



(11)

EP 4 772 691 A1

(12)

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

(43) Date of publication:
08.07.2026 Bulletin 2026/28

(51) International Patent Classification (IPC):
D06F 105/42 ^(2020.01) **D06F 33/36** ^(2020.01)
D06F 39/02 ^(2006.01) **D06F 33/32** ^(2020.01)

(21) Application number: **24870082.5**

(52) Cooperative Patent Classification (CPC):
D06F 33/32; D06F 33/36; D06F 39/02;
D06F 2105/42

(22) Date of filing: **31.07.2024**

(86) International application number:
PCT/CN2024/108949

(87) International publication number:
WO 2025/066529 (03.04.2025 Gazette 2025/14)

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

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(30) Priority: **26.09.2023 CN 202311260698**
17.10.2023 CN 202311339500

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(54) **METHOD AND APPARATUS FOR CONTROLLING CLOTHES TREATMENT DEVICE**

(57) A method and apparatus for controlling a clothes treatment device (10). The method comprises: spraying washing foam to a load in a clothes treatment cavity; on the basis of the spraying of the washing foam being stopped, controlling the clothes treatment cavity to stand still or rotate for a preset soaking duration; and on the basis of the preset soaking duration being reached,

feeding water into the clothes treatment cavity by means of a dispensing assembly. The clothes treatment device (10) can reduce the friction between clothes and the clothes treatment cavity, better protecting the clothes, and can also make detergent components in a detergent be in sufficient contact with stains, improving the stain removal of the clothes.

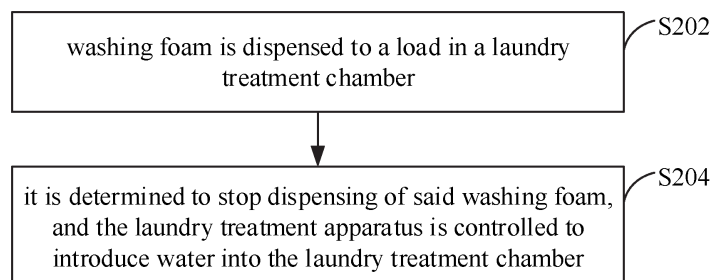


FIG. 2

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Description

CROSS-REFERENCE TO RELATED APPLICATION

[0001] The present application claims priority to the Chinese Patent Application No. 202311260698.6 filed on September 26, 2023, entitled "METHOD AND APPARATUS FOR CONTROLLING CLOTHES TREATMENT DEVICE", and Chinese Patent Application No. 202311339500.3 filed on October 17, 2023, entitled "WASHING METHOD AND APPARATUS FOR CONTROLLING CLOTHES TREATMENT DEVICE". The disclosures of these applications are incorporated herein by reference in their entirety.

TECHNICAL FIELD

[0002] The present application relates to the technical field of electrical equipment, and in particular to a control method and device for a laundry treatment apparatus.

BACKGROUND

[0003] Washing machines, washer-dryers and other laundry treatment apparatuses have become indispensable household electrical appliances in family life. The use of laundry treatment apparatuses for laundry treatment brings great convenience to users' daily lives.

[0004] In the related art, during the laundry treatment process of a laundry treatment apparatus, the conventional approach is to dispense detergent into the tub of the laundry treatment apparatus and fill water to a preset water level for laundry washing. However, such an approach fails to effectively bring the detergent components into full contact with the laundry, thus resulting in poor stain removal efficiency during the laundry treatment process.

SUMMARY

[0005] In view of this, the present application provides a control method and device for a laundry treatment apparatus, so as to at least solve the technical problems in the related art that detergent components cannot be effectively brought into full contact with the laundry, resulting in poor decontamination effect during the laundry treatment process.

[0006] According to a first aspect of embodiments of the present application, there is provided a control method for a laundry treatment apparatus, including: washing foam is dispensed to a load in a laundry treatment chamber; it is determined to stop the dispensing of said washing foam, and the laundry treatment apparatus is controlled to introduce water into the laundry treatment chamber.

[0007] According to a second aspect of embodiments of the present application, there is provided a control device for a laundry treatment apparatus, including: a

spray unit configured to dispense a washing foam to a load in a laundry treatment chamber; and a water introduction unit configured to determine to stop dispensing the washing foam, and control the laundry treatment apparatus to introduce water into the laundry treatment chamber.

[0008] According to a third aspect of embodiments of the present application, there is further provided an electronic device, including a memory and a processor. A computer program is stored in the memory, and the processor is configured to perform the control method for a laundry treatment apparatus according to the first aspect through the computer program.

[0009] According to a fourth aspect of embodiments of the present application, there is also provided a computer-readable storage medium having a computer program stored therein. The computer program is configured to, when run, perform the control method for the laundry treatment apparatus according to the first aspect.

[0010] In the method of the embodiments of the present application, the washing foam is formed in the dispensing assembly and dispensed to a load in the washing tub; in responsive to determining to stop the dispensing of said washing foam, the laundry treatment apparatus is controlled to introduce water into the washing tub. Compared with the related art in which detergent and water are directly dispensed into the laundry treatment chamber for mixing, in the present application, a detergent solution is formed in the dispensing assembly and then dispensed into the laundry treatment chamber in the form of foam. The washing foam can adhere to the surface of the laundry to wrap the laundry, reduce friction between the laundry and the laundry treatment chamber, better care for the laundry, and bring the detergent components into full contact with stains. In addition, the mechanical force generated by the rupture of the foam acts on the surface of the laundry, which can improve the decontamination effect of the laundry.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] Upon reading the detailed description of the preferred embodiments set forth below, various other advantages and benefits will become apparent to a person of ordinary skill in the art. The accompanying drawings are provided solely for the purpose of illustrating the preferred embodiments and are not to be construed as limiting the present application. Furthermore, throughout the accompanying drawings, like components are denoted by the same reference numerals.

FIG. 1 is a schematic view of an application environment of an optional control method for a laundry treatment apparatus according to an embodiment of the present application;

FIG. 2 is a schematic flow diagram of an optional control method for a laundry treatment apparatus according to an embodiment of the present applica-

tion;

FIG. 3 is a schematic flow diagram of another optional control method for a laundry treatment apparatus according to an embodiment of the present application;

FIG. 4 is a schematic flow diagram of a further optional control method for a laundry treatment apparatus according to an embodiment of the present application;

FIG. 5 is a schematic flow diagram of another optional control method for a laundry treatment apparatus according to an embodiment of the present application;

FIG. 6 is a schematic flow diagram of another optional control method for a laundry treatment apparatus according to an embodiment of the present application;

FIG. 7 is a schematic flow diagram of another optional control method for a laundry treatment apparatus according to an embodiment of the present application;

FIG. 8 is a schematic flow diagram of another optional control method for a laundry treatment apparatus according to an embodiment of the present application;

FIG. 9 is a schematic flow diagram of another optional control method for a laundry treatment apparatus according to an embodiment of the present application;

FIG. 10 is a schematic structural view of a control device for a laundry treatment apparatus provided in an embodiment of the present application;

FIG. 11 is a schematic structural view of an electronic device provided in an embodiment of the present application;

FIG. 12 illustrates a schematic flow diagram of a washing control method provided in an embodiment of the present application;

FIG. 13 illustrates a schematic view of foam in a wave form provided in an embodiment of the present application;

FIG. 14 illustrates a schematic structural view of a washing control device provided in an embodiment of the present application;

FIG. 15 illustrates a schematic structural view of another laundry treatment apparatus provided in an embodiment of the present application;

FIG. 16 illustrates a schematic view of a storage medium provided in one embodiment of the present application.

DETAILED DESCRIPTION

[0012] To enable those skilled in the art to better understand the solutions of the present invention, the technical solutions in the embodiments of the present application will be described in a clear and comprehensive manner below in conjunction with the accompanying drawings in

the embodiments of the present application. Obviously, the described embodiments are merely some rather than all of the embodiments of the present invention. Based on the embodiments of the present invention, all other embodiments obtained by a person of ordinary skill in the art without making creative efforts shall fall within the protection scope of the present invention.

[0013] It should be noted that the terms "first", "second" and the like in the specification and claims of the present invention as well as the aforesaid accompanying drawings are used to distinguish between similar objects, and are not necessarily used to describe a specific order or sequence. It should be understood that such data used may be interchanged under appropriate circumstances, so that the embodiments of the present invention described herein can be practiced in orders other than those illustrated or described herein. Furthermore, the terms "include" and "have" and any variations thereof are intended to cover non-exclusive inclusion. For example, a process, method, system, product or apparatus including a series of steps or units need not be limited to those steps or units explicitly listed, but may include other steps or units that are not explicitly listed or are inherent to such processes, methods, products or apparatuses.

[0014] Optionally, according to one aspect of the embodiments of the present application, a control method for a laundry treatment apparatus is provided. As an optional implementation manner, the control method for a laundry treatment apparatus may be applied, but is not limited to, the application environment as shown in FIG. 1. As shown in FIG. 1, user 102 may perform human-computer interaction with the laundry treatment apparatus 10. The laundry treatment apparatus 10 includes a memory 106 and a processor 108. In the present embodiment, the laundry treatment apparatus 10 may perform, but is not limited to, the following operations of: forming a detergent solution in a dispensing assembly of the laundry treatment apparatus 10, and spraying washing foam onto the load in the washing tub of the laundry treatment apparatus 10; determining to stop spraying the washing foam, and introducing water into the wash tub through the dispensing assembly. The laundry treatment apparatus 10 may be various laundry treatment apparatuses such as a washing machine and a washer-dryer. The aforesaid is merely an example, and no limitation is imposed thereon in the present embodiment.

[0015] In the related art, during the laundry treatment process of a laundry treatment apparatus, the conventional approach is to dispense detergent into the washing tub of the laundry treatment apparatus and fill water to a preset water level simultaneously for laundry washing. However, this approach fails to effectively bring the detergent components into full contact with the laundry, thus resulting in poor stain removal efficiency during the laundry treatment process.

[0016] To address the aforesaid technical problem, in an optional implementation manner, as shown in FIG. 2, a control method for a laundry treatment apparatus accord-

ing to an embodiment of the present application is provided, which control method includes the following operations.

[0017] At S202, washing foam is dispensed onto the load in the laundry treatment chamber.

[0018] Specifically, in some embodiments of the present application, washing foam is dispensed onto the load in the laundry treatment chamber through the dispensing assembly. The dispensing assembly includes a detergent mixing chamber, which is configured to mix the detergent and water to form a detergent solution. The detergent solution formed by mixing detergent and water passes through an atomizing nozzle of the dispensing assembly and is dispensed onto the load in a foamed state. The surface of the load is in direct contact with the high-concentration foamed detergent solution, which can enhance the washing effect on the laundry. Furthermore, the foam forms a foam film in the inner tub, which helps prevent the foamed detergent solution from flowing out of the inner tub of the washing tub, thereby enabling the detergent solution to fully contact the laundry. The detergent herein includes liquid detergent and/or solid detergent. Liquid detergent may include a cleaning agent and a fabric softener, and solid detergent may include detergent powder, solid cleaning agent and detergent pods. The load includes various laundry or other items to be cleaned. The laundry treatment chamber includes a washing tub, a drying drum and the like.

[0019] In the prior art, among the detergent dispensing methods of laundry treatment apparatuses, most directly dispense the detergent solution between the inner and outer tubs of the laundry treatment apparatus, or directly onto the load. However, these two methods fail to effectively bring the detergent components into full contact with the laundry, resulting in poor stain removal efficiency, and also fail to reduce friction between the laundry and the washing tub. In contrast, the present application directly dispenses foamed detergent onto the load; the foamed detergent solution can expand its coverage area inside the washing tub, thereby increasing the wetted area of the laundry. This also increases the contact area between the detergent solution and the laundry, enabling the detergent components to come into full contact with stains, and thereby enhancing the washing effect of the detergent on the laundry. In addition, it can also reduce friction between the laundry and the laundry treatment chamber, thus better protecting the laundry. Spraying the mist-like or foamed detergent solution onto the load can minimize the impact on the formed foam.

[0020] At S204, it is determined to stop dispensing the washing foam, and the laundry treatment apparatus is controlled to introduce water into the laundry treatment chamber.

[0021] Specifically, in the embodiments of the present application, after the dispensing of the washing foam is completed, water may be introduced into the washing tub to perform the washing operation. After water is introduced into the washing tub, the laundry can be fully

wetted, thereby improving the stain removal efficiency for the laundry.

[0022] In addition, in some embodiments of the present application, water is sprayed into the washing tub through the atomizing nozzle, and air is mixed into the water to form fine and dense micro-foam. This can enhance the rinsing effect of water on the laundry, thereby achieving water saving and shortening the rinsing time.

