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(54) **WASHING MACHINE AND CONTROL METHOD THEREOF**

(57) The disclosure discloses a washing machine and a control method thereof. The washing machine includes: a box body; an additive delivery device for delivering clothing additives into the washing machine; and a spare additive box storage structure, which is arranged on the box body and has at least one installation cavity for storing at least one additive box. The additive box can be stored in the spare additive box storage structure, which effectively avoids problems such as random placement of the additive box, easy forgetting, and inconvenience for users to find when replacing the additive box. During the process of adding additives, within a set time after the washing machine sends an alarm prompt to the user that the remaining amount of additives in the additive adding device is insufficient: if the user is still not detected to replace the new additive box, the spare additive suction device is controlled to start and deliver the additives in the spare additive box into the washing machine, effectively avoiding the problem of poor clothes cleaning effect caused by the user's failure to replace the additive box in time.

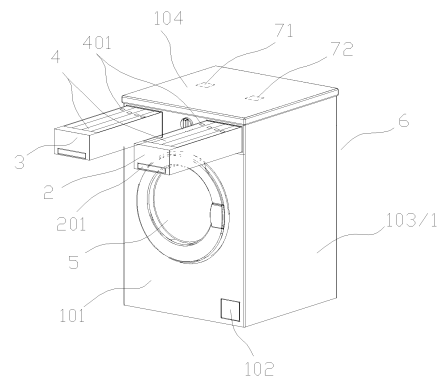


FIG. 1

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Description

TECHNICAL FIELD

[0001] The disclosure belongs to the technical field of household appliances, and specifically relates to a washing machine and a control method thereof.

BACKGROUND

[0002] The washing machine uses water, clothing additives and mechanical operations to wash and care the clothes, so that the clothes can achieve the expected washing and care effect. With the improvement of the automation of washing machines, in the related art, there is automatic detergent dispensing technology of washing machines. The washing machine is configured to communicate the additive box containing detergent or/and softener with the water inlet pipeline, and the detergent in the additive box is discharged through the incoming water or/and softener into the wash drum.

[0003] Chinese patent with application number 201610797034.7 discloses a detergent delivery device for a washing machine and a washing machine with the same. The detergent delivery device includes a storage cavity, and a special detergent box is defined in the storage cavity. The special detergent box placement groove is provided with a first ejector and a second ejector for puncturing the special detergent box, and the first ejector has a water inlet hole, and the second ejector has a water outlet hole, the first ejector and the second ejector are both configured to be adapted for the water inlet hole and the water outlet hole to communicate with the internal space of the special detergent box after the end is pierced into the special detergent box.

[0004] The detergent dispensing device of the washing machine provided by the above application can directly use boxed clothing additives, and the boxed clothing additives can be used once, placed and used, and are easy to operate. But there are the following problems:

1. Since the additive box does not have a designated storage structure, users cannot form good habits of fixed storage. The excess additive boxes purchased are placed randomly and are easy to forget. When replacing the additive box, it takes a certain amount of time to search, causing the replacement of the additive box. Problems such as not being timely.
2. When the detergent dispensing device is dispensing detergent, if the detergent remaining amount is insufficient, the user fails to replace the detergent box in time, which will result in insufficient detergent dosage for this washing program, resulting in poor clothing cleaning effect.

[0005] In view of this, the present disclosure is proposed.

SUMMARY

[0006] The technical problem to be solved by the present disclosure is to overcome the shortcomings of the prior art and provide a washing machine and a control method thereof. Through the spare additive box storage structure provided on the washing machine, it effectively solves the problem that the additive box is placed randomly and is easily forgotten and replaced by the user. Inconvenient problem when looking for additive boxes.

[0007] In order to solve the above technical problems, the first aspect of this application discloses a washing machine, including:

a box body;

an additive delivery device, being configured to deliver laundry additives to the washing machine, and being provided with an installation cavity for storing at least one additive box; characterized in that

the washing machine also includes:

a spare additive box storage structure, being provided on the box body and provided with an accommodation space for storing at least one spare additive box.

[0008] Further, the spare additive box storage structure is fixedly arranged on a top wall or a side wall of the box body;

or, it can be installed in the box body in a pullable manner.

[0009] Further, the spare additive box storage structure is a storage shelf or a storage box that is detachably fixed on the top wall or side wall of the box body;

alternatively, the spare additive box storage structure is the storage shelf or the storage box that is pullably provided in the box body.

[0010] Further, the spare additive box storage structure is a drawer-type storage structure that can be pulled out of the box body;

the drawer-type storage structure includes a drawer body with a placement cavity inside, and a plurality of storage positions corresponding to spare additive boxes are formed in the placement cavity.

[0011] Further, the spare additive box storage structure is pullably disposed at a top or bottom of the box body near a front side wall; preferably, a handle structure is provided on a front panel of the drawer body.

[0012] Furthermore, it also includes:

a spare delivery pipeline communicating the spare additive box and a water supply pipeline of the washing machine;

a spare additive suction device, being provided on the spare delivery pipeline and being configured to deliver the additive in the spare additive box into a washing drum.

[0013] Further, the additive delivery device includes:

an additive dispenser, being pullably arranged in the box body, and the additive dispenser is provided with an installation cavity for placing at least one additive box;

preferably, it also includes:

a position detection module, being installed in the installation cavity or on the box body above the installation cavity, and configured to detect whether a new additive box has been replaced;

preferably, it also includes:
an additive remaining amount detection module, being arranged in the installation cavity or the additive box and configured to detect remaining amount information of the additive in the additive box.

[0014] Further, the washing machine is a drum washing machine;

the additive dispenser is pullably disposed in the box body located above the washing drum, and the spare additive box storage structure is pullably disposed in the box body located below the washing drum;

alternatively, the additive dispenser and the spare additive box storage structure are both arranged in the box body located above the washing drum, and are distributed on the left and right sides of the washing drum.

[0015] Further,

the additive box is provided with an electronic label, and the electronic label stores additive information;

the washing machine also includes:

a first identification module, being arranged in the installation cavity or on the box body and being configured to read the additive information in the electronic label on each additive box in the additive dispenser;

preferably, it also includes:

a second identification module, being arranged in the spare additive box storage structure or on the box body, and being configured to read the additive information in the electronic label on each spare additive box in the spare additive box storage structure;

preferably, the additive information includes one or more of a type, a concentration, and a brand of the additive.

[0016] The second aspect of the present application also provides a control method for the above-mentioned washing machine, which effectively solves the problem of the user failing to replace the detergent in time when the remaining amount of detergent is insufficient during the process of putting the detergent into the detergent delivery device, resulting in insufficient amount of detergent, resulting in poor cleaning effect on clothes.

