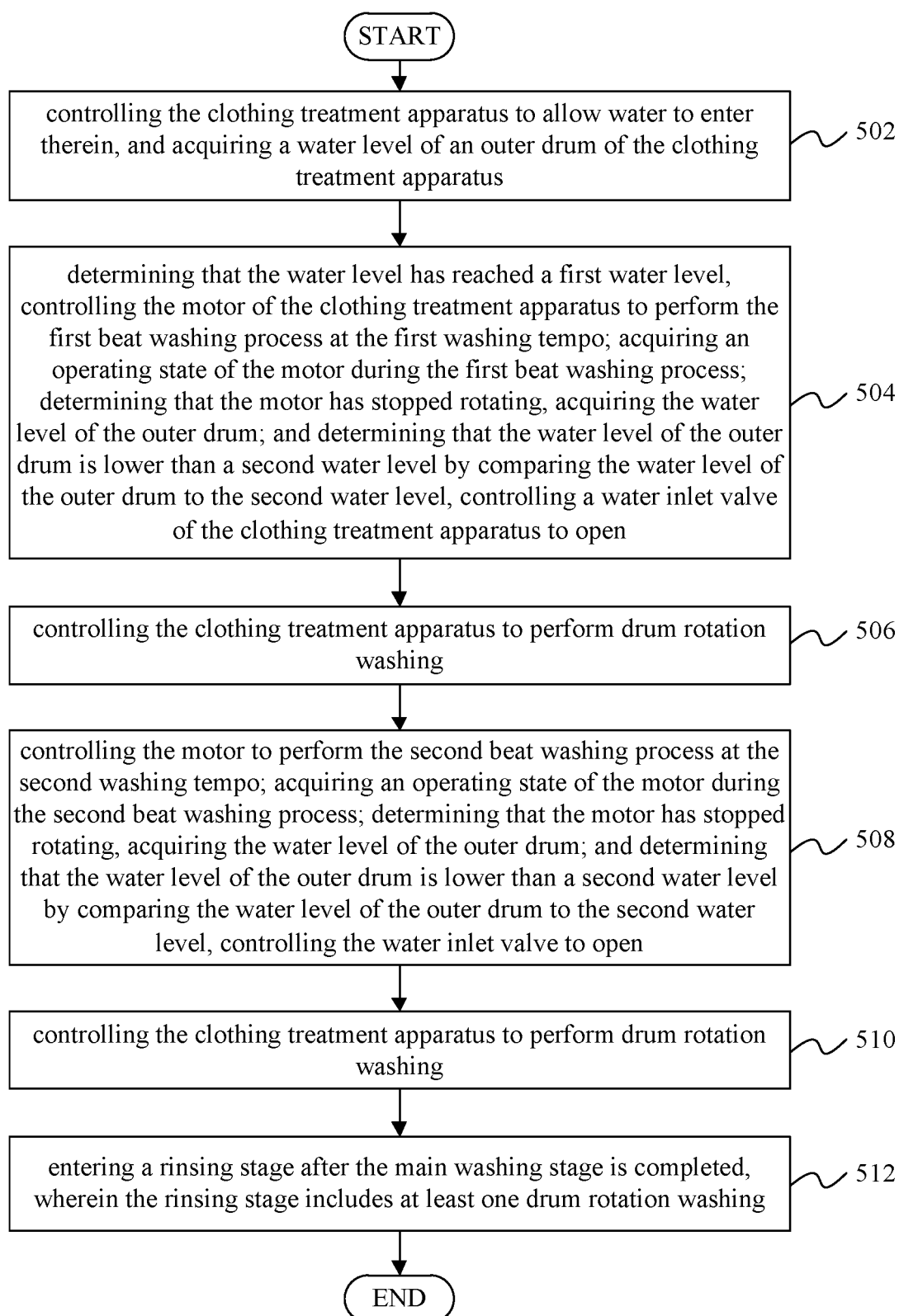


Figure 5

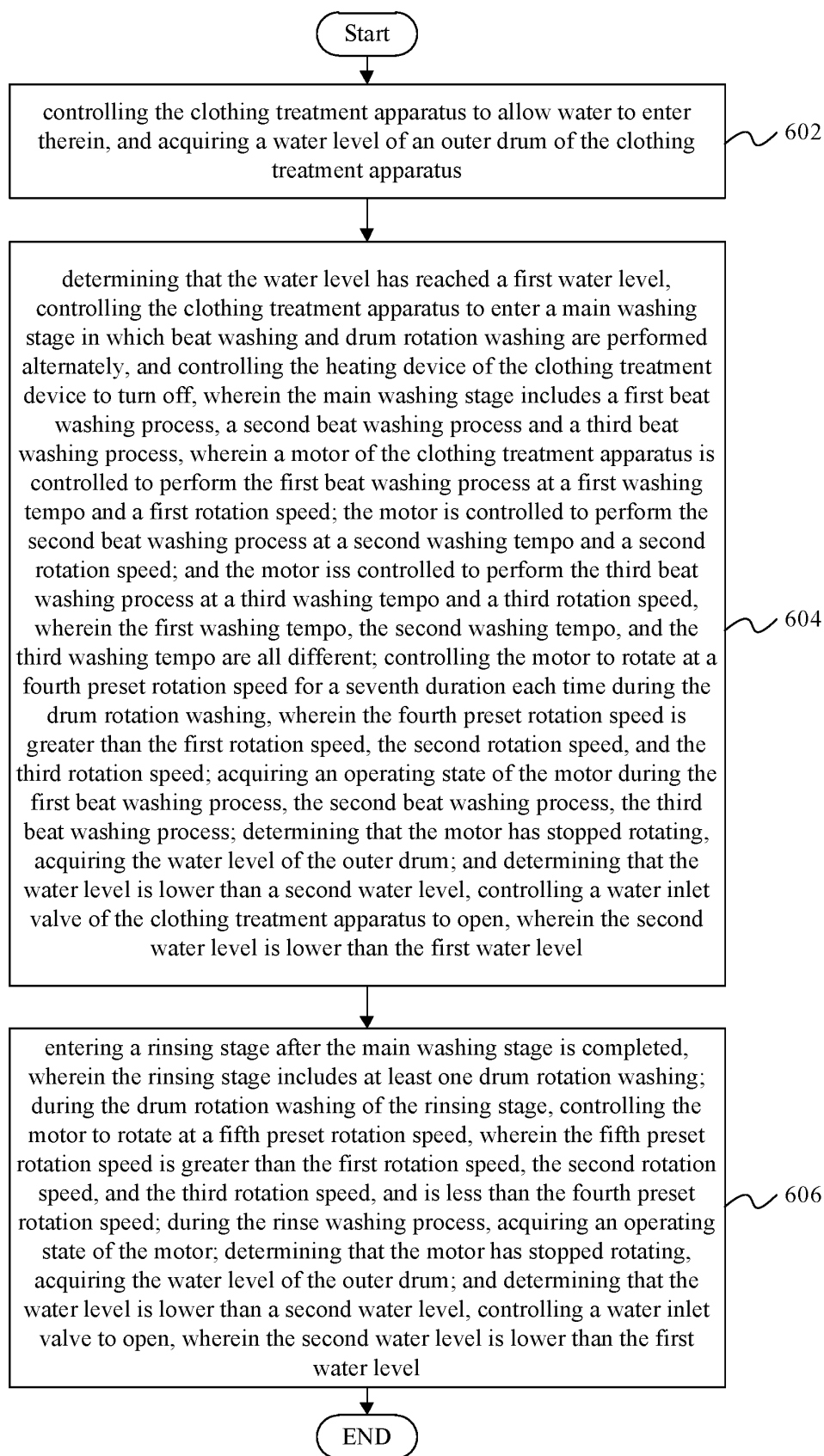


Figure 6

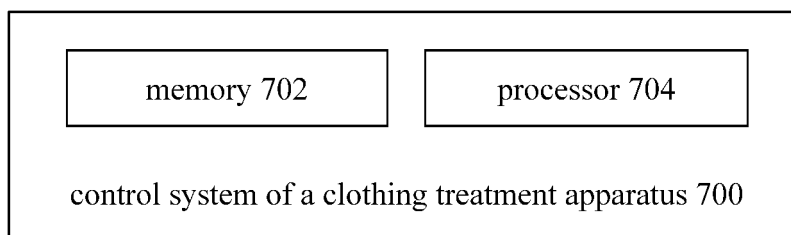


Figure 7

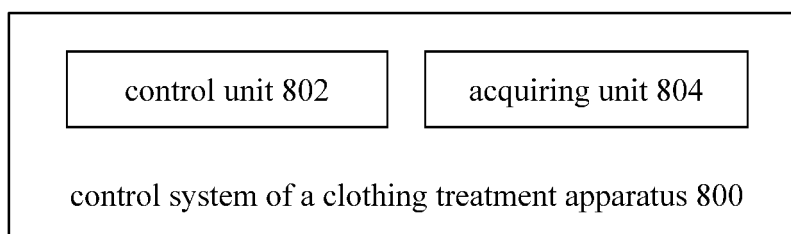


Figure 8

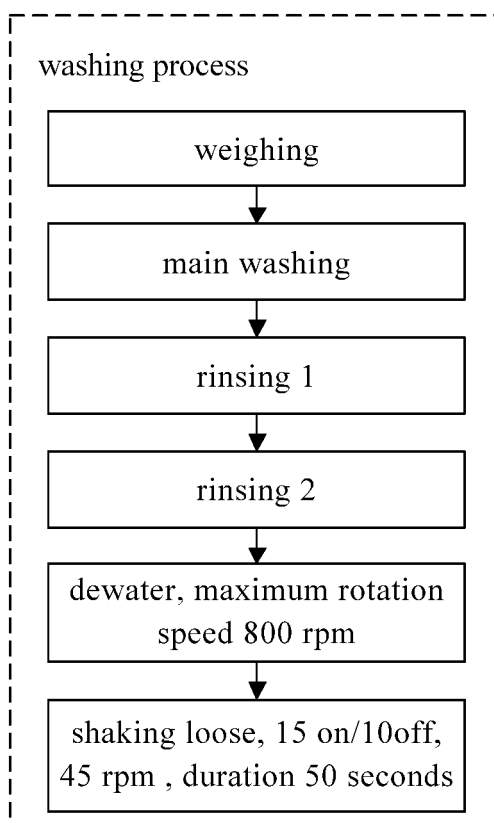


Figure 9

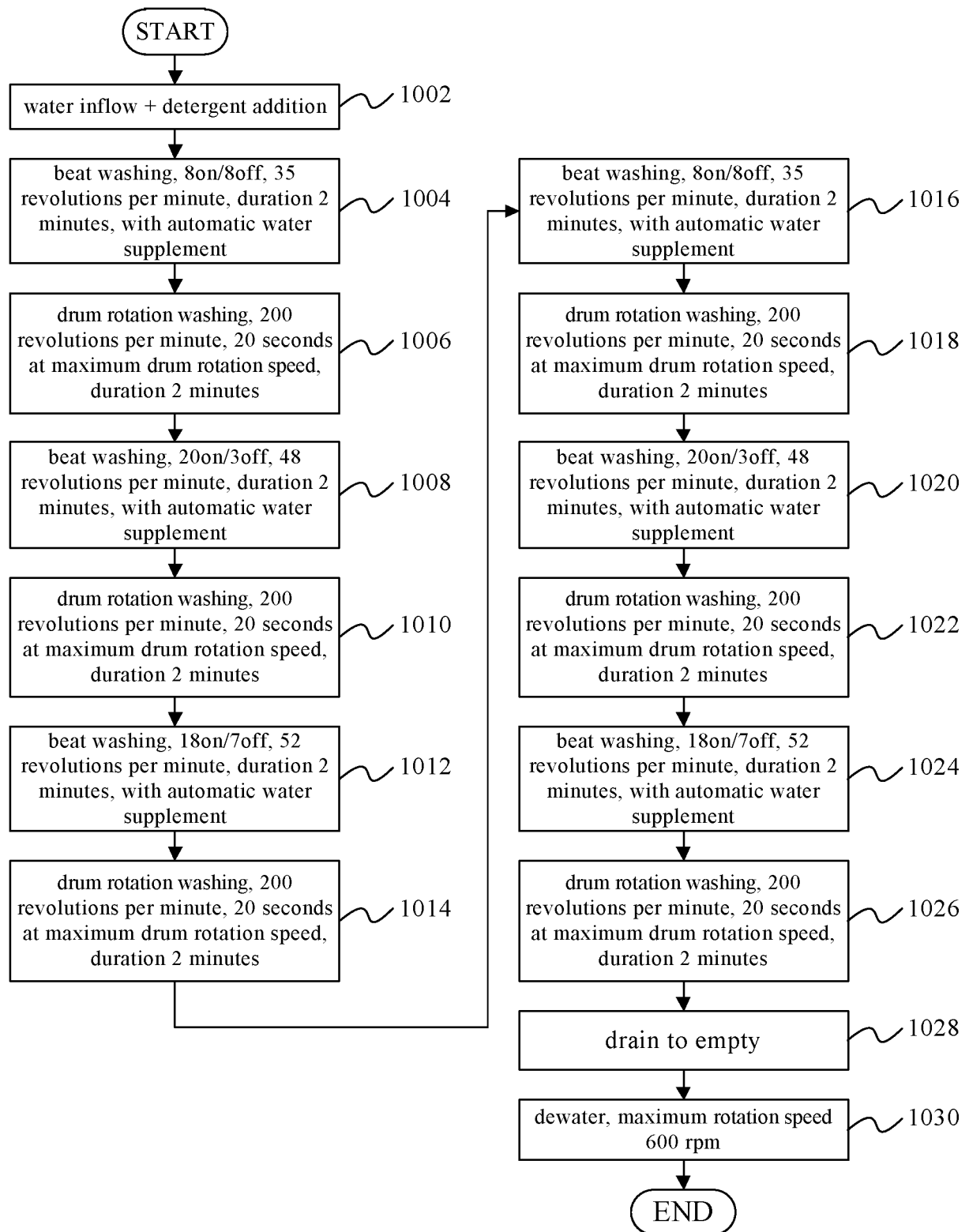


Figure 10

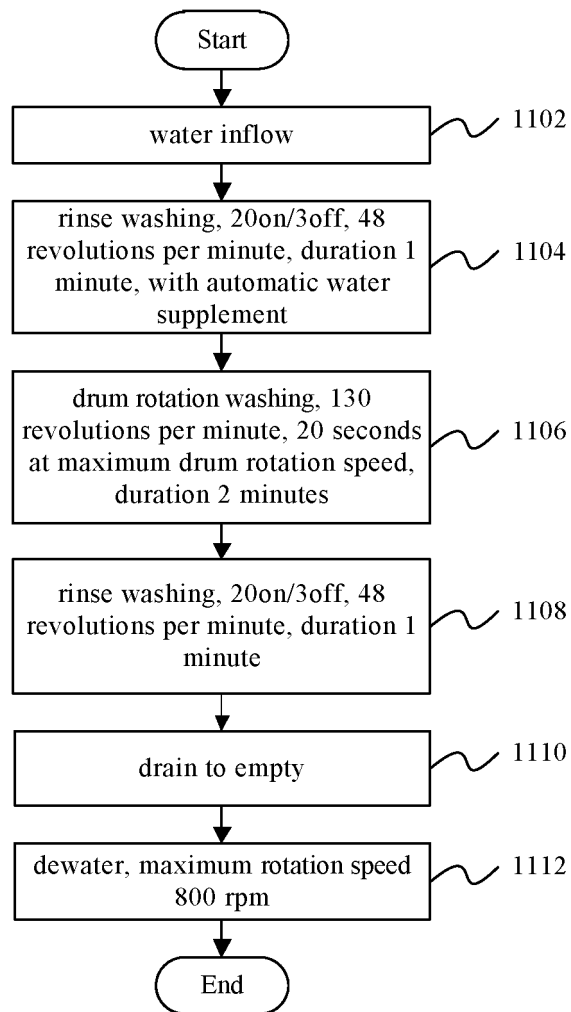


Figure 11

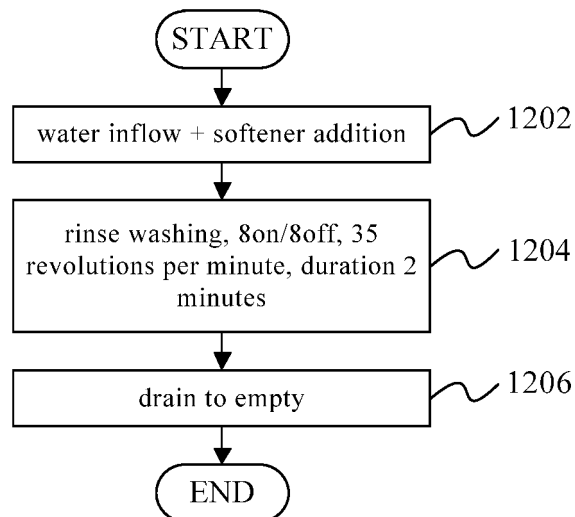


Figure 12

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2019/086901

A. CLASSIFICATION OF SUBJECT MATTER 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) CNKI, CNPAT, WPI, EPODOC: 小天鹅, 海尔, 洗涤, 摔打, 击打, 拍打, 甩, 抛, 旋转, 转速, 节拍, 交替, 循环, 漂洗, 加热, wash+, beat+, throw, swing, speed, barrel w spinning, cycle, alternat+, rinsing, heat+																								
C. DOCUMENTS CONSIDERED TO BE RELEVANT																								
<table border="1"> <thead> <tr> <th>Category*</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>Y</td> <td>CN 203890750 U (WUXI LITTLE SWAN CO., LTD.) 22 October 2014 (2014-10-22) claims 1-8, description, paragraphs [0033]-[0092], and figures 1-10</td> <td>1-17</td> </tr> <tr> <td>Y</td> <td>CN 108660682 A (WUXI LITTLE SWAN CO., LTD.) 16 October 2018 (2018-10-16) claims 1-30, description, paragraphs [0061]-[0139], and figures 1-6</td> <td>1-17</td> </tr> <tr> <td>A</td> <td>CN 109440388 A (WUXI LITTLE SWAN CO., LTD.) 08 March 2019 (2019-03-08) entire document</td> <td>1-17</td> </tr> <tr> <td>A</td> <td>CN 105951357 A (WUXI LITTLE SWAN CO., LTD.) 21 September 2016 (2016-09-21) entire document</td> <td>1-17</td> </tr> <tr> <td>A</td> <td>CN 109440389 A (WUXI LITTLE SWAN CO., LTD.) 08 March 2019 (2019-03-08) entire document</td> <td>1-17</td> </tr> <tr> <td>A</td> <td>JP 2004236704 A (SANYO ELECTRIC CO., LTD.) 26 August 2004 (2004-08-26) entire document</td> <td>1-17</td> </tr> <tr> <td>A</td> <td>JP 2007082651 A (MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD.) 05 April 2007 (2007-04-05) entire document</td> <td>1-17</td> </tr> </tbody> </table>	Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	Y	CN 203890750 U (WUXI LITTLE SWAN CO., LTD.) 22 October 2014 (2014-10-22) claims 1-8, description, paragraphs [0033]-[0092], and figures 1-10	1-17	Y	CN 108660682 A (WUXI LITTLE SWAN CO., LTD.) 16 October 2018 (2018-10-16) claims 1-30, description, paragraphs [0061]-[0139], and figures 1-6	1-17	A	CN 109440388 A (WUXI LITTLE SWAN CO., LTD.) 08 March 2019 (2019-03-08) entire document	1-17	A	CN 105951357 A (WUXI LITTLE SWAN CO., LTD.) 21 September 2016 (2016-09-21) entire document	1-17	A	CN 109440389 A (WUXI LITTLE SWAN CO., LTD.) 08 March 2019 (2019-03-08) entire document	1-17	A	JP 2004236704 A (SANYO ELECTRIC CO., LTD.) 26 August 2004 (2004-08-26) entire document	1-17	A	JP 2007082651 A (MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD.) 05 April 2007 (2007-04-05) entire document	1-17