[0023] In the method of the embodiments of the present application, washing foam is dispensed onto the load in the washing tub; it is determined to stop dispensing the aforesaid washing foam, and the laundry treatment apparatus is controlled to introduce water into the washing tub through the dispensing assembly. In comparison with the related art where detergent and water are directly dispensed into the laundry treatment chamber for mixing, the present application forms a detergent solution via the dispensing assembly and then dispenses it in a foamed state into the laundry treatment chamber. The washing foam can adhere to the surface of the laundry to warp the laundry, reduce friction between the laundry and the laundry treatment chamber, and better protect the laundry. It can also bring the detergent components in the detergent into full contact with stains, achieve a more uniform detergent concentration, and enhance the stain removal effect of the laundry.

[0024] In an optional implementation manner, as shown in FIG. 3, a control method for a laundry treatment apparatus according to an embodiment of the present application is provided, and the control method includes the following operations.

[0025] At S302, the laundry treatment chamber is driven to rotate at a first rotational speed and/or a first rhythm, and the washing foam is dispensed onto the load in the rotating laundry treatment chamber.

[0026] Specifically, in the embodiments of the present application, the washing foam can be sprayed evenly onto the load during dispensing by spraying the washing foam while controlling the washing tub to rotate synchronously. In one example, the first rotational speed may be 35 revolutions per minute, the rotation duration of the first rhythm may be 20 seconds, and the stop duration of the first rhythm may be 5 seconds. That is, when the rotational speed of the washing tub is increased from zero to 35 revolutions per minute, and is maintained at a uniform speed of 35 revolutions per minute, the washing foam is sprayed onto the load in the washing tub. After the washing tub rotates at the uniform speed of 35 revolutions per minute for 20 seconds, it stops for 5 seconds, and then the rotation of the washing tub is continuously controlled in the rhythm of "rotating for 20 seconds and stopping for 5 seconds".

[0027] S304, in responsive to stopping dispensing the washing foam, the laundry treatment apparatus is controlled to introduce water into the laundry treatment chamber.

[0028] Operation S304 has been described above and will not be repeated herein.

[0029] In an optional implementation, an embodiment of the present application provides a control method for a laundry treatment apparatus (as shown in FIG. 4), which includes the following operations.

[0030] At S402, the laundry treatment chamber is driven to rotate at a first rotational speed and/or a first rhythm, and the washing foam is dispensed onto the load in the rotating laundry treatment chamber.

[0031] At S404, it is determined to stop dispensing the washing foam, and the laundry treatment chamber is driven to rotate at a second rotational speed and/or a second rhythm for a preset duration to cause the load to tumble in the laundry treatment chamber.

[0032] Specifically, in the embodiments of the present application, after the dispensing of the washing foam is completed, the washing tub is driven to rotate at a preset second rotational speed and/or a preset second rhythm for a preset duration, which enables the load to tumble in the washing tub. This allows the foamed detergent solution to be evenly distributed over the load. Furthermore, the tumbling load collides with the inner wall of the washing tub to generate a beating force, which helps loosen the stains on the laundry and facilitates the contact between the detergent components in the detergent solution and the stains, thus aiding in stain removal. In addition, during tumbling of the load, more foam is generated when the sprayed washing foam collides with the surface of the load or the inner wall of the washing tub. This enriches the foam and also further helps protect the laundry.

[0033] In one example, the second rotational speed may be 45 revolutions per minute, the rotation duration of the second rhythm may be 5 seconds, and the stop duration of the second rhythm may be 5 seconds. The operation of driving the washing tub to rotate at the second rotational speed and/or the second rhythm for a preset duration includes: the washing tub is controlled to rotate at a uniform speed of 45 revolutions per minute for 20 seconds and then is stopped for 5 seconds, then is continuously controlled to rotate in the rhythm of rotating for 5 seconds and stopping for 5 seconds.

[0034] At S406, the laundry treatment apparatus is controlled to introduce water into the laundry treatment chamber.

[0035] Operations S402 and S406 have been described above and will not be repeated herein.

[0036] In one or more embodiments, the operation of controlling the laundry treatment apparatus to introduce water into the laundry treatment chamber includes: water is introduced into the laundry treatment chamber via the dispensing assembly for dispensing the washing foam.

[0037] Specifically, in the embodiments of the present application, after the operation of spraying the detergent solution is completed, the water inlet valve is controlled to introduce water into the washing tub via the dispensing assembly. Water is introduced into the washing tub through the detergent mixing chamber and the atomizing nozzle of the dispensing assembly, which helps to rinse

the residual detergent solution in the detergent mixing chamber and improve the cleanliness of the dispensing assembly. In addition, thanks to the dispensing assembly, the apparatus of the present application can dispense washing foam into the laundry treatment chamber and also introduce water into the laundry treatment chamber, thus realizing the dispensing of two types of fluids by a single dispensing assembly. This can simplify the structure of the laundry treatment apparatus and reduce manufacturing cost.

[0038] In an optional implementation, an embodiment of the present application provides a control method for a laundry treatment apparatus (as shown in FIG. 5), which includes the following operations.

[0039] At S502, the washing foam is dispensed onto the load in the laundry treatment chamber.

[0040] At S504, it is determined to stop dispensing the washing foam, the laundry treatment chamber is driven to rotate at a third rotational speed and/or a third rhythm, and water is introduced into the washing tub synchronously.

[0041] Specifically, in the embodiments of the present application, after the dispensing of the detergent solution is completed, water can be evenly sprayed onto the load by controlling the washing tub to rotate while introducing water synchronously, thus fully wetting the laundry and enhancing the stain removal effect for the laundry. In one example, the third rotational speed may be 35 revolutions per minute, the rotation duration of the third rhythm may be 20 seconds, and the stop duration of the third rhythm may be 5 seconds. The operation of driving the washing tub to rotate at the third rotational speed and/or the third rhythm while introducing water into the washing tub synchronously includes: the washing tub is controlled to rotate at a uniform speed of 35 revolutions per minute and water is introduced into the washing tub at the same time. After the washing tub rotates at a uniform speed of 35 revolutions per minute for 20 seconds, the washing tub stops for 5 seconds, and then the washing tub is continuously controlled to rotate in the rhythm of rotating for 20 seconds and stopping for 5 seconds.

[0042] Operation S502 has been described above and will not be repeated herein.

[0043] In an optional implementation, as shown in FIG. 6, an embodiment of the present application provides a control method for a laundry treatment apparatus, which includes the following operations.

[0044] At S602, the number of detergent dispensing times is determined based on the load amount.

[0045] At S604, the single dispensing operation is performed for the number of times to dispense detergent. The single dispensing operation includes that the detergent solution of a single dispensing amount is sprayed onto the load, and water is introduced into the wash tub in responsive to stopping the dispensing of the washing foam.

[0046] Specifically, in the embodiments of the present application, if the load amount is large, the detergent

matching the load amount may be dispensed in multiple times. The single dispensing amount of the detergent (i.e. the amount of detergent dispensed by the laundry treatment apparatus in a single time) can be determined based on the load amount. For example, a mapping relationship between the load amount and the detergent amount is stored in the memory of the laundry treatment apparatus, and the single dispensing amount of the detergent and the number of times to dispense detergent can be obtained based on the mapping relationship.

[0047] In one example, the single dispensing amount of the detergent dispensed by the laundry treatment apparatus is L_0 , the load amount corresponding to L_0 is M_1 , and the load amount corresponding to $2L_0$ is M_2 . Then, if the load amount is less than or equal to M_1 , detergent amount of L_0 is dispensed; if the load amount is greater than M_1 and less than or equal to M_2 , detergent amount of L_0 is dispensed twice, i.e., two detergent dispensing operations are performed, and so on. After all scheduled pre-washing operations are completed, the laundry treatment apparatus performs the operation of introducing water into the wash tub in response to stopping the spraying of the detergent solution.

[0048] In another example, the preset mapping relationship between the load amount and the detergent amount is as follows: when the load amount $M < M_1$, the detergent dispensing amount is L_0 , where L_0 is the single dispensing amount of the detergent, and the number of times to dispense detergent is 1; when $M_1 < M < M_2$, the detergent dispensing amount is L_1 , where $L_1 = 2L_0$, and the number of times to dispense detergent is 2; when $M_2 < M < M_3$, the detergent dispensing amount is L_3 , where $L_3 = 3L_0$, and the number of times to dispense detergent is 3; when $M_3 < M < M_4$, the detergent dispensing amount is L_4 , where $L_4 = 4L_0$, and the number of times to dispense detergent is 4; it should be noted that $M_1 < M_2 < M_3 < M_4$.

[0049] In one or more embodiments, the operation of forming the detergent solution in the dispensing assembly includes follows.

[0050] The water inlet valve is controlled to introduce water of a first water amount into the dispensing assembly, the dispensing assembly is controlled to suck the detergent of the single dispensing amount from the detergent box, and the water and the detergent are mixed to form the detergent solution; the concentration of the detergent solution is greater than or equal to the preset concentration.

[0051] Specifically, in the embodiments of the present application, the detergent amount can be determined based on the load amount. For example, a mapping relationship between the amount of detergent per unit and the dissolving water required is stored in the memory of the laundry treatment apparatus. After the first water amount of the water required for the detergent of the single dispensing amount is mixed with the detergent in the dispensing assembly, the detergent solution of the single dispensing amount is obtained. It should be noted

that the first water amount can make the concentration of the detergent solution for a single dispensing greater than or equal to the preset concentration, and ensure that the residual amount of the detergent solution in the dispensing assembly is less than or equal to the preset threshold.

[0052] In one or more embodiments, the dispensing assembly includes a detergent dispensing pump, a detergent mixing chamber and an atomizing nozzle. The detergent mixing chamber is connected with the detergent dispensing pump and the atomizing nozzle. The detergent dispensing pump sucks detergent a target amount of from the detergent box and dispenses it into the detergent mixing chamber. The water inlet valve is controlled to introduce an appropriate amount of water into the detergent mixing chamber, and the detergent and the appropriate amount of water are mixed to obtain a detergent solution. The detergent solution under the water pressure of water inflow flows into the atomizing nozzle to form an atomized detergent solution, which is then sprayed into the wash tub.

[0053] In one or more embodiments, the operation of dispensing the detergent which is a single dispensing amount of the washing foam onto the load in the laundry treatment chamber includes follows.

[0054] The detergent of a single dispensing amount is sucked from the detergent box and introduced into the detergent mixing chamber.

[0055] The water inlet valve is controlled to introduce water of the first water amount into the detergent mixing chamber, a detergent solution is formed by mixing the water and the detergent, and the washing foam is then sprayed through the atomizing nozzle into the laundry treatment chamber.

[0056] In an optional implementation, as shown in FIG. 7, an embodiment of the present application provides a control method for a laundry treatment apparatus, which includes the following operations.

[0057] **[0073]** At S702, the detergent solution is dispensed onto the load in the laundry treatment chamber.

[0058] **[0074]** At S704, in responsive to stopping the dispensing of the washing foam, the laundry treatment chamber is controlled to stand still or rotate for a preset soaking duration.

[0059] **[0075]** At S706, in responsive to the elapse of the preset soaking duration, the laundry treatment apparatus is controlled to introduce water into the laundry treatment chamber.

[0060] **[0076]** Specifically, in the embodiments of the present application, the operation of controlling the wash tub to stand still or rotate for a preset soaking duration after the spraying of the washing foam is stopped can ensure that the load is completely wetted by the washing foam. In this way, the detergent solution can fully penetrate into the load, enabling the washing ingredients in the detergent solution to dissolve stains effectively, thus achieving an excellent cleaning effect on loads with heavy stain contamination.

[0061] [0077] Operation S702 has been elaborated above and will not be repeated herein.

[0062] [0078] In one or more embodiments, the operation of introducing water into the wash tub through the dispensing assembly includes the follows.

[0063] [0079] The water inlet valve is controlled to open, and water of the second water amount is introduced into the wash tub through the dispensing assembly. The second water amount is determined based on the load amount corresponding to the load.

[0064] [0080] Specifically, in the embodiments of the present application, after the water inlet valve is opened, the water inflow per unit time of the water inlet valve is within a preset range. Before introducing water into the wash tub through the dispensing assembly, the water inflow required for washing (i.e., the second water amount) can be obtained based on the weight of the load. It can be understood that the required second water amount can be obtained by controlling the opening time of the water inlet valve. In one example, the second water amount is twice the weight of the load.