[0017] Specifically, the control method of the washing machine includes:

during a process of adding additives, and within a set time after the washing machine issues an alarm prompt to a user that the additive balance in the additive adding device is insufficient:

if it is still not detected that the user has replaced a new additive box, the spare additive suction device is controlled to start and the additive in the spare additive box is put into the washing machine.

[0018] Further, the method also includes the following steps:

obtaining an additive type of the additive box in the additive delivery device that has not been replaced in time;

controlling the second identification module to start and read the additive information in the electronic label on each spare additive box in the spare additive box storage structure;

determining whether there is the additive box of the additive type stored in the spare additive box storage structure: if so, control a delivery of the corresponding additive type of additive; if not, continue to alarm.

[0019] After adopting the above technical solution, the present disclosure has the following beneficial effects compared with the prior art.

1. The present disclosure adds a spare additive box storage structure to the washing machine box. The excess additive boxes purchased by users can be stored in the spare additive box storage structure, making it easy for users to form good habits of fixed storage and effectively avoiding additives. If the box is placed randomly, it is easy to forget and lose it. At the same time, the additive box in the additive delivery device is used up. When the additive box needs to be replaced, the user can directly take out the corresponding type of additive box from the spare additive box storage structure and replace it, which reduces the search and replacement time and facilitates timely replacement. Additive box brings great convenience to users.

2. In the washing machine control method provided by the present disclosure, during the process of adding additives, within a set time after the washing machine sends an alarm prompt to the user that the remaining amount of additives in the additive adding

device is insufficient: if the user is not detected to replace the new additives, box, the spare additive suction device is controlled to start and the additives in the spare additive box are injected into the washing machine. This effectively avoids the problem of insufficient additive dosage due to the user's failure to replace the additive box in time, resulting in poor laundry care effect.

3. The washing machine control method provided by the present disclosure uses an Electronic label set on the additive box to identify the backup detergent box. When it is detected that the remaining amount of a certain type of additive in the additive delivery device is insufficient, and at the set time When the contents are not replaced in time, the Electronic labels on each additive box in the spare additive box storage structure can be identified through the second identification module. When a corresponding type of additive is identified, the additive is controlled to be released, so as to realize the storage structure of the spare additive box. The effect of accurately identifying the types of additives in the additive boxes stored in the box and automatically dispensing them not only has a high degree of automation and high dispensing efficiency, but also can effectively avoid mis-dispensing.

[0020] Specific embodiments of the present disclosure will be described in further detail below with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] The drawings, as part of the present disclosure, are used to provide a further understanding of the present disclosure. The schematic embodiments of the present disclosure and their descriptions are used to explain the present disclosure, but do not constitute an improper limitation of the present disclosure. Obviously, the drawings in the following description are only some embodiments. For those of ordinary skill in the art, other drawings can be obtained based on these drawings without exerting creative efforts. In the attached picture:

Figure 1 is a schematic structural diagram of a washing machine in an embodiment of the present disclosure;

Figure 2 is a schematic cross-sectional view of the storage structure of the spare additive box in the embodiment of the present disclosure;

Figure 3 is an enlarged schematic diagram of the conductive state between the additive box and the liquid-conducting plug-in structure at portion A in Figure 2 in an embodiment of the present disclosure;

Figure 4 is an enlarged schematic diagram of the state where the additive box and the liquid-conducting plug-in structure are separated from each other

in the embodiment of the present disclosure;

Figure 5 is a schematic flowchart of an implementation method of a washing machine control method in an embodiment of the present disclosure;

Figure 6 is a schematic flowchart of another implementation method of a washing machine control method in an embodiment of the present disclosure.

[0022] In the picture:

1. Box body; 101. Front side wall; 102. Lint dust cleaning cover; 103. Left side wall; 104. Top wall; 2. Spare additive box storage structure; 201. Handle structure; 3. Additive dispenser; 4. Additive box; 401. Electronic label; 5. Washing drum; 6. Washing machine; 71. First identification module; 72. Second identification module; 8. Mounting seat; 9. Reset valve; 91. Valve body; 92. Spring; 93. Seal; 10. Liquid guide plug; 110. Ejector; 11. Spare additive suction device; 12. Limiting part; 13. Avoidance hole.

[0023] It should be noted that these drawings and text descriptions are not intended to limit the scope of the present disclosure in any way, but are intended to illustrate the concept of the present disclosure for those skilled in the art by referring to specific embodiments.

DETAILED DESCRIPTION

[0024] In order to make the purpose, technical solutions and advantages of the embodiments of the present disclosure clearer, the technical solutions in the embodiments of the present disclosure will be clearly and completely described below in conjunction with the drawings in the embodiments of the present disclosure. The following examples are used to illustrate the present disclosure, but are not used to limit the scope of the present disclosure.

[0025] In the description of the present disclosure, it should be noted that the terms "upper", "lower", "left", "right", "inner", "outer", etc. indicate an orientation or positional relationship based on those shown in the drawings. The orientation or positional relationship is only for the convenience of describing the present disclosure and simplifying the description. It does not indicate or imply that the device or element referred to must have a specific orientation, be constructed and operated in a specific orientation, and therefore cannot be understood as a limitation of the present disclosure.

[0026] In the description of the present disclosure, it should be noted that, unless otherwise clearly stated and limited, the terms "installation", "connection" and "connection" should be understood in a broad sense. For example, it can be a fixed connection or a detachable connection. Connection, or integral connection; it can be a mechanical connection or an electrical connection; it can be a direct connection or an indirect connection through

an intermediate medium. For those of ordinary skill in the art, the specific meanings of the above terms in the present disclosure can be understood on a case-by-case basis.

Embodiment 1

[0027] As shown in Figures 1 to 4, this embodiment provides a washing machine 6, including:

- a box body 1;
- an additive delivery device for delivering laundry additives to the washing machine 6 and is provided with an installation cavity for storing at least one additive box 4; it also includes:
- a spare additive box storage structure 2, being provided on the box body 1 and has a storage space for at least one spare additive box 4 to be stored.

[0028] In this embodiment, as shown in Figure 1, through the spare additive box storage structure 2 added to the box body 1 of the washing machine 6, the excess additive box 4 purchased by the user can be stored in the spare additive box storage structure 2, it is easy for the user to form a good habit of fixed storage, effectively preventing the additive box 4 from being placed randomly and easily forgotten. At the same time, when the additives in the additive box 4 in the additive delivery device are used up and the additive box 4 needs to be replaced, the user can directly take out the corresponding type of additive box 4 from the spare additive box storage structure 2 for replacement, which facilitates the user to replace the additive box 4 in time which brings great convenience to users.