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☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.																								
<table border="0"> <tr> <td style="vertical-align: top;"> * Special categories of cited documents: “A” document defining the general state of the art which is not considered to be of particular relevance “E” earlier application or patent but published on or after the international filing date “L” document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) “O” document referring to an oral disclosure, use, exhibition or other means “P” document published prior to the international filing date but later than the priority date claimed </td> <td style="vertical-align: top;"> “T” later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention “X” document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone “Y” document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art “&” document member of the same patent family </td> </tr> </table>	* Special categories of cited documents: “A” document defining the general state of the art which is not considered to be of particular relevance “E” earlier application or patent but published on or after the international filing date “L” document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) “O” document referring to an oral disclosure, use, exhibition or other means “P” document published prior to the international filing date but later than the priority date claimed	“T” later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention “X” document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone “Y” document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art “&” document member of the same patent family																						
* Special categories of cited documents: “A” document defining the general state of the art which is not considered to be of particular relevance “E” earlier application or patent but published on or after the international filing date “L” document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) “O” document referring to an oral disclosure, use, exhibition or other means “P” document published prior to the international filing date but later than the priority date claimed	“T” later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention “X” document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone “Y” document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art “&” document member of the same patent family																							
Date of the actual completion of the international search 07 December 2019	Date of mailing of the international search report 02 January 2020																							
Name and mailing address of the ISA/CN China National Intellectual Property Administration (ISA/CN) No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088 China Facsimile No. (86-10)62019451	Authorized officer Telephone No.																							

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

INTERNATIONAL SEARCH REPORT

International application No. PCT/CN2019/086901

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C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN 104878561 A (WUXI LITTLE SWAN CO., LTD.) 02 September 2015 (2015-09-02) entire document	1-17
A	CN 109112782 A (WUXI LITTLE SWAN CO., LTD.) 01 January 2019 (2019-01-01) entire document	1-17

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2019/086901

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Patent document cited in search report			Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
CN	203890750	U	22 October 2014	None	
CN	108660682	A	16 October 2018	None	
CN	109440388	A	08 March 2019	None	
CN	105951357	A	21 September 2016	None	
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JP	2004236704	A	26 August 2004	None	
JP	2007082651	A	05 April 2007	None	
CN	104878561	A	02 September 2015	None	
CN	109112782	A	01 January 2019	None	

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Patent documents cited in the description

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