[0065] [0081] In an embodiment, the control method for the laundry treatment apparatus can be applied not only in the main washing stage of the load. When there are heavy stains on the load, in order to improve the cleaning effect of the load, the control method can also be applied in the pre-treatment stage of the load, in which the pre-washing treatment for the load is performed. After the pre-washing treatment is completed, the laundry treatment apparatus is controlled to enter the main washing stage.

[0066] [0082] According to the embodiment, in one example, the present application provides a control method for a laundry treatment apparatus, as shown in FIG. 8, which includes the following operations:

[0067] [0083] At S1: the load is weighed, the detergent dispensing amount is determined according to the weight of the load, and the detergent of the dispensing amount is automatically dispensed.

[0068] [0084] At S2: after the detergent dispensing is completed, the detergent dispensing pump is controlled to stop operating, the water inlet valve is controlled to introduce water via the atomizing pipeline for dispensing a detergent solution, and the water introduction amount is twice the weight of the load.

[0069] [0085] In operation S2, during the water introduction process, the wash tub is controlled to rotate at a constant speed of 35 revolutions per minute while water is introduced into the wash tub. The wash tub rotates at a constant speed of 35 revolutions per minute for 20 seconds, stops for 5 seconds, and then continues to be controlled to rotate in such a rhythm of "rotating for 20 seconds and stopping for 5 seconds".

[0070] [0086] In an embodiment, as shown in FIG. 9, the operation S1 includes the following operations:

[0087] At S11: the dispensing level is determined corresponding to the weight of the load, and the detergent matching the dispensing level is determined.

[0071] [0088] At S12: the single dispensing amount of the detergent and the number of times to dispense detergent are determined.

5 **[0072] [0089]** At S13: after the detergent dispensing pump sucks out the single dispensing amount of detergent, water is introduced through the atomizing pipeline included in the dispensing assembly, and the detergent is mixed with water by means of the water inflow pressure to obtain the detergent solution for a single dispensing.

10 **[0073] [0090]** At S14: the wash tub is controlled to rotate, and when the rotation speed of the wash tub reaches 35 revolutions per minute, the foamed detergent solution is synchronously dispensed into the wash tub through the atomizing pipeline.

15 **[0074] [0091]** Specifically, when the rotation speed of the wash tub is increased from zero to 35 revolutions per minute, the wash tub is controlled to keep rotating at a constant speed of 35 revolutions per minute, and the washing foam is sprayed onto the load in the wash tub. 20 The wash tub rotates at a constant speed of 35 revolutions per minute for 20 seconds, then stops for 5 seconds, and then is continuously controlled to rotate in the rhythm of rotating for 20 seconds and stopping for 5 seconds.

25 **[0075] [0092]** At S15: after each dispensing is completed, the wash tub is controlled to stand still or rotate for a preset soaking duration, to ensure that the washing foam is uniformly distributed on the load.

30 **[0076] [0093]** Specifically, the operation of controlling the wash tub to rotate for the preset soaking duration includes: during the preset soaking duration, the wash tub is controlled to rotate at a constant speed of 45 revolutions per minute for 20 seconds and then stop for 5 seconds, and then continue to be controlled to rotate in the rhythm of rotating for 5 seconds and stopping for 5 seconds. 35

[0077] [0094] In the embodiments of the present application, the washing foam formed by mixing the detergent and water is sprayed into the wash tub, such that the surface of the load is in direct contact with the foamy detergent solution of a relatively high concentration. Furthermore, the detergent foam forms a foam film in the inner tub, which helps to prevent the foamy washing water from flowing out of the inner tub and thus enhances the washing effect on the laundry. Water is introduced 40 through the dispensing assembly where the detergent solution is mixed and dispensed, which facilitates rinsing off the residual detergent solution in the mixing chamber and improves the cleanliness of the dispensing assembly. Moreover, after water is introduced into the wash tub, the laundry can be thoroughly wetted, thereby improving the stain removal effect on the laundry. 45

50 **[0078] [0095]** According to another aspect of the embodiments of the present application, there is further provided a control device for a laundry treatment apparatus, which is configured to implement the control method for the laundry treatment apparatus. As shown in FIG. 10, the device includes:

[0096] a spray unit 1002, configured to dispense the washing foam onto the load in the laundry treatment chamber;

[0097] a water introduction unit 1004, configured to determine the stop of dispensing the washing foam and control the laundry treatment apparatus to introduce water into the laundry treatment chamber.

[0079] **[0098]** In the method according to the embodiments of the present application, the washing foam is formed in the dispensing assembly and dispensed onto the load in the wash tub; the stop of dispensing the washing foam is determined, and the laundry treatment apparatus is controlled to introduce water into the wash tub. Compared with the related art in which detergent and water are directly dispensed into the laundry treatment chamber for mixing, the detergent solution in the present application is formed via the dispensing assembly and then dispensed into the laundry treatment chamber in the form of foam. The washing foam can adhere to the surface of the laundry to wrap the laundry, reduce friction between the laundry and the laundry treatment chamber, thereby better protecting the laundry. It can also bring the detergent components in the detergent into full contact with stains, so as to improve the stain removal effect on the laundry.

[0080] **[0099]** In one or more embodiments, the spray unit 1002 includes:

[00100] a spray module, configured to drive the laundry treatment chamber to rotate at a first rotation speed and in a first rhythm, and dispense the washing foam onto the load in the rotating laundry treatment chamber.

[0081] **[00101]** In one or more embodiments, the control device for the laundry treatment apparatus further includes:

[00102] a drive unit, configured to determine to stop dispensing the washing foam, and drive the laundry treatment chamber to rotate at a second rotation speed and in a second rhythm for a preset duration, to make the load tumble in the laundry treatment chamber.

[0082] **[00103]** In one or more embodiments, the water introduction unit 1004 includes:

[00104] a first water introduction module, configured to introduce water into the laundry treatment chamber via the dispensing assembly that dispenses the washing foam.

[0083] **[00105]** In one or more embodiments, the water introduction unit 1004 includes:

[00106] a second water introduction module, configured to drive the laundry treatment chamber to rotate at a third rotation speed and in a third rhythm, and synchronously introduce water into the laundry treatment chamber.

[0084] **[00107]** In one or more embodiments, the control device for the laundry treatment apparatus further includes:

[00108] a determination unit, configured to determine the number of times to dispense detergent

based on the load amount;

[00109] a dispensing unit, configured to sequentially execute the single dispensing operation for the number of times to dispense detergent, and introduce water into the wash tub in response to stopping the dispensing of the washing foam. The single dispensing operation includes dispensing washing foam having a single dispensing amount of detergent onto the load.

[0085] **[00110]** In one or more embodiments, the dispensing unit includes:

[00111] a suction module, configured to suck a single dispensing amount of detergent from the detergent box and introduce it into the detergent mixing chamber;

[00112] a mixing and dispensing module, configured to control the water inlet valve to introduce a first water amount of water into the detergent mixing chamber, mix the detergent and water to form a detergent solution, and then spray washing foam into the laundry treatment chamber through a nozzle.

[0086] **[00113]** In one or more embodiments, the water introduction unit 1004 includes:

[00114] a control module, configured to determine to stop dispensing the washing foam, and control the laundry treatment chamber to stand still or rotate for a preset soaking duration;

[00115] a second water introduction module, configured to determine that the preset soaking duration has elapsed, and then control the laundry treatment apparatus to introduce water into the laundry treatment chamber.

[0087] **[00116]** In one or more embodiments, the water introduction unit 1004 includes:

[00117] a third water introduction module, configured to control the water inlet valve to open, and control the laundry treatment apparatus to introduce a second water amount of water into the laundry treatment chamber. The second water amount is determined based on the load amount corresponding to the load.

[0088] **[00118]** According to still another aspect of the embodiments of the present application, there is further provided an electronic device for implementing the control method of the laundry treatment apparatus. The electronic device may be the laundry treatment apparatus as shown in FIG. 1, or a terminal device installed with a control client for the laundry treatment apparatus. The present embodiment is described by taking the electronic device as the laundry treatment apparatus as an example. Optionally, in the present embodiment, the laundry treatment apparatus may access a computer network via a wired or wireless network to communicate with the terminal device, receive control instructions from the

terminal device, and execute corresponding operations according to the control instructions.

[0089] [00119] Optionally, the terminal device includes but is not limited to mobile phone, laptop computer, tablet computer, palmtop computer, MID (Mobile Internet Devices), desktop computer, smart TV, etc. The control client of the laundry treatment apparatus in the embodiments of the present application includes but is not limited to a client providing laundry treatment apparatus control services such as video client, instant messaging client, browser client, education client, etc. The network may include but is not limited to: wired network and wireless network, in which the wired network includes local area network, metropolitan area network and wide area network, and the wireless network includes networks implementing wireless communication such as Bluetooth, WIFI and others.

[0090] [00120] As shown in FIG. 11, the laundry treatment apparatus includes a memory 1102 and a processor 1104. A computer program is stored in the memory 1102, and the processor 1104 is configured to execute the operations of the method in any of the embodiments through the computer program.

[0091] [00121] Optionally, in the present embodiment, the processor may be configured to execute the following operations through the computer program:

[00122] at S1, a washing foam is dispensed onto the load in the laundry treatment chamber;

[00123] at S2, it is determined to stop dispensing the washing foam, and the laundry treatment apparatus is controlled to introduce water into the laundry treatment chamber.

[0092] [00124] Optionally, those of ordinary skill in the art may understand that the structure shown in FIG. 11 is only schematic. FIG. 11 does not limit the structure of the electronic device. For example, the electronic device may further include more or fewer components (such as a network interface, etc.) than the device shown in FIG. 11, or have a configuration different from that shown in FIG. 11.

[0093] [00125] The memory 1102 may be configured to store software programs and modules, such as program instructions/modules corresponding to the control method and device of the laundry treatment apparatus in the embodiments of the present application. The processor 1104 executes various functional applications and data processing by running the software programs and modules stored in the memory 1102, that is, implements the control method of the laundry treatment apparatus. The memory 1102 may include high-speed random access memory, and may also include non-volatile memory, such as one or more magnetic storage devices, flash memory, or other non-volatile solid-state memory. In some examples, the memory 1102 may further include memory remote from the processor 1104, and such remote memory may be connected to the terminal device via a net-

work. Examples of the network include, but are not limited to, the Internet, corporate intranets, local area networks, mobile communication networks, and combinations thereof. The memory 1102 may, but is not limited to, store laundry treatment programs and laundry treatment parameters. In one example, as shown in FIG. 11, the memory 1102 may include, but is not limited to, the spray unit 1002 and the water introduction unit 1004 in the control device of the laundry treatment apparatus. In addition, it may also include, but is not limited to, other module units in the control device of the laundry treatment apparatus, which will not be repeated in this example.

[0094] [00126] Optionally, the transmission device 1106 is configured to receive or transmit data via a network. Specific examples of the network may include wired networks and wireless networks. In one example, the transmission device 1106 includes a Network Interface Controller (NIC), which can be connected to other network devices and a router via a network cable so as to communicate with the Internet or a local area network. In one example, the transmission device 1106 is a Radio Frequency (RF) module, which is configured to communicate with the Internet in a wireless manner.

[0095] [00127] In addition, the laundry treatment apparatus further includes: a display 1108 for displaying various modes of laundry treatment, and a connection bus 1110 for connecting various module components in the electronic device.

[0096] [00128] One or more embodiments of the present application further provide a computer program product or a computer program. The computer program product or the computer program includes computer instructions, and the computer instructions are stored in a computer-readable storage medium. A processor of a computer device reads the computer instructions from the computer-readable storage medium, and the processor executes the computer instructions to cause the computer device to perform the control method of the laundry treatment apparatus. The computer program is configured to, when executed, perform the operations of the method in any of the embodiments.

[0097] [00129] Optionally, in the present embodiment, the computer-readable storage medium may be configured to store a computer program for performing the following operations:

[00130] at S1, the washing foam is dispensed onto the load in the laundry treatment chamber;

[00131] at S2, it is determined to stop dispensing the washing foam, and then the laundry treatment apparatus is controlled to introduce water into the laundry treatment chamber.

[0098] [00132] Optionally, in the present embodiment, those of ordinary skill in the art may understand that all or part of the operations in the methods of the embodiments can be completed by instructing the relevant hardware of the terminal device through a program, and the program

can be stored in a computer-readable storage medium, which may include: a flash drive, Read-Only Memory (ROM), Random Access Memory (RAM), a magnetic disk, an optical disk, and the like.

[0099] [00133] Optionally, the embodiment of the present application further provides a control method for a laundry treatment apparatus. Referring to FIG. 12, the method includes the following operations:

At S101, a washing program is executed, where the washing program includes a dispensing operation of dispensing washing foam into the laundry treatment chamber and a first washing operation including an operation of driving the laundry treatment chamber to rotate according to first washing parameters.