[0029] Further, in this embodiment, the additive delivery device may be an external delivery device. The external delivery device is installed outside the washing machine 6 and is provided on the water inlet pipeline between the water inlet valve of the washing machine 6 and the tap water connector. Alternatively, the additive delivery device is a built-in dispensing device installed in the washing machine 6.

[0030] The additive delivery device has an installation cavity for installation and storage of the additive box 4. After the additive box 4 is installed in the installation cavity, it is connected to the dispensing mechanism of the additive delivery device, such as the first Venturi tube or the first delivery pump. When adding additives, the first Venturi tube or the first delivery pump will extract the additives in the additive box 4 into the water inlet waterway of the washing machine 6 or into the fixed volume cavity. The additives along with the water in the washing machine 6 are delivered into the washing machine 6 to realize the washing and care treatment of the clothes.

[0031] The additive box 4 described in this embodiment has a closed chamber inside for storing additives, and the additive box 4 is a disposable cartridge type additive box 4. The additive box 4 can store liquid laundry

additives such as detergent, softener, flavoring agent, bleach, disinfectant or softener inside.

[0032] Further, the spare additive box storage structure 2 is fixedly arranged on the top wall 104 or the side wall of the box body 1; the spare additive box storage structure 2 can be fixed on the side wall of the box body 1. Preferably, the spare additive box storage structure 2 is fixedly arranged at a set height position above the middle part of the side wall of the box body 1, and the height is convenient for the user to pick up and place the additive box 4. Of course, if the washing machine 6 is a drum washing machine, the spare additive box storage structure 2 can also be directly fixed on the top wall 104 of the box body 1.

[0033] Or, as shown in Figure 1, in another embodiment, the spare additive box storage structure 2 is pullably arranged in the box body 1, so that the spare additive box storage structure 2 cannot be seen from the appearance, which improves the overall aesthetics of the washing machine 6.

[0034] Further, the spare additive box storage structure 2 is a storage shelf or a storage box detachably fixed on the top wall 104 or side wall of the box body 1. The storage shelf or storage box can be fixed on the top wall 104 or side wall of the box body 1 through screws, buckles, hooks, etc., to facilitate disassembly and installation.

[0035] Preferably, in one embodiment, the left side wall 103 or the right side wall of the box body 1 is provided with at least one or more hook holes or hook posts, and the storage shelf or the storage box is provided with a hooking part that cooperates with it, and the hooking part is hooked in the hooking hole or on the hooking post to realize the assembly connection between the storage shelf or the storage box and the washing machine 6. The said accommodating shelf or accommodating box can be disassembled without the use of disassembly tools.

[0036] Of course, the storage shelf or the storage box can also be connected and fixed on the box body 1 of the washing machine 6 through connectors such as screws or buckles, or can also be fixed on the top wall 104 of the box body 1 through welding, melting, bonding, etc. Or on the side wall.

[0037] Or, in another preferred embodiment, the spare additive box storage structure 2 is a storage shelf or a storage box that is pullably provided in the box body 1. The pull-out storage shelf or the storage box is arranged in the box body 1, which not only does not occupy the space outside the washing machine 6, but also makes the space inside the washing machine 6 more rationally utilized, making the structure of the washing machine 6 more efficient. It is compact, and at the same time, the storage shelf or the storage box cannot be seen from the outside, which improves the overall aesthetics and regularity, and provides a better user experience.

[0038] Further, in this embodiment, as shown in FIGS. 1 and 2, the spare additive box storage structure 2 is a drawer-type storage structure that is pull-

lably provided in the box body 1.

[0039] The drawer-type storage structure includes a drawer body with a placement cavity inside, the top of the drawer body is open, and a plurality of storage positions corresponding to the spare additive boxes 4 are formed in the placement cavity, so that all the additive boxes 4 can be stored independently and in a more orderly manner, thus avoiding the inconvenience of searching caused by mixed storage to the user.

[0040] Furthermore, a plurality of additive box 4 storage slots are arranged side by side in the placement cavity to form the storage position for independent storage of the additive boxes 4.

[0041] Preferably, in this embodiment, one or more storage locations can be designated to place a certain type of additive, so that the user can find the additive box 4 and improve the timeliness of replacing the additive box 4. For example, a first storage position, a second storage position, a third storage position, and a fourth storage position are formed in the placement cavity, the first storage position and the second storage position can be designated to store detergent, and the third storage position can be designated to store softener, the fourth storage position does not need to be set and can be used to store some uncommon additives such as disinfectants, bleach, etc. In this way, when the user wants to replace the detergent, he can directly take it from the first storage position and the second storage position, which improves the timeliness of replacement and is more orderly.

[0042] More preferably, an identification structure is provided on the inner wall of the drawer body corresponding to each storage position to remind the user what kind of additive box 4 is placed in each storage position, so as to give the user a more intuitive reminder. The identification structure may be text, such as "detergent", "softener" and other text identifications are pasted on the drawer bodies corresponding to the first storage position and the second storage position, so that whether the additive box 4 is stored or taken out, it can give users more intuitive reminders to avoid misplacement or mistaking, achieve accurate placement, and further ensure the effect of washing and care of clothes.

[0043] Of course, other forms of identification structures can also be used for identification, such as graphic identification cards or color identification cards.

[0044] Further, the spare additive box spare additive box storage structure 2 is pullably disposed at the top or bottom of the box body 1 near the front side wall 101. The front side wall 101 of the box body 1 is provided with a pull-out opening for pulling out the drawer body. The drawer body includes a front panel. The drawer body is pushed into the box body 1 through the pull-out opening, the front panel is flush with the front side wall 101 of the box body 1, so that the appearance looks smooth and integrated, and is more beautiful.

[0045] Preferably, as shown in Figure 1, the front panel of the drawer body is provided with a handle structure 201. The handle structure 201 can be a handle groove

opened on the front panel, or a drawer handle protruding from the front panel. The drawer handle may be an arc-shaped rod-shaped structure. The provided handle structure 201 can facilitate the user to pull out the spare additive box storage structure 2.

[0046] In this embodiment, as shown in Figure 1, a lint cleaning port is provided on the left and right side walls of the box body 1 or at the bottom of the front side wall 101, through which the lint dust inside the box body 1 can be cleaned. The lint dust cleaning port is provided with a lint dust cleaning cover 102 that can be opened and closed. When the lint dust inside the box body 1 needs to be cleaned, the lint dust cleaning cover 102 is opened. When the cleaning process is completed, the lint dust cleaning cover 102 is closed to prevent impurities and foreign matter from entering the inside of the washing machine 6 through the lint cleaning port.