[0100] [00135] In the embodiments of the present application, the washing program includes a dispensing operation of dispensing washing foam into the laundry treatment chamber and a first washing operation. The first washing operation may be performed while dispensing the washing foam, or may be performed after a part of the washing foam is dispensed, or may be performed after the dispensing of the washing foam is completed. The specific timing of the dispensing operation and the first washing operation can be customized according to actual requirements.

[0101] [00136] In the present embodiment, the washing foam may be dispensed through a nozzle. The nozzle may spray foamy detergent solution to generate more washing foam. In another example, the nozzle may also spray misty detergent solution. When the misty detergent solution is sprayed onto the load, washing foam can also be formed to achieve the effect of dispensing washing foam. The spraying of the misty or foamy detergent solution onto the load can reduce the impact on the already formed washing foam.

[0102] [00137] In the present embodiment, the washing control method may be performed by a laundry treatment apparatus. The laundry treatment apparatus in the embodiments of the present application may be a washing machine (such as a drum washing machine), a washer-dryer, or the like. The user places a load in the laundry treatment chamber of the laundry treatment apparatus, such as a wash tub. The laundry treatment apparatus executes the washing program by executing a default program, or executes the washing program after receiving a washing instruction from a client or inputted by a user through the control panel of the laundry treatment apparatus.

[0103] [00138] In the embodiments of the present application, the performance phase of the washing program is a washing phase, in which, after the amount of washing foam to be dispensed is determined based on the current load amount in the wash tub, the washing foam is dispensed onto the surface of the load, and the rotation of the laundry treatment chamber is controlled to rotate to dissolve the stains on the load. The required detergent amount can be determined according to the load weight, and then the amount of washing foam can be determined

according to the detergent amount.

[0104] [00139] In the embodiments of the present application, the washing program includes a dispensing operation of dispensing washing foam into the laundry treatment chamber and a first washing operation, and a large amount of washing foam can be generated. The large amount of washing foam can provide excellent care effect for the laundry, and has a large contact area with the laundry, thereby accelerating the wetting of the laundry. Before the main washing, the laundry is wetted with the foam containing detergent, so that the detergent components in the foam fully dissolve stains. On the other hand, the concentration of the detergent wetted into the interior of the load laundry at the initial stage of foam dispensing is very high, and soaking the laundry with the high-concentration detergent can improve the decontamination effect.

[0105] [00140] In addition, when the nozzle sprays a misty detergent solution, the detergent solution falls onto the load from top to bottom and exerts a force on the laundry. This force, together with the impact force of the detergent solution on the stains, helps loosen and detach the stains, and is conducive to improving the ability to remove stains inside the load. When the detergent solution impacts the existing detergent solution on the laundry surface, more washing foam can be formed on the laundry surface, which further helps improve the stain removal performance.

[0106] [00141] The first washing operation includes the operation of driving the laundry treatment chamber to rotate according to first washing parameters, so that the movement of the washing foam in the laundry treatment chamber presents a wave shape with crests and troughs. In the present embodiment, the wave shape refers to the undulating phenomenon of the washing foam under the action of an external force. The movement of the washing foam in a wave shape means that the washing foam fluctuates with the rotation of the laundry treatment chamber and the impact between the washing foam and the inner wall of the laundry treatment chamber, forming a wave movement shape with crests and troughs. On the one hand, the washing foam moving in a wave shape oscillates and impacts in the laundry treatment chamber, thereby generating more washing foam. On the other hand, the washing foam in a wave shape can adhere to and wrap the surface of the laundry, reducing friction between the laundry and the wash tub. The washing foam in a wave shape has fluidity, which can better loosen stains on the laundry and further improve the decontamination effect. In addition, the user can see the washing foam in a wave shape through the visible window of the wash tub, which delivers a good visual effect, enhances user satisfaction and improves the user experience.

[0107] [00142] FIG. 13 shows a schematic view of the washing foam in a wave shape provided by an embodiment of the present application. Referring to FIG. 13, the laundry treatment chamber 11 of the laundry treatment

apparatus 10 rotates under the control of the motor of the laundry treatment apparatus 10, driving the load 12 to tumble. The washing foam 13 adhered to the load 12 presents the wave shape as shown in FIG. 13 along with the rotation of the laundry treatment chamber 11.

[0108] [00143] It may be understood that for different laundry treatment apparatuses, the initial parameters are different, and the parameters of different washing programs for the same laundry treatment apparatus may also be different. Therefore, in a specific example, the washing program of the washing control method in the present embodiment further includes a second washing operation which includes an operation of driving the laundry treatment chamber to rotate according to second washing parameters.

[0109] [00144] In one example, the first washing operation may correspond to the pre-wash program of the laundry treatment apparatus, and the second washing operation may correspond to a main wash program of the laundry treatment apparatus. The pre-wash program may break down stains in advance, and assist the main wash program in cleaning the laundry, thereby improving the laundry cleaning effect.

[0110] [00145] In the embodiments of the present application, the washing parameters include the rotation rhythm and/or the rotation speed and/or the rotation angle. For example, the washing parameters include one of the rotation rhythm, the rotation speed and the rotation angle; or the washing parameters include the rotation rhythm and the rotation speed; or the washing parameters include the rotation rhythm and the rotation angle; or the washing parameters include the rotation rhythm, rotation speed and rotation angle.

[0111] [00146] Rotation rhythm includes the on-off ratio of the motor, where the on-off ratio refers to the ratio of rotation time of the motor to stop time of the motor. The on-off ratio can characterize the rotation frequency of the motor: a smaller on-off ratio indicates a stronger rotation rhythm, and a larger on-off ratio indicates a weaker rotation rhythm.

[0112] [00147] The rotation speed in the washing parameters refers to the motor rotation speed, and the rotation angle refers to the angle by which the motor drives the laundry treatment chamber to rotate.

[0113] [00148] In one example, the washing parameters may further include water introduction volume, washing time, temperature, and the like.

[0114] [00149] In the embodiments of the present application, the washing parameters include rotation rhythm and/or rotation speed and/or rotation angle. By means of the above washing parameters, the laundry treatment chamber can be driven to rotate according to different washing parameters, and then, different washing operations can be realized by different first washing parameters and second washing parameters.

[0115] [00150] In the embodiments of the present application, the on-off ratio corresponding to the rotation rhythm included in the first washing parameters is smaller

than the on-off ratio corresponding to the rotation rhythm included in the second washing parameters. In this way, the rotation rhythm of the first washing operation can be stronger than the rotation rhythm of the second washing operation. The first washing operation with a stronger rotation rhythm can speed up the rotation and stop of the load following the laundry treatment chamber, increase the tumbling times of the load in the laundry treatment chamber, and generate more washing foam. Moreover, it can make the wave shape of the washing foam more obvious, further help loosen the stains on the laundry and promote the contact between the detergent components in the detergent solution and the stains, so as to enhance the decontamination effect. More washing foam can also help care for the laundry and reduce laundry wear.

[0116] [00151] In one example, the on-off ratio corresponding to the rotation rhythm included in the first washing parameters may be 12:3, and the on-off ratio corresponding to the rotation rhythm included in the second washing parameters may be 25:3. That is, within one rotation rhythm, the motor corresponding to the first washing parameters runs for 12 seconds and stops for 3 seconds, while the motor corresponding to the second washing parameters runs for 25 seconds and stops for 3 seconds.

[0117] [00152] It can be understood that the second washing operation corresponds to the main washing stage. In the main washing stage, the water amount is relatively large, and the laundry treatment apparatus adopts a relatively high rotation speed to increase the impact force of the water flow on the load. The first washing operation corresponds to the pre-washing stage, in which the water amount is smaller than the water amount in the main washing stage. If a high rotation speed is adopted, the laundry will cling to the wall, resulting in high friction between the laundry and the inner wall of the laundry treatment chamber, which is unfavorable for decontamination. Therefore, in the embodiments of the present application, the rotation speed included in the first washing parameters is less than or equal to the rotation speed included in the second washing parameters, so that the laundry treatment chamber has a lower rotation speed in the pre-washing stage than in the main washing stage, which can drive the load to tumble. On the one hand, the tumbling laundry collides with the inner wall of the laundry treatment chamber to produce a beating force, which helps loosen the stains on the laundry and promotes the contact between detergent components and the stains, thereby improving the decontamination performance. On the other hand, the tumbling of the laundry allows multiple surfaces of the laundry to be covered with the foam containing detergent components, making the foam distribution more uniform and facilitating thorough cleaning of the laundry. In addition, the tumbling motion enables the foam on the laundry surface in the laundry treatment chamber to flow with the tumbling, which contributes to a better wave shape of the foam. Furthermore, when the dispensed foam impacts

the surface of the load laundry or the inner wall of the laundry treatment chamber during tumbling, the detergent components are prompted to generate more foam, enriching the foam amount and further caring the laundry.

[0118] [00153] In one example, the rotation speed included in the first washing parameters may be 35 revolutions per minute or 45 revolutions per minute, and the rotation speed included in the second washing parameters may be 45 revolutions per minute or 87 revolutions per minute, etc.

[0119] [00154] In the embodiments of the present application, the rotation angle included in the first washing parameters is smaller than the rotation angle included in the second washing parameters. In one example, the rotation angle included in the second washing parameters may be 360 degrees, which can enable the laundry to fully tumble with the rotation of the laundry treatment chamber in the main washing stage to achieve a better cleaning effect. The rotation angle included in the first washing parameters may be 120 degrees. In this way, the foam dispensed in the dispensing operation can be evenly sprayed onto the laundry, so that the detergent components in the foam can fully penetrate into all parts of the laundry to improve the decontamination effect.

[0120] [00155] In the embodiments of the present application, the rotation speed included in the first washing parameters is greater than or equal to 30 revolutions per minute and less than or equal to 45 revolutions per minute. For example, the rotation speed included in the first washing parameters may be 30 revolutions per minute, 35 revolutions per minute, 40 revolutions per minute, or 45 revolutions per minute, etc. In this way, the movement of the washing foam in the laundry treatment chamber can present a wave shape with crests and troughs and more washing foam can be generated, and the laundry can be prevented from clinging to the wall while being driven to tumble in the laundry treatment chamber.

[0121] [00156] In one example, the range of the on-off ratio of the rotation rhythm included in the first washing parameters may be 2:1 to 5:1. For example, the rotation rhythm included in the first washing parameters may be rotating for 10 seconds and stopping for 5 seconds, rotating for 12 seconds and stopping for 5 seconds, rotating for 9 seconds and stopping for 3 seconds, rotating for 12 seconds and stopping for 3 seconds, rotating for 10 seconds and stopping for 3 seconds, rotating for 11 seconds and stopping for 3 seconds, or rotating for 10 seconds and stopping for 2 seconds, etc.

[0122] [00157] The on-off ratio of the rotation rhythm of the first washing parameters can be combined with any rotation speed of the first washing parameters to meet different user needs. For example, the rotation speed of the first washing parameters is 30 revolutions per minute and the on-off ratio of the rotation rhythm of the first washing parameters is 2:1, or the rotation speed of the first washing parameters is 30 revolutions per minute and the on-off ratio of the rotation rhythm of the first washing

parameters is 3:1, or the rotation speed of the first washing parameters is 40 revolutions per minute and the on-off ratio of the rotation rhythm of the first washing parameters is 2:1. The specific parameter values can be stored in the laundry treatment apparatus through a preset program.

[0123] [00158] In a specific example, the first washing parameters include a rotation speed of 35 revolutions per minute, a rotation rhythm of rotating for 12 seconds and stopping for 3 seconds, and a rotation angle of 120 degrees, and the second washing parameters include a rotation speed of 87 revolutions per minute, a rotation rhythm of rotating for 25 seconds and stopping for 5 seconds, and a rotation angle of 360 degrees.

[0124] [00159] In the embodiments of the present application, the dispensing operation of dispensing foam into the laundry treatment chamber includes: driving the laundry treatment chamber to rotate according to the first washing parameters, and dispensing foam into the laundry treatment chamber when the rotation speed of the laundry treatment chamber reaches a preset rotation speed.

[0125] [00160] It can be understood that a certain period of time is required for the laundry treatment chamber to go from starting to rotate to rotating at a constant speed. In the present embodiment, the preset rotation speed is the rotation speed included in the first washing parameters. For example, if the rotation speed included in the first washing parameters is 45 revolutions per minute, foam is dispensed into the laundry treatment chamber when the rotation speed of the laundry treatment chamber reaches 45 revolutions per minute. In this way, foam can be dispensed into the laundry treatment chamber when the laundry treatment chamber is rotating at a constant speed, so that the dispensed foam is distributed more evenly on the laundry.