Embodiment 2

[0047] As shown in Figures 1 to 4, this embodiment is further improved on the basis of Embodiment 1 to solve the problem of poor cleaning effect caused by the user failing to replace the additive box 4 in the additive delivery device in time in Embodiment 1.

[0048] As shown in Figures 2 to 4, the washing machine 6 provided in this embodiment also includes:

a spare delivery pipeline connects the spare additive box 4 and the water supply pipeline of the washing machine 6;

a spare additive suction device 11 is provided on the spare delivery pipeline, and is used to deliver the additive in the spare additive box 4 into the washing drum 5.

[0049] The spare additive suction device 11 is a dispenser such as a second delivery pump or a second Venturi tube, and the spare additive suction device 11 can be fixedly installed on the drawer mounting seat 8.

[0050] During the process of adding additives, within a set time after the washing machine 6 sends an alarm prompt to the user that the remaining amount of additives in the additive adding device is insufficient: if it is still not detected that the new additive box 4 is replaced by the user, the spare additive suction device is controlled to operate to deliver the additives in the spare additive box 4 into the washing machine 6, which effectively avoids the problem of insufficient additive amount due to the user's failure to replace the additive box 4 in time, resulting in poor clothes cleaning effect.

[0051] As shown in Figure 2, the box body 1 is provided with a mounting seat 8 for accommodating and installing the drawer body. The drawer body and the mounting seat 8 are slidably matched so that the drawer body can be pulled out or pushed into the box body 1.

[0052] Specifically, in this embodiment, the spare ad-

ditive box 4 can be lifted out from the upper part of the drawer body or pulled out from the front part.

[0053] As shown in Figure 2, the spare additive box 4 can be pushed into the additive box 4 storage slot of the spare additive box storage structure 2. There is a limiting part 12 on the side wall of the spare additive box storage slot to prevent the additive box 4 moves in the storage tank of the spare additive box.

[0054] As shown in Figures 2 to 4, the additive box 4 has a liquid outlet connected to the spare delivery pipeline, and the liquid outlet connects the sealed cavity of the additive box 4 to the water supply pipeline of the washing machine 6 through the spare additive suction device 11, the spare additive box storage tank is provided with an avoidance hole 13 for avoiding the spare delivery pipeline.

[0055] The spare additive suction device 11 is fixedly installed in the box body 1. The inlet of the spare additive suction device 11 is connected to the liquid outlet of the cartridge-type additive box 4, and the outlet is connected to the water supply waterway.

[0056] Preferably, the box body 1 is provided with a temporary storage chamber through which the water supply waterway flows, and the outlet of the spare additive suction device 11 is connected with the temporary storage chamber.

[0057] Further preferably, the spare additive suction device 11 includes a second delivery pump that can only conduct one-way communication from the inlet to the outlet.

[0058] The spare delivery pipeline includes a liquid guide plug-in structure and a liquid suction pipe with one end connected to the inlet of the spare additive suction device 11 and the other end connected to the liquid outlet of the cartridge-type additive box 4 through the liquid guide plug-in structure.

[0059] Preferably, the liquid conduction plug-in structure includes a liquid guide plug 10. The liquid guide plug 10 extends into the placement cavity from the avoidance hole 13 of the spare additive box storage tank. After the box 4 is installed in place, its liquid outlet is connected to the liquid guide plug 10.

[0060] The liquid outlet of the cartridge-type additive box 4 is provided with a container connection part that matches and communicates with the liquid guide plug 10. The container connection part is provided with a reset valve 9 that a liquid outlet that is opened by the resistance of the liquid guide plug 10 and closed by the reset valve under normal conditions. As shown in Figures 3 and 4, the reset valve 9 includes a valve body 91, a spring 92, and a seal 93 provided in a container connection portion. The container connection portion provided at the liquid outlet of the cartridge-type additive box 4 is a casing structure extends along the pulling direction of the additive box 4. The casing structure has a flow guide channel. One end of the casing structure is provided with the valve body 91, and the other end is connected to the inside of the additive box 4.

[0061] As shown in Figure 4, the casing structure is also provided with a spring 92 in a compressed state. Both ends of the spring 92 are in contact with the valve body 91 and the casing structure respectively. The valve body 91 closes the casing under the elastic force of the spring 92. The channel formed inside the structure seals the liquid outlet of the cartridge-type additive box 4 and forms a closed container, thereby ensuring sealing without any leakage after the additive box 4 is pulled out.

[0062] As shown in Figure 3, the liquid guide plug 10 is equipped with an ejector 110. When the cartridge-type additive box 4 is placed in the spare additive box storage tank, the ejector 110 in the liquid guide plug 10 is in contact with the valve body 91 contacts each other and drives the valve body 91 to move toward the inside of the additive box 4 against the elastic force exerted by the spring 92, thereby achieving the effect of opening the liquid outlet of the additive box 4 and dispensing the additive.

[0063] Further, as shown in Figures 1 and 2, the additive delivery device in this embodiment includes: an additive dispenser 3, being pullably arranged in the box body 1, the additive dispenser 3 is provided with an installation cavity for placing at least one additive box 4.

[0064] The box body 1 is provided with an additive dispenser mounting seat for accommodating and installing the additive dispenser 3. The additive dispenser 3 and the additive dispenser mounting seat are slidably matched to realize that the additive dispenser 3 can be pulled out or pushed it into the box body 1.

[0065] The additive delivery device includes a dispensing mechanism, and the dispensing mechanism includes a first delivery pump or a first Venturi tube. The first delivery pump or first Venturi tube can suck the additive in the additive box 4 in the additive dispenser 3 and put into the inlet waterway of the washing machine 6 for washing and protecting the clothes in the washing drum 5. The dispensing mechanism may be provided on the additive dispenser mounting seat.

[0066] In this embodiment, the adding principle of the additive delivery device is the same as the adding principle of adding the additive in the spare additive box 4, and will not be described in detail here.

[0067] Preferably, the additive delivery device includes: a position detection module, which is arranged in the installation cavity or on the box body 1 above the installation cavity, and is used to detect whether a new additive box 4 has been replaced. The position detection module may be a pressure sensor or an infrared sensor arranged in the placement cavity. When it is detected that the remaining amount of additive in the additive box 4 is insufficient, a pressure sensor or an infrared sensor is provided to detect whether a new additive box 4 is placed in the installation cavity of the additive dispenser 3. When it is detected that the user has put in a new additive box 4, a signal is fed back to the main control board of the washing machine 6 to stop the alarm.

[0068] Preferably, the additive delivery device includes: an additive remaining amount detection module,

which is arranged in the installation cavity or the additive box 4 and is used to detect the remaining amount information of the additive in the additive box 4. The remaining amount detection module may be a liquid level conductive probe or a liquid level sensor disposed in the additive box 4 for detecting the liquid level of the additive in the additive box 4.

[0069] Preferably, the additive delivery device includes: an alarm unit, the alarm unit may be an alarm connected to the main control board of the washing machine 6 in a wired or wireless manner. When the remaining amount detection module detects that the remaining amount of any additive in the additive box 4 is lower than the set value, a signal is fed back to the main control board, and the main control board controls the alarm module to issue an alarm, prompting the user to replace the additive box 4 in time.

[0070] Preferably, the additive delivery device includes: a timing module, which starts timing when the alarm unit starts to issue an alarm, and provides feedback to the main control board.

[0071] Furthermore, in this embodiment, the washing machine 6 is a drum washing machine. Of course, it is not limited to a drum washing machine and may also be a pulsator washing machine.

[0072] The additive dispenser 3 is pullably arranged in the box body 1 located above the washing drum 5, and the spare additive box storage structure 2 is pullably arranged in the box body 1 located below the washing drum 5.

[0073] Preferably, as shown in Figure 1, in this embodiment, the additive dispenser 3 and the spare additive box storage structure 2 are both arranged in the box body 1 located above the washing drum 5, and are distributed on the left and right sides of the washing drum 5. On the other hand, since the water inlet waterway of the washing machine 6 is mostly located above the washing drum 5, the above design facilitates the connection between the spare additive box 4 in the spare additive box storage structure 2 and the water inlet waterway of the washing machine 6, simplifying the internal circuit of the washing machine 6 setting.

[0074] Further, in this embodiment, the additive box 4 is provided with an electronic label 401, and the electronic label 401 stores additive information. Electronic labels 401 are provided on both the additive box 4 in the additive delivery device and the spare additive box 4 stored in the spare additive box storage structure 2.

[0075] Preferably, the additive information includes the type, manufacturer, brand, production date, concentration, ingredients and other relevant parameter information of the additive.

[0076] In this embodiment, the electronic label 401 stores at least the type information of the additives stored in the additive box 4, such as detergent, softener, flavoring agent, disinfectant, etc.

[0077] The electronic label 401 is an NFC tag set on the outer or inner wall of the additive box 4. Of course,

the electronic label 401 can also be an RFID tag set on the inner or outer wall of the additive box 4. Since the information interaction effect of NFC is better than that of RFID, moreover, NFC has the advantages of short distance, high bandwidth, and low energy consumption, so it is more suitable for application in washing machines 6.

[0078] In the above solution, the additive information stored inside the electronic label 401 is shipped from the factory. Preferably, the additive information inside the electronic label 401 can be input or changed through the operating panel of the washing machine 6, or can be input through the mobile phone APP or change.

[0079] The electronic label 401 and the additive box 4 can be connected and fixed through the following connection methods, such as integrated injection molding, screw fastening, welding, pasting, snapping, etc.

[0080] Further, as shown in FIG. 1, the washing machine 6 also includes: a first identification module 71, which is provided in the installation cavity or on the box body 1 and is used to read the additive information in electronic label 401 on each additive box 4 in the additive dispenser 3.

[0081] The first identification module 71 is a first RFID reader or a first NFC reader that is installed on the integrated waterway cover on the top of the box body 1 or in the installation cavity corresponding to each additive box 4 in the additive dispenser 3. The additive information in the electronic label 401 on each additive box 4 in the additive dispenser 3 can be read.

[0082] Preferably, as shown in Figure 1, it also includes: a second identification module 72, which is arranged in the spare additive box storage structure 2 or on the integrated waterway cover on the top of the box body 1, and is used to read the additive information in the electronic label 401 on each spare additive box 4 of the spare additive box storage structure 2.

[0083] The second identification module 72 is a second RFID reader or a second NFC reader that is installed on the box body 1 or in the spare additive box storage structure 2 corresponding to each additive box 4 in the spare additive box storage structure 2, the additive information in the electronic label 401 on each spare additive box 4 in the spare additive box storage structure 2 can be read.

[0084] Specifically, the second identification module 72 can identify the type of additive in the additive box 4 placed in each storage position in the spare additive box storage structure 2.

[0085] As shown in Figures 1 to 6, this embodiment also provides a control method with the above-mentioned washing machine 6. As shown in Figure 5, the method includes:

during the process of adding additives, the washing machine 6 sends an alarm prompt to the user that the remaining amount of additives in the additive adding device is insufficient within a set time,

if it is still not detected that the user replaces a new additive box 4, the spare additive suction device 11 is controlled to start, and the additive in the spare additive box 4 is put into the washing machine 6.

[0086] The washing machine control method provided by this embodiment, during the process of adding additives, the washing machine 6 sends an alarm prompt to the user that the remaining amount of additives in the additive adding device is insufficient within a set time: if the user is not detected to replace the new additives, box 4, the spare additive suction device 11 is controlled to start, and the additives in the spare additive box 4 are put into the washing machine 6, effectively avoiding the insufficient amount of additives caused by the user's failure to replace the additive box 4 in time, resulting in laundry deterioration.

[0087] Further preferably, as shown in Figure 6, the method further includes the following steps:

during the process of adding additives;
after the washing machine issues an alarm prompt to the user that the additive balance in the additive delivery device is insufficient;
if it is still not detected that the user has replaced a new additive box, obtain the additive type of the additive box 4 in the additive delivery device that has not been replaced in time;
control the second identification module 72 to start and read the additive information in the Electronic label 401 on each spare additive box 4 in the spare additive box storage structure 2;
determine whether there is an additive box 4 of this type stored in the spare additive box storage structure 2: if so, control the release of the corresponding type of backup additive; if not, continue to alarm.

[0088] The washing machine control method provided by this embodiment uses the electronic label 401 set on the additive box 4 to identify the spare detergent box. When it is detected that the remaining amount of a certain type of additive in the additive delivery device is insufficient, and it is not replaced in the setting time, the electronic label 401 on each additive box 4 in the spare additive box storage structure 2 can be identified through the second identification module 72. When a corresponding type of additive is identified, the additive is controlled to be released to realize the control. The effect of accurately identifying the types of additives in the additive box 4 stored in the spare additive box storage structure 2 and automatically dispensing them not only has a high degree of automation and high dispensing efficiency, but also can effectively avoid the occurrence of mis-dispensing.