[0126] [00161] In an optional embodiment, foam may also be dispensed into the laundry treatment chamber when the laundry treatment chamber starts to rotate, so as to reduce the time required for the dispensing operation.

[0127] [00162] The operation of driving the laundry treatment chamber to rotate according to the first washing parameters includes driving the laundry treatment chamber to rotate unidirectionally with the first washing parameters. As shown in FIG. 13, the laundry treatment chamber is driven to rotate unidirectionally in the direction indicated by the arrow in FIG. 13 with the first washing parameters. In this way, when the load rotates to the highest point, it will tumble and fall under the action of gravity, and then will reach the highest point again and tumble and fall again with the second rotation of the laundry treatment chamber. By repeating this process, the tumbling of the load can be realized, so that the dispensed foam is evenly adhered to the load, achieving a better cleaning effect.

[0128] [00163] In addition, the unidirectional rotation of the laundry treatment chamber can make foam in the wave shape fluctuate uniformly in the rotation direction of

the laundry treatment chamber, make the formed wave crests and wave troughs more obvious, enhance the visual effect and improve the user experience.

[0129] [00164] In the embodiments of the present application, the dispensing operation of dispensing foam into the laundry treatment chamber includes: dispensing foam into the laundry treatment chamber while driving the laundry treatment chamber to rotate according to the first washing parameters. In this way, the dispensed foam can be distributed more evenly on the laundry, and the foam dispensed into the laundry treatment chamber can also rotate according to the rotation of the laundry treatment chamber, thereby generating more foam.

[0130] [00165] The operation of driving the laundry treatment chamber to rotate according to the first washing parameters includes driving the laundry treatment chamber to rotate unidirectionally with the first washing parameters. In this way, tumbling of the load can be realized, so that the dispensed foam is evenly adhered to the load, thereby achieving a better cleaning effect.

[0131] [00166] The washing program is a control method executed when one foam dispensing and one first washing operation are performed in the pre-washing stage. When the load amount is relatively large and multiple foam dispensings are required, the washing control method in the embodiments of the present application further includes: executing the washing program multiple times.

[0132] [00167] In one example, the number of times for executing the washing program may be determined according to the load amount. For example, the memory of the laundry treatment apparatus stores a one-to-one correspondence between the load amount and the detergent amount. There is also a one-to-one correspondence between each unit of detergent amount and the dissolving water required therefor, so that the detergent required for the load amount in the laundry treatment chamber and the dissolving water required for the detergent amount can be mixed to obtain a target amount of detergent solution. Then, the number of times for executing the washing program is obtained according to the target amount of detergent solution and the maximum amount of detergent solution dispensed by the laundry treatment apparatus each time, a corresponding amount of washing foam obtained from the detergent solution to be dispensed is dispensed in each dispensing operation, and the pre-washing operation is executed. Further, the washing program is executed multiple times according to the load amount, so as to dispense the washing foam required for the corresponding load amount, and improve the decontamination effect.

[0133] [00168] In the washing control method according to the embodiments of the present application, the laundry treatment apparatus is controlled to execute at least one washing program. The washing program includes a dispensing operation of dispensing washing foam into the laundry treatment chamber and a first washing operation, and can generate a large amount

of washing foam, which can provide a good care effect on the laundry. Moreover, the large amount of washing foam has a large contact surface with the laundry, accelerating the soak of the laundry. The washing foam containing detergent is used to soak the laundry before the main washing, so that the detergent components in the washing foam fully dissolve the stains. The first washing operation includes an operation of driving the laundry treatment chamber to rotate according to first washing parameters, so that the movement of the washing foam in the laundry treatment chamber presents a wave shape with crests and troughs. The washing foam in the wave shape can adhere to and wrap the surface of the laundry, reducing the friction between the laundry and the wash tub. The washing foam in the wave shape has fluidity, which can better loosen the stains on the laundry and further improve the decontamination effect. The user can see the wave-shaped washing foam from the visible window of the wash tub, which has a good visual effect, increases user satisfaction and improves the user experience.

[0134] [00169] Embodiments of the present application further provide a control device 300 for a laundry treatment apparatus, which is configured to execute the control method for a laundry treatment apparatus according to any one of the embodiments. As shown in FIG. 14, the device includes:

[0135] [00170] an execution unit 301, configured to execute the washing program including the dispensing operation of dispensing washing foam into the laundry treatment chamber and the first washing operation. The first washing operation includes an operation of driving the laundry treatment chamber to rotate according to first washing parameters, so that the movement of the washing foam in the laundry treatment chamber presents a wave shape with crests and troughs.

[0136] [00171] The execution unit 301 is further configured to execute a second washing operation which includes the operation of driving the laundry treatment chamber to rotate according to second washing parameters.

[0137] [00172] The execution unit 301 is further configured to drive the laundry treatment chamber to rotate according to the first washing parameters, and dispense washing foam into the laundry treatment chamber when the rotation speed of the laundry treatment chamber reaches a preset rotation speed. The operation of driving the laundry treatment chamber to rotate according to the first washing parameters includes driving the laundry treatment chamber to rotate unidirectionally with the first washing parameters.

[0138] [00173] The execution unit 301 is further configured to: dispense washing foam into the laundry treatment chamber while driving the laundry treatment chamber to rotate according to the first washing parameters. The operation of driving the laundry treatment chamber to rotate according to the first washing parameters includes driving the laundry treatment chamber to rotate

unidirectionally with the first washing parameters.

[0139] [00174] In the washing control device of the embodiments of the present application, a large amount of washing foam can be generated by executing the washing program. The large amount of washing foam can provide a good care effect on the laundry, and has a large contact surface with the laundry, accelerating the soaking of the laundry. The washing foam containing detergent is used to soak the laundry before the main washing, so that the detergent components in the washing foam fully dissolve the stains. In addition, the washing control device can also generate washing foam in the wave shape. The washing foam in the wave shape has fluidity, which can better loosen the stains on the laundry and further improve the decontamination effect. Moreover, the user can see the wave-shaped washing foam from the visible window of the wash tub, which delivers a good visual effect, increases user satisfaction and improves the user experience.

[0140] [00175] The washing control device of the described embodiments of the present application and the washing control method of the embodiments of the present application are based on the same inventive concept, and have the same beneficial effects as the method adopted, operated or implemented by the application program stored therein.

[0141] [00176] Embodiments of the present application further provide a laundry treatment apparatus for executing the washing control method. The laundry treatment apparatus may be a washing machine, a washer-dryer, or the like.

[0142] [00177] Please refer to FIG. 15, which shows a schematic view of a laundry treatment apparatus according to some embodiments of the present application. As shown in FIG. 15, the laundry treatment apparatus 20 includes a processor 200, a memory 201, a connection bus 202 and a communication interface 203. The processor 200, the communication interface 203 and the memory 201 are connected to each other via the connection bus 202. A computer program executable on the processor 200 is stored in the memory 201. When the processor 200 runs the computer program, it will execute the method according to any of the foregoing embodiments of the present application.

[0143] [00178] The memory 201 may include high-speed random access memory (RAM), and may also include non-volatile memory, such as at least one magnetic disk memory. The communication connection between the system network element and at least one other network element is obtained via at least one communication interface 203 (which may be wired or wireless), and the Internet, wide area network, local area network, metropolitan area network, etc. may be used.

[0144] [00179] The connection bus 202 may be an ISA bus, PCI bus, EISA bus, or the like. The bus can be divided into an address bus, a data bus, a control bus, and the like. The memory 201 is configured to store a program, and the processor 200 executes the program

after receiving an execution instruction. The washing control method disclosed in any of the embodiments of the present application can be applied to the processor 200 or implemented by the processor 200.

[0145] [00180] The processor 200 may be an integrated circuit chip with signal processing capability. In the implementation process, each operation of the method can be completed by hardware integrated logic circuits in the processor 200 or software instructions. The processor 200 may be a general-purpose processor, including a central processing unit (CPU), a network processor (NP), etc.; it may also be a digital signal processor (DSP), an application specific integrated circuit (ASIC), a field programmable gate array (FPGA) or other programmable logic devices, discrete gate or transistor logic devices, discrete hardware components. The processor can implement or execute the methods, operations and logic block diagrams disclosed in the embodiments of the present application. The general-purpose processor may be a microprocessor or any conventional processor. The operations of the method disclosed in conjunction with the embodiments of the present application may be executed and completed by a hardware decoding processor, or by a combination of hardware in the decoding processor and a software module. The software module may be located in a mature storage medium in the art such as random access memory, flash memory, read-only memory, programmable read-only memory or electrically erasable programmable read-only memory, registers. The storage medium is located in the memory 201, and the processor 200 reads the information in the memory 201 and completes the operations of the method in combination with hardware.

[0146] [00181] The laundry treatment apparatus in the embodiments of the present application and the washing control method in the embodiments of the present application are based on the same inventive concept, and have the same beneficial effects as the method adopted, operated or implemented thereby.

[0147] [00182] Embodiments of the present application further provide a computer-readable storage medium corresponding to the washing control method of the foregoing embodiments. Please refer to FIG. 16, which shows a computer-readable storage medium that is an optical disc 50 having a computer program (i.e., a program product) stored thereon. When the computer program is run by a processor, the washing control method in any of the foregoing embodiments will be executed.

[0148] [00183] It should be noted that examples of the computer-readable storage medium may also include, but are not limited to, phase-change random access memory (PRAM), static random access memory (SRAM), dynamic random access memory (DRAM), other types of random access memory (RAM), read-only memory (ROM), electrically erasable programmable read-only memory (EEPROM), flash memory or other optical or magnetic storage media.

[0149] [00184] The computer-readable storage med-

ium in the described embodiments of the present application and the washing control method in the embodiments of the present application are based on the same inventive concept, and have the same beneficial effects as the method adopted, operated or implemented by the application program stored therein.

[0150] [00185] Embodiments of the present application further provide a washing control method, including: **[00186]** executing a washing program, which includes a dispensing operation of dispensing washing foam into the laundry treatment chamber and a first washing operation. The first washing operation includes an operation of driving the laundry treatment chamber to rotate according to first washing parameters, so that the movement of the washing foam in the laundry treatment chamber presents a wave shape with crests and troughs.

[0151] [00187] In one or more embodiments, the washing program further includes a second washing operation, and the second washing operation includes an operation of driving the laundry treatment chamber to rotate according to second washing parameters.

[0152] [00188] In one or more embodiments, the washing parameters include the rotation rhythm and/or the rotation speed and/or the rotation angle.

[0153] [00189] In one or more embodiments, the on-off ratio corresponding to the rotation rhythm included in the first washing parameters is less than the on-off ratio corresponding to the rotation rhythm included in the second washing parameters; or

[00190] the rotation speed included in the first washing parameters is less than or equal to the rotation speed included in the second washing parameters; or

[00191] the rotation angle included in the first washing parameters is less than the rotation angle included in the second washing parameters.

[0154] [00192] In one or more embodiments, the rotation speed included in the first washing parameters is greater than or equal to 30 revolutions per minute and less than or equal to 45 revolutions per minute.

[0155] [00193] In one or more embodiments, the on-off ratio of the rotation rhythm included in the first washing parameters ranges from 2:1 to 5:1.

[0156] [00194] In one or more embodiments, the operation of dispensing washing foam into the laundry treatment chamber includes:

[00195] driving the laundry treatment chamber to rotate according to the first washing parameters, and dispensing washing foam into the laundry treatment chamber when the rotation speed of the laundry treatment chamber reaches a preset rotation speed;

[00196] the operation of driving the laundry treatment chamber to rotate according to the first washing parameters includes driving the laundry treatment

chamber to rotate unidirectionally with the first washing parameters.

[0157] [00197] In one or more embodiments, the operation of dispensing washing foam into the laundry treatment chamber includes:

[00198] dispensing washing foam into the laundry treatment chamber while driving the laundry treatment chamber to rotate according to the first washing parameters;

[00199] the operation of driving the laundry treatment chamber to rotate according to the first washing parameters includes driving the laundry treatment chamber to rotate unidirectionally according to the first washing parameters.

[0158] [00200] Embodiments of the present application further provide a washing control device, including an execution unit configured to execute a washing program. The washing program includes a dispensing operation of dispensing washing foam into the laundry treatment chamber and a first washing operation. The first washing operation includes an operation of driving the laundry treatment chamber to rotate according to first washing parameters, so that the movement of the washing foam in the laundry treatment chamber presents a wave shape with crests and troughs.