[0089] The above are only preferred embodiments of the present disclosure, and do not limit the present disclosure in any form. Although the present disclosure has been disclosed above in preferred embodiments, it is not intended to limit the present disclosure. Anyone familiar

with the technology of this patent Without departing from the scope of the technical solution of the present disclosure, personnel can make some changes or modify the above-mentioned technical contents into equivalent embodiments with equivalent changes. In essence, any simple modifications, equivalent changes and modifications made to the above embodiments still fall within the scope of the present disclosure.

Claims

1. A washing machine, including:

a box body;
an additive delivery device, being configured to deliver laundry additives to the washing machine, and being provided with an installation cavity for storing at least one additive box; **characterized in that**
the washing machine also includes:
a spare additive box storage structure, being provided on the box body and provided with an accommodation space for storing at least one spare additive box.

2. The washing machine according to claim 1, **characterized in that** the spare additive box storage structure is fixedly arranged on a top wall or a side wall of the box body;
or, it can be installed in the box body in a pullable manner.

3. The washing machine according to claim 1, wherein the spare additive box storage structure is a storage shelf or a storage box that is detachably fixed on the top wall or side wall of the box body;
alternatively, the spare additive box storage structure is the storage shelf or the storage box that is pullably provided in the box body.

4. The washing machine according to any one of claims 1 to 3, **characterized in that** the spare additive box storage structure is a drawer-type storage structure that can be pulled out of the box body;

the drawer-type storage structure includes a drawer body with a placement cavity inside, and a plurality of storage positions corresponding to spare additive boxes are formed in the placement cavity;
preferably, the spare additive box storage structure is pullably disposed at a top or bottom of the box body near a front side wall;
preferably, a handle structure is provided on a front panel of the drawer body.

5. The washing machine according to any one of claims

1 to 4, further comprising:

a spare delivery pipeline communicating the spare additive box and a water supply pipeline of the washing machine;
a spare additive suction device, being provided on the spare delivery pipeline and being configured to deliver the additive in the spare additive box into a washing drum.

6. The washing machine according to any one of claims 1 to 5, **characterized in that** the additive delivery device includes:

an additive dispenser, being pullably arranged in the box body, and the additive dispenser is provided with an installation cavity for placing at least one additive box;
preferably, it also includes:

a position detection module, being installed in the installation cavity or on the box body above the installation cavity, and configured to detect whether a new additive box has been replaced;
preferably, it also includes:
an additive remaining amount detection module, being arranged in the installation cavity or the additive box and configured to detect remaining amount information of the additive in the additive box.

7. The washing machine according to claim 6, **characterized in that**, the washing machine is a drum washing machine;

the additive dispenser is pullably disposed in the box body located above the washing drum, and the spare additive box storage structure is pullably disposed in the box body located below the washing drum;
alternatively, the additive dispenser and the spare additive box storage structure are both arranged in the box body located above the washing drum, and are distributed on the left and right sides of the washing drum.

8. The washing machine according to claim 6, **characterized in that**, the additive box is provided with an electronic label, and the electronic label stores additive information;
the washing machine also includes:

a first identification module, being arranged in the installation cavity or on the box body and being configured to read the additive information in the electronic label on each additive box in the additive dispenser;

preferably, it also includes:

a second identification module, being arranged in the spare additive box storage structure or on the box body, and being configured to read the additive information in the electronic label on each spare additive box in the spare additive box storage structure;
preferably, the additive information includes one or more of a type, a concentration, and a brand of the additive.

9. A control method of the washing machine according to any one of claims 1 to 8, **characterized in that** the method includes:

during a process of adding additives, and within a set time after the washing machine issues an alarm prompt to a user that the additive balance in the additive adding device is insufficient:

if it is still not detected that the user has replaced a new additive box, the spare additive suction device is controlled to start and the additive in the spare additive box is put into the washing machine.

10. The control method of the washing machine according to claim 9, **characterized in that** the method further includes the following steps:

obtaining an additive type of the additive box in the additive delivery device that has not been replaced in time;
controlling the second identification module to start and read the additive information in the electronic label on each spare additive box in the spare additive box storage structure;
determining whether there is the additive box of the additive type stored in the spare additive box storage structure: if so, control a delivery of the corresponding additive type of additive; if not, continue to alarm.