[0159] [00201] Embodiments of the present application further provide a laundry treatment apparatus, including a memory, a processor, and a computer program stored on the memory and executable on the processor. The processor can execute the computer program to implement the washing control method.

[0160] [00202] The serial numbers of the embodiments in the present application are for description only and do not represent the merits of the embodiments.

[0161] [00203] When the integrated unit in the embodiment is implemented in the form of a software functional unit, and sold or used as a stand-alone product, it may be stored in the computer-readable storage medium. Based on such understanding, the technical solution of the present invention in essence may be embodied in the form of a software product, or the part that contributes to the prior art, or all or part of the technical solution, may be embodied in the form of a software product. The computer software product is stored in a storage medium and includes a number of instructions for causing one or more computer devices (which may be personal computers, servers, network devices, etc.) to perform all or part of the operations of the methods in the various embodiments of the present invention.

[0162] [00204] In the embodiments of the present invention, the description of each embodiment focuses on different points, and for parts not detailed in a certain embodiment, reference may be made to the relevant descriptions in other embodiments.

[0163] [00205] It should be understood that the client

disclosed in several embodiments of the present application may be implemented in other manners. The device embodiments described above are merely illustrative. For example, the division of units is only a logical function division, and other division manners may be adopted in actual implementation. For instance, multiple units or components may be combined or integrated into another system, or some features may be omitted or not implemented. In addition, the mutual coupling, direct coupling or communication connection shown or discussed may be indirect coupling or communication connection through some interfaces, units or modules, and may be in electrical or other forms.

[0164] [00206] Units described as separate components may or may not be physically separate. Components shown as units may or may not be physical units, that is, they may be located in one place, or distributed to multiple network units. Some or all of the units may be selected according to actual needs to achieve the objectives of the solution of this embodiment.

[0165] [00207] In addition, each functional unit in each embodiment of the present invention may be integrated into one processing unit, may exist physically separately, or two or more units may be integrated into one unit. The integrated unit may be implemented in the form of hardware or a software functional unit. The above are only preferred embodiments of the present invention. It should be noted that those skilled in the art can make several improvements and modifications without departing from the principles of the present invention, and such improvements and modifications shall also fall within the protection scope of the present invention.

Claims

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

dispensing a washing foam to a load in a laundry treatment chamber;
determining to stop dispensing the washing foam, and controlling the laundry treatment apparatus to introduce water into the laundry treatment chamber.

2. The method according to claim 1, wherein the dispensing the washing foam to the load in the laundry treatment chamber comprises:

driving the laundry treatment chamber to rotate at a first rotation speed and/or in a first rhythm, and dispensing the washing foam to the load in the rotating laundry treatment chamber.

3. The method according to claim 1 or 2, wherein before controlling the laundry treatment apparatus to introduce water into the laundry treatment chamber, the method further comprises:

determining to stop dispensing the washing foam, and driving the laundry treatment chamber to rotate at a second rotation speed and/or in a second rhythm for a preset duration, to cause the load to tumble in the laundry treatment chamber.

4. The method according to claim 1 or 2, wherein the controlling the laundry treatment apparatus to introduce water into the laundry treatment chamber comprises:

introducing water into the laundry treatment chamber through a dispensing assembly that dispenses the washing foam.

5. The method according to claim 1 or 2, wherein the controlling the laundry treatment apparatus to introduce water into the laundry treatment chamber comprises:

driving the laundry treatment chamber to rotate at a third rotation speed and/or in a third rhythm, and simultaneously introducing water into the laundry treatment chamber.

6. The method according to claim 1, wherein the method further comprises:

determining the number of times to dispense detergent based on a load amount; and performing a single dispensing operation for the number of times to dispense detergent in sequence, and introducing water into the laundry treatment chamber after stopping dispensing the washing foam, wherein the single dispensing operation comprises dispensing the washing foam having a single dispensing amount of detergent to the load.

7. The method according to claim 6, wherein the dispensing the washing foam having the single dispensing amount of detergent to a load in the laundry treatment chamber comprises:

sucking the single dispensing amount of detergent from a detergent box and introducing the detergent into a detergent mixing chamber; and controlling a water inlet valve to introduce a first water amount of water into the detergent mixing chamber, mixing the water and the detergent to form a detergent solution, and then spraying the washing foam into the laundry treatment chamber through a nozzle.

8. The method according to claim 1 or 2, wherein the determining to stop dispensing the washing foam and controlling the laundry treatment apparatus to introduce water into the laundry treatment chamber comprises:

- determining to stop dispensing the washing foam, and then controlling the laundry treatment chamber to stand still or rotate for a preset soaking duration; and
determining that the preset soaking duration has elapsed, and then controlling the laundry treatment apparatus to introduce water into the laundry treatment chamber.
9. The method according to claim 1 or 2, wherein the controlling the laundry treatment apparatus to introduce water into the laundry treatment chamber comprises:
controlling the water inlet valve to open, and controlling the laundry treatment apparatus to introduce a second water amount of water into the laundry treatment chamber, wherein the second water amount is determined based on a load amount corresponding to the load.
10. The method according to claim 1, further comprising a first washing operation, wherein the first washing operation comprises an operation of driving the laundry treatment chamber to rotate with first washing parameters, to cause a movement of the washing foam in the laundry treatment chamber to present a wave shape with wave crests and wave troughs.
11. The method according to claim 10, further comprising a second washing operation, wherein the second washing operation comprises an operation of driving the laundry treatment chamber to rotate with second washing parameters.
12. The method according to claim 11, wherein the washing parameters comprise at least one of a rotation rhythm, a rotation speed and a rotation angle.
13. The method according to claim 12, wherein:
an on-off ratio corresponding to the rotation rhythm comprised in the first washing parameters is less than an on-off ratio corresponding to the rotation rhythm comprised in the second washing parameters; or
the rotation speed comprised in the first washing parameters is less than or equal to the rotation speed comprised in the second washing parameters; or
the rotation angle comprised in the first washing parameters is less than the rotation angle comprised in the second washing parameters.
14. The method according to claim 12 or 13, wherein the rotation speed comprised in the first washing parameters is greater than or equal to 30 revolutions per minute and less than or equal to 45 revolutions per minute.
15. The method according to claim 12 or 13, wherein the on-off ratio of the rotation rhythm comprised in the first washing parameters ranges from 2:1 to 5:1.
16. A control device for a laundry treatment apparatus, wherein the device comprises:
a spray unit configured to dispense washing foam to a load in a laundry treatment chamber;
a water introduction unit configured to determine to stop dispensing the washing foam, and control the laundry treatment apparatus to introduce water into the laundry treatment chamber.
17. A control device for a laundry treatment apparatus, comprising an execution unit configured to execute a washing program,
wherein the washing program comprises a dispensing operation of dispensing foam into the laundry treatment chamber and a first washing operation, the first washing operation comprising an operation of driving the laundry treatment chamber to rotate with first washing parameters, to cause a movement of the foam in the laundry treatment chamber to present a wave shape with crests and troughs.
18. A laundry treatment apparatus, comprising a memory, a processor, and a computer program stored in the memory and executable on the processor, the processor executing the computer program to perform the control method according to any one of claims 1 to 15.

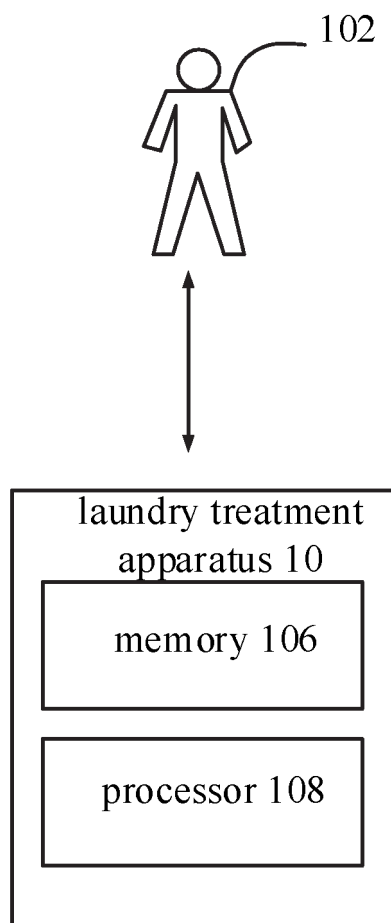


FIG. 1

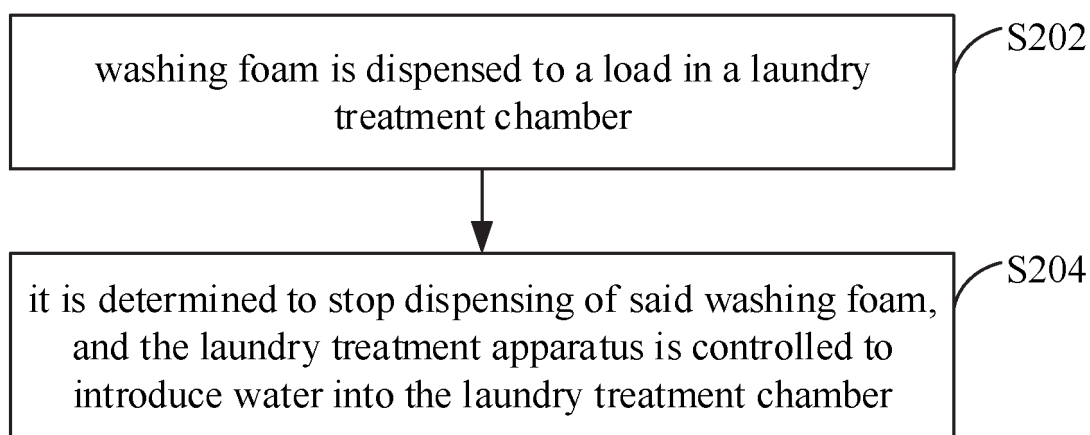


FIG. 2

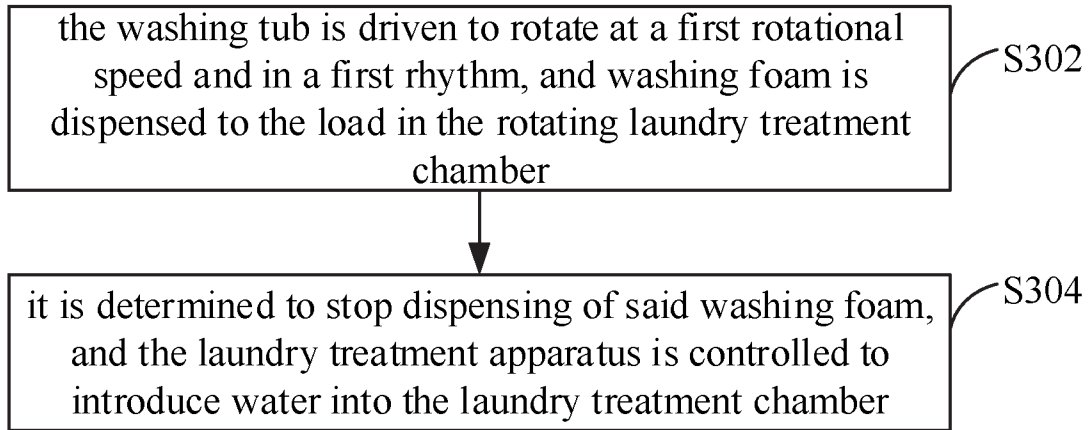


FIG. 3

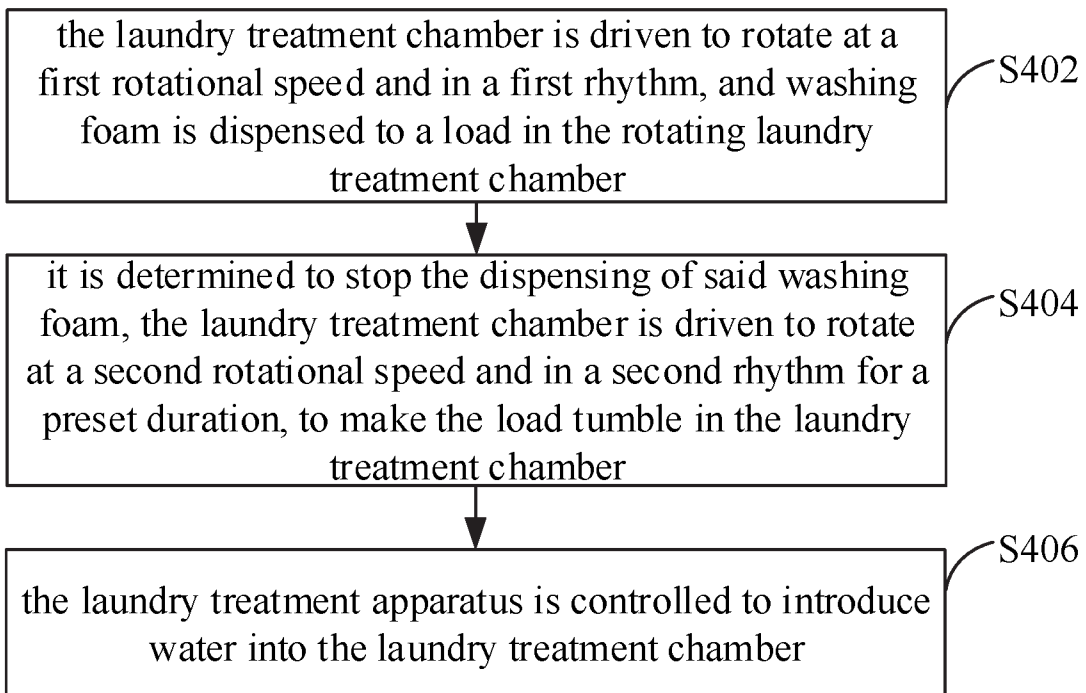


FIG. 4

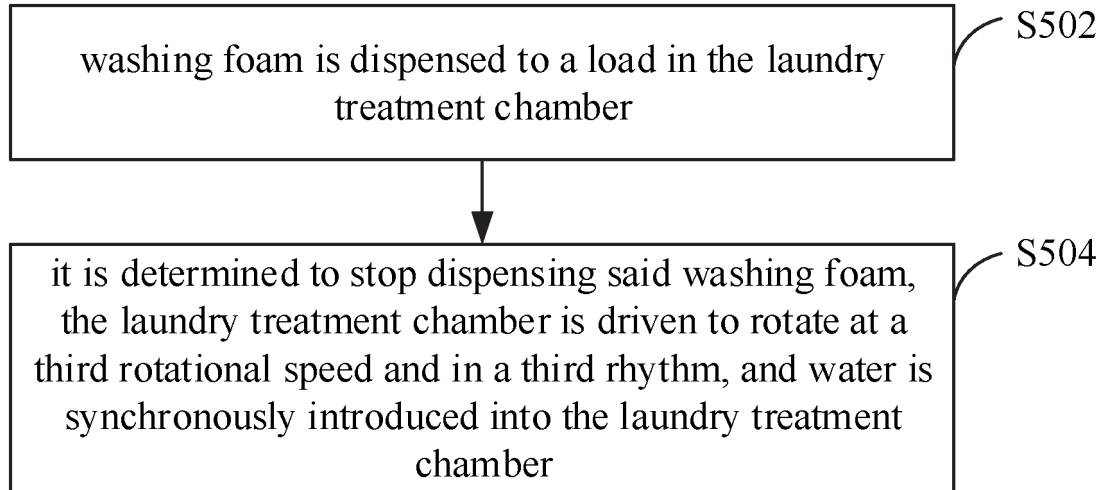


FIG. 5

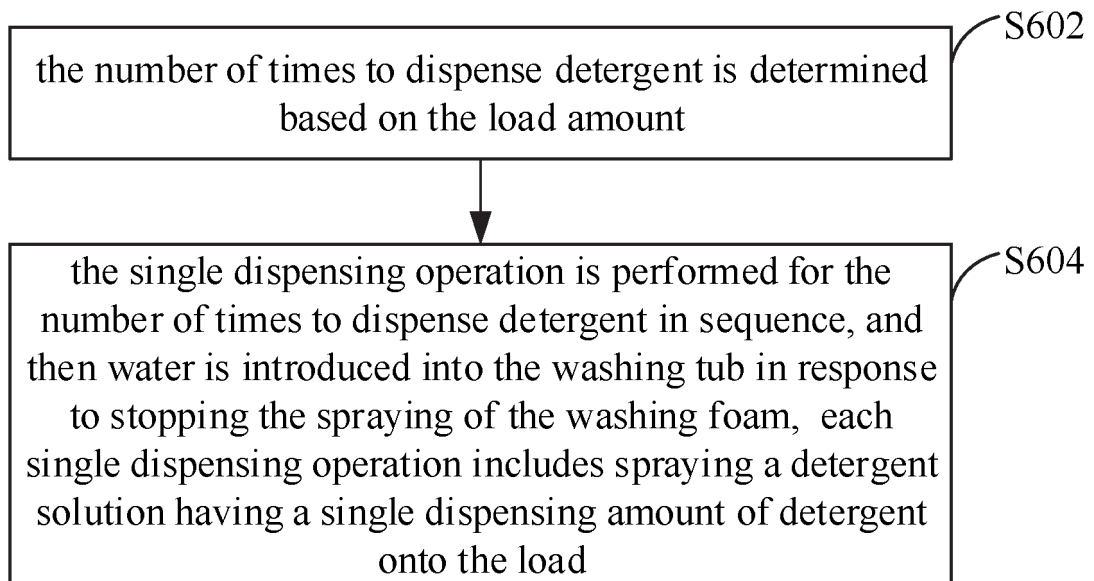


FIG. 6

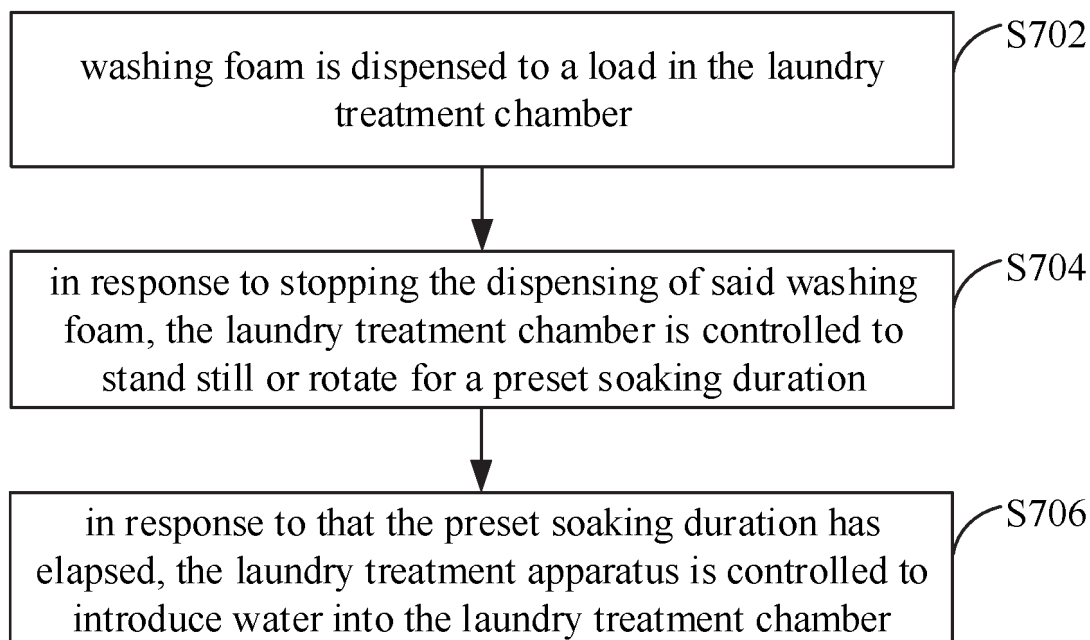


FIG. 7

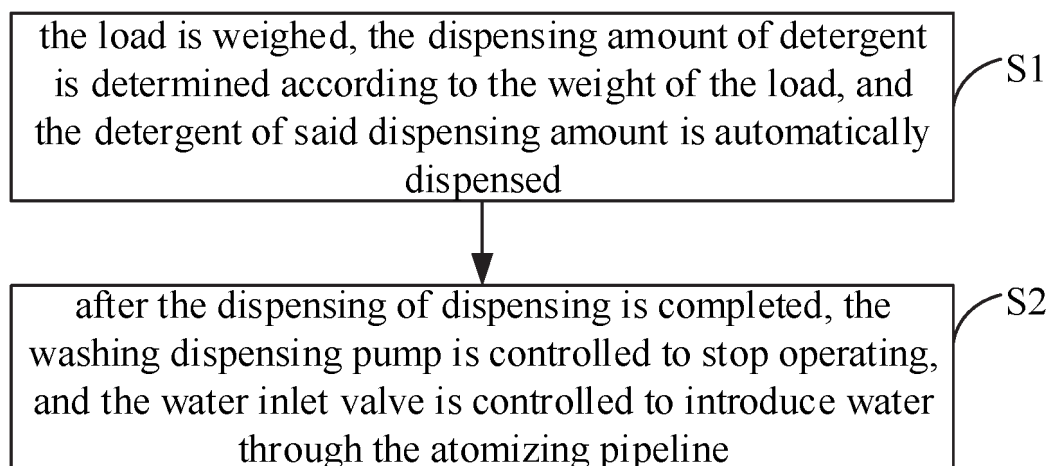


FIG. 8

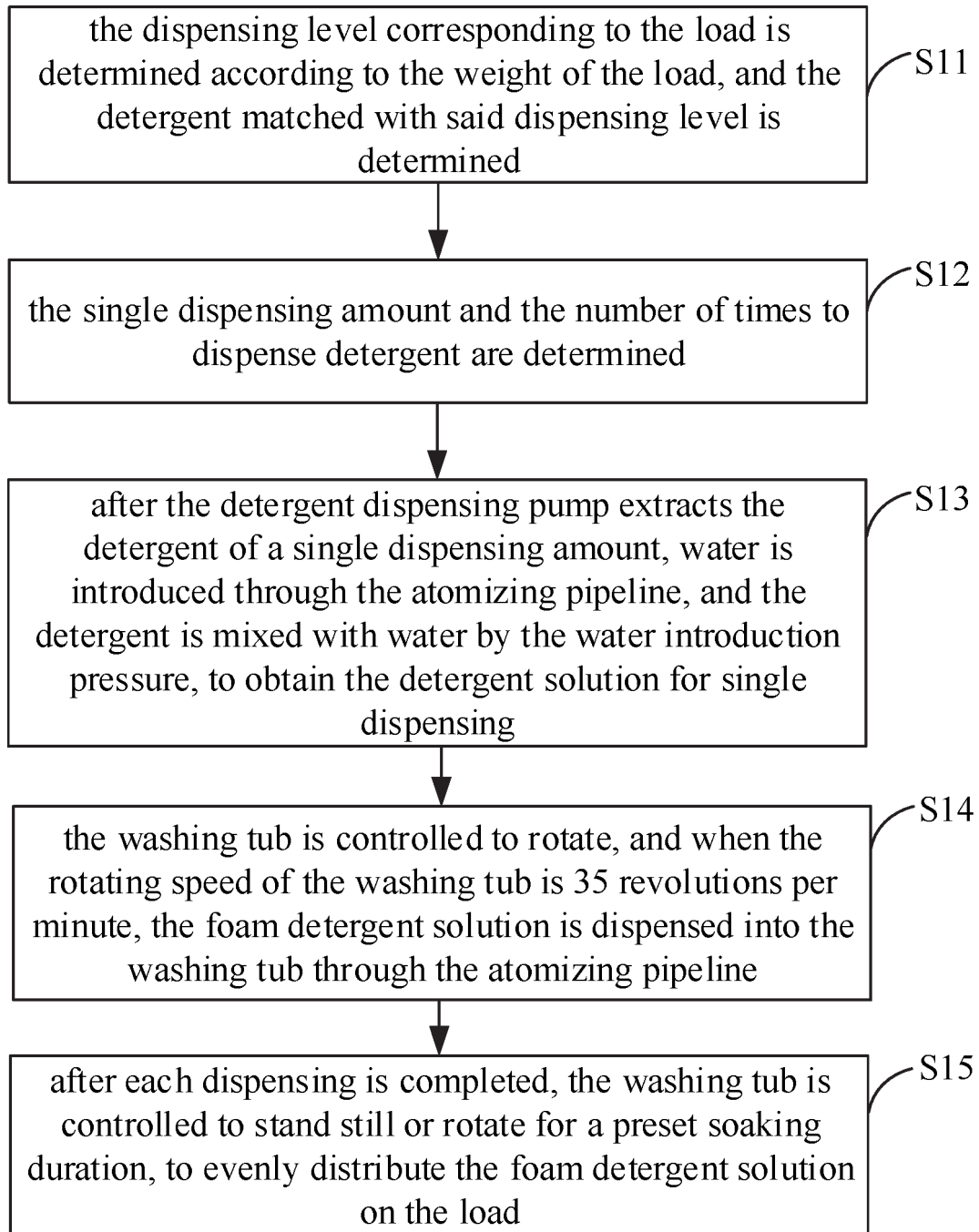


FIG. 9

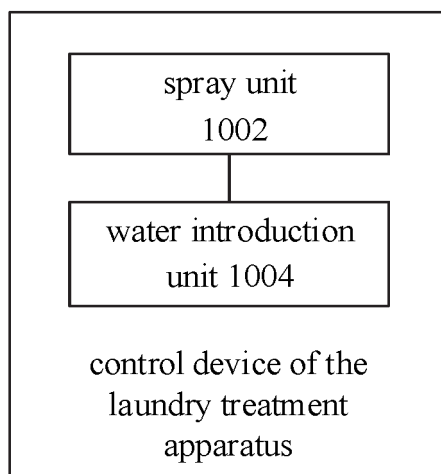


FIG. 10

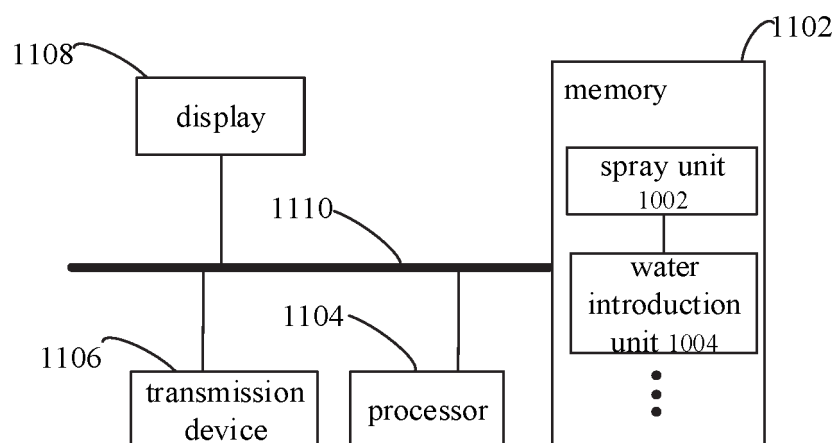


FIG. 11

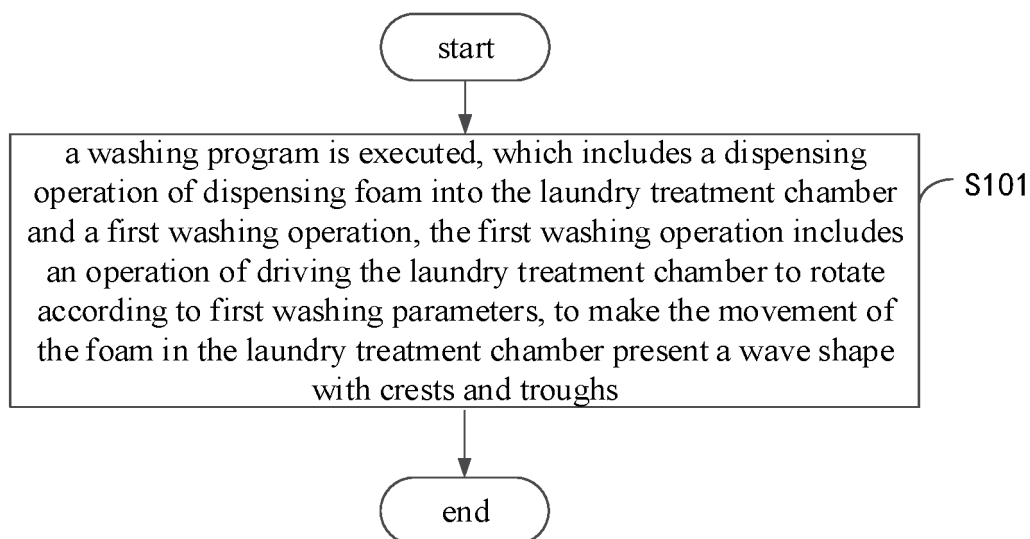


FIG. 12

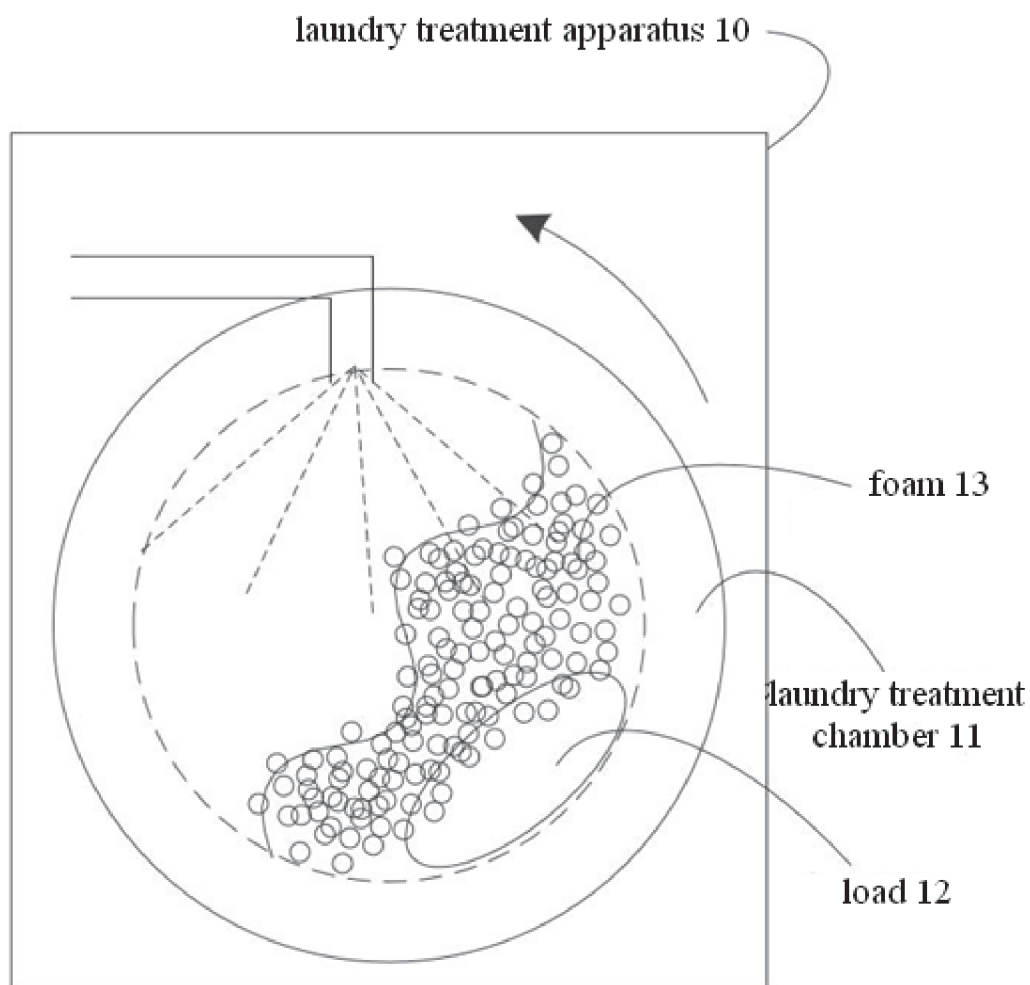


FIG. 13

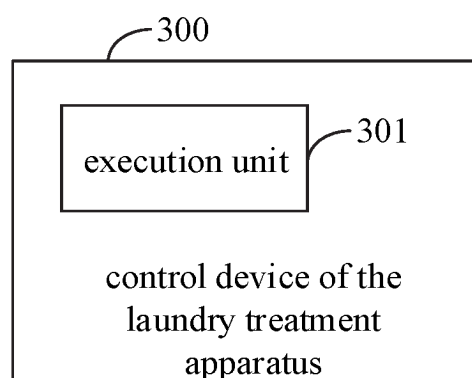


FIG. 14

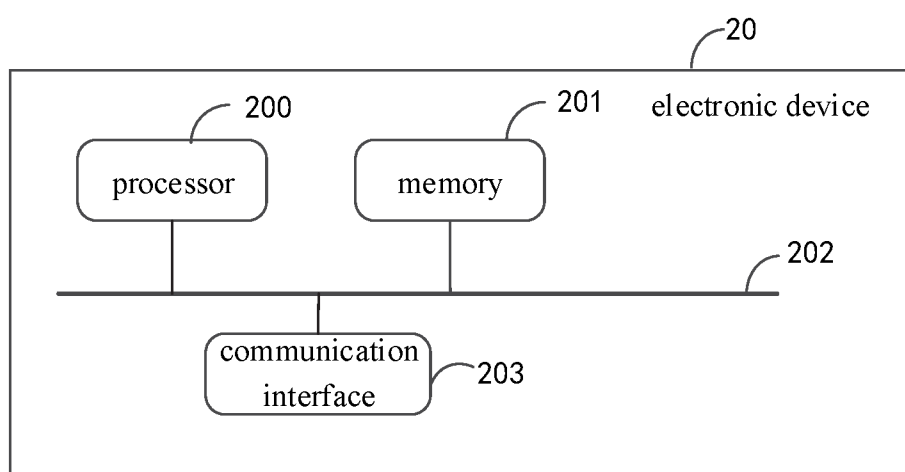


FIG. 15

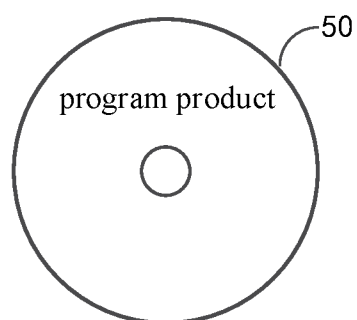


FIG. 16

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2024/108949

A. CLASSIFICATION OF SUBJECT MATTER

D06F105/42(2020.01)i; D06F33/36(2020.01)i; D06F39/02(2006.01)i; D06F33/32(2020.01)i

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: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)

CNTXT, ENTXTC, ENTXT, VEN, CNKI: 洗涤, 清洗, 泡沫, 雾化, 进水, 注水, wash, clean, foam, nebulization, atomization, inlet, inject

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 112538729 A (ZHUHAI GREE ELECTRIC APPLIANCES INC.) 23 March 2021 (2021-03-23) description, specific embodiments, and figures 1-5	1-18
PX	CN 118223237 A (WUXI MEIZHI ELECTRIC APPLIANCE CO., LTD.) 21 June 2024 (2024-06-21) description, specific embodiments, and figures 1-11	1-18
PX	CN 118223240 A (WUXI MEIZHI ELECTRIC APPLIANCE CO., LTD.) 21 June 2024 (2024-06-21) description, specific embodiments, and figures 1-5	1-18
PX	CN 118223241 A (WUXI MEIZHI ELECTRIC APPLIANCE CO., LTD.) 21 June 2024 (2024-06-21) description, specific embodiments, and figures 1-9	1-18
PX	CN 118223242 A (WUXI MEIZHI ELECTRIC APPLIANCE CO., LTD.) 21 June 2024 (2024-06-21) description, specific embodiments, and figures 1-9	1-18

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

* Special categories of cited documents:

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“O” document referring to an oral disclosure, use, exhibition or other means

“P” document published prior to the international filing date but later than the priority date claimed

“T” later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

“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

26 August 2024

Date of mailing of the international search report

09 September 2024

Name and mailing address of the ISA/CN

China National Intellectual Property Administration (ISA/
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China No. 6, Xitucheng Road, Jimenqiao, Haidian District,
Beijing 100088

Authorized officer

Telephone No.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2024/108949

C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN 110552169 A (WUXI LITTLE SWAN ELECTRIC CO., LTD.) 10 December 2019 (2019-12-10) entire document	1-18
A	KR 20080042610 A (SAMSUNG ELECTRONICS CO., LTD.) 15 May 2008 (2008-05-15) entire document	1-18
A	CN 217579403 U (YUNMI INTERNET TECHNOLOGY (GUANGDONG) CO., LTD.) 14 October 2022 (2022-10-14) entire document	1-18

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/CN2024/108949

Patent document cited in search report			Publication date (day/month/year)	Patent family member(s)			Publication date (day/month/year)
CN	112538729	A	23 March 2021	None			
CN	118223237	A	21 June 2024	None			
CN	118223240	A	21 June 2024	None			
CN	118223241	A	21 June 2024	None			
CN	118223242	A	21 June 2024	None			
CN	110552169	A	10 December 2019	None			
KR	20080042610	A	15 May 2008	KR	100835357	B1	04 June 2008
CN	217579403	U	14 October 2022	None			

REFERENCES CITED IN THE DESCRIPTION

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