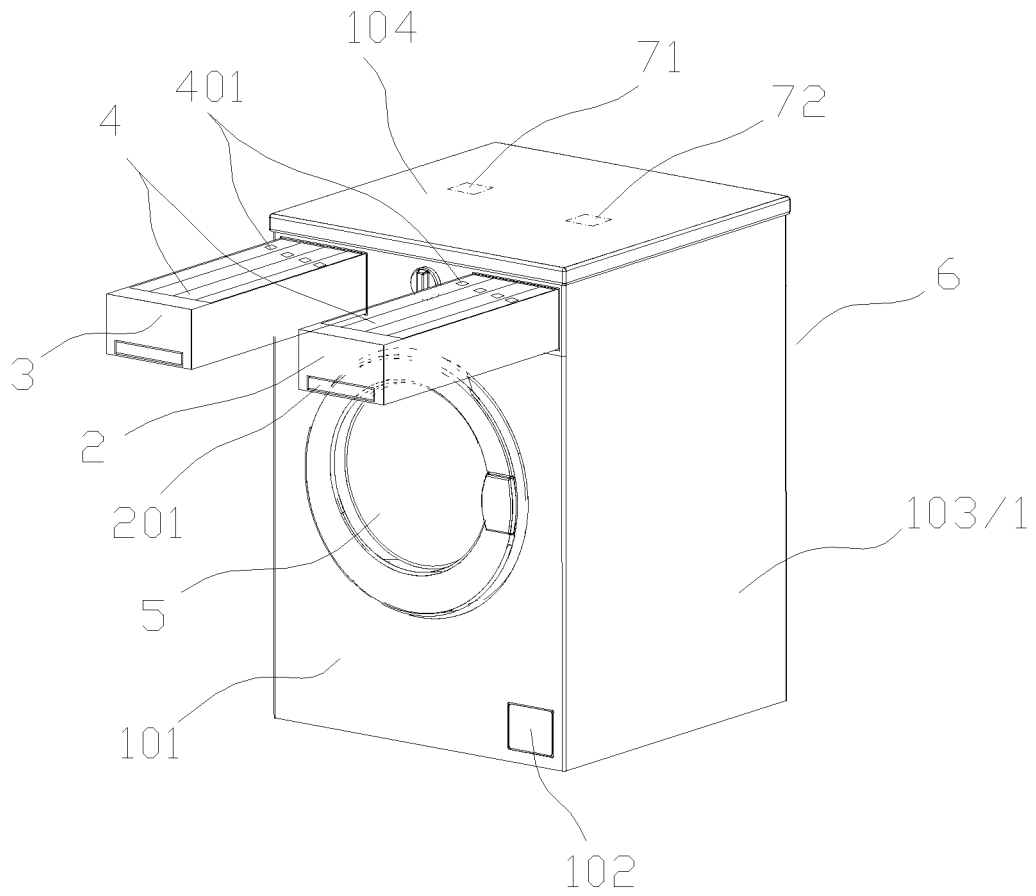


FIG. 1

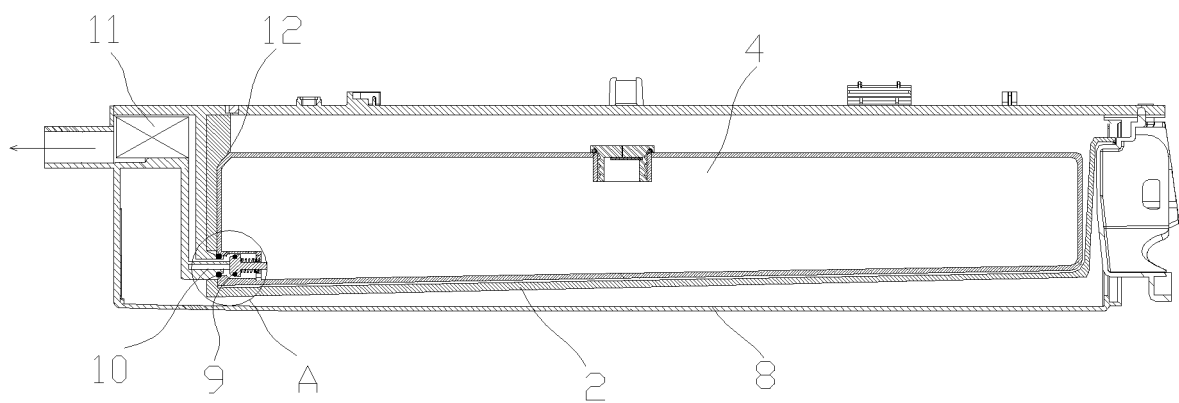


FIG. 2

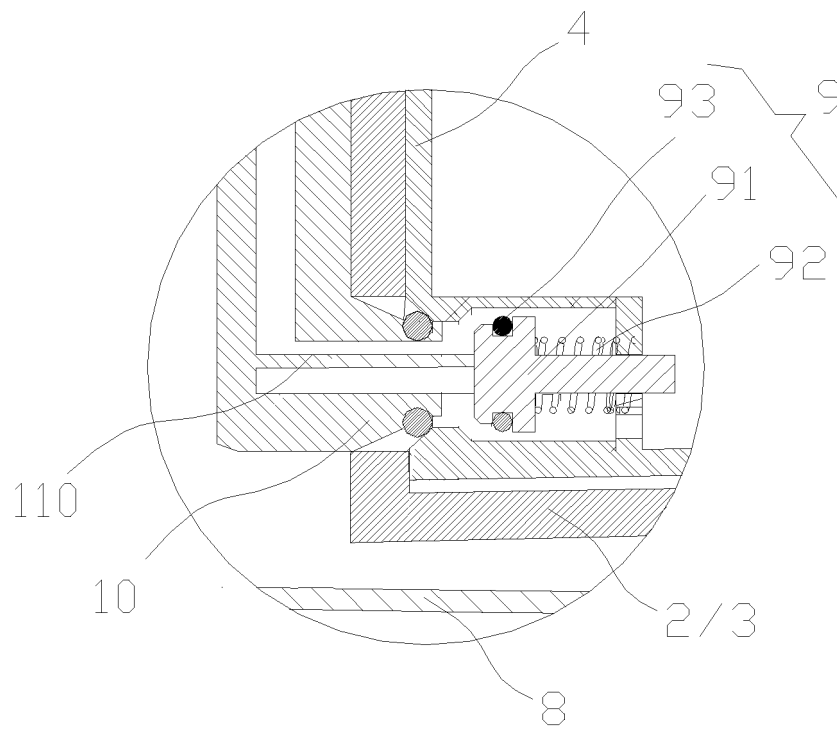


FIG. 3

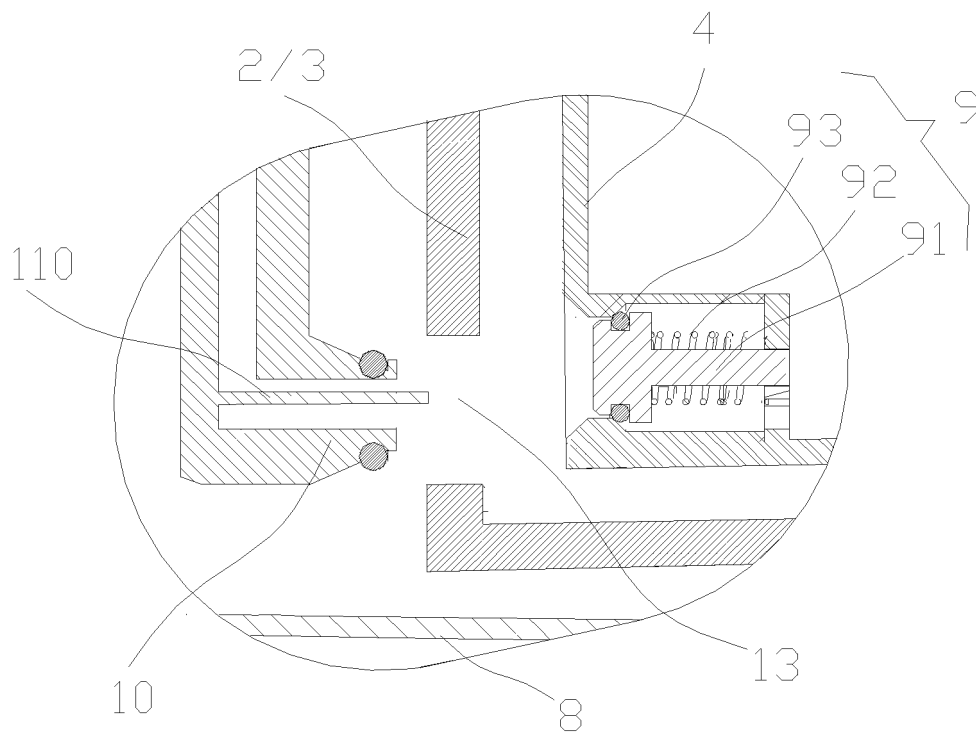


FIG. 4

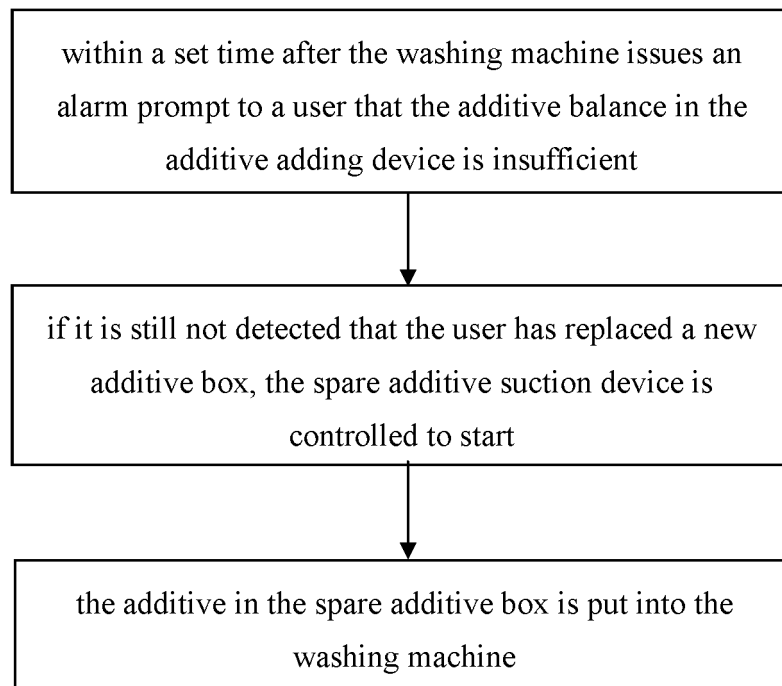


FIG. 5

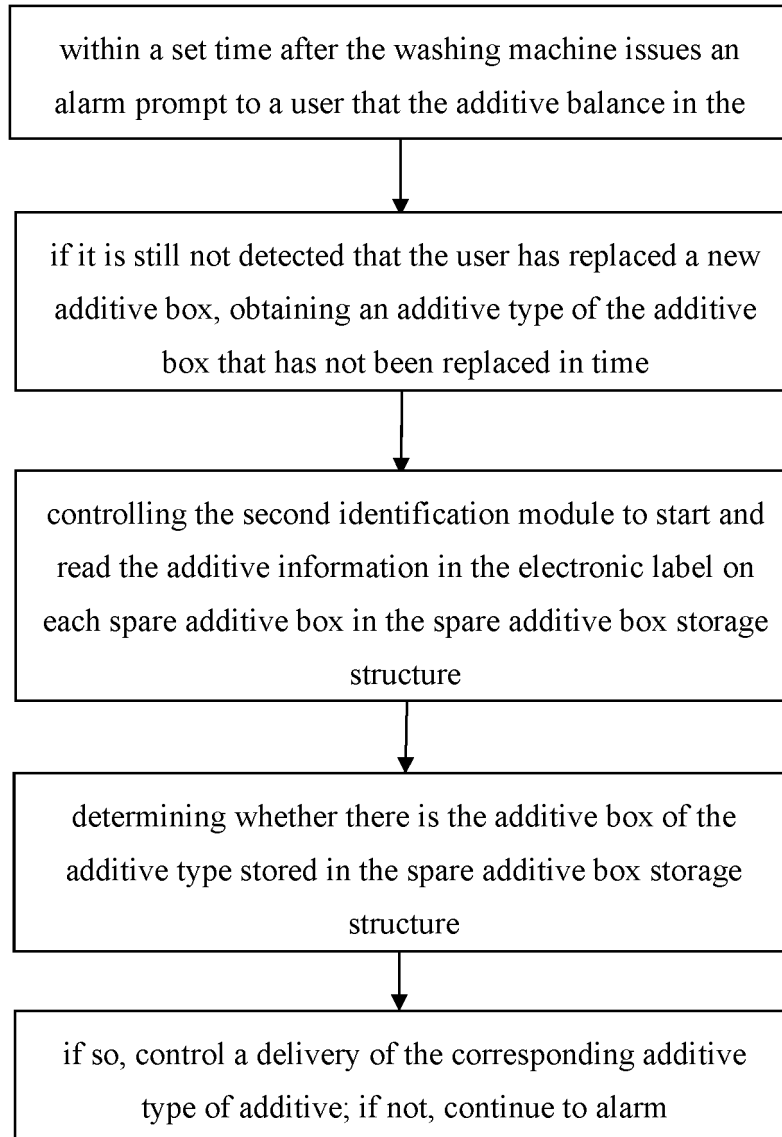


FIG. 6

INTERNATIONAL SEARCH REPORT

International application No.

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A. CLASSIFICATION OF SUBJECT MATTER D06F 39/02(2006.01)i According to International Patent Classification (IPC) or to both national classification and IPC																					
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) D06F; A47L 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) EPODOC, WPI, CNPAT, CNKI: 洗衣机, 添加剂盒, 洗涤剂盒, 瓶, 添加剂, 洗涤剂, 容器, 罐, 储液盒, 储液瓶, 投放盒, 备用, 储备, 更换, 替换, 投放, 抽屉, 抽拉, 抽吸, 负压, 文丘里, 虹吸, 警, 提示, 识别, 读取, 标签, 种类, 类型, 余量, 存量, 安装, 位置, wash+, additive, box?, detergent, bottle?, container?, pot?, kettle?, storag+, deliver+, standby+, reserv+, replac+, drawer?, pull+, suct+, negative, pressure, venturi, siphon, alarm+, prompt+, identif+, read+, label, type, surplus, stock+, installation, location																					
C. DOCUMENTS CONSIDERED TO BE RELEVANT <table border="1"> <thead> <tr> <th>Category*</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>Y</td> <td>CN 101680152 A (BSH BOSCH SIEMENS HAUSGERAETE) 24 March 2010 (2010-03-24) description, pages 5-8, and figures 1-2</td> <td>1-8</td> </tr> <tr> <td>Y</td> <td>CN 109750457 A (QINGDAO HAIER DRUM WASHING MACHINE CO., LTD.) 14 May 2019 (2019-05-14) description, paragraphs 23-29, and figure 1</td> <td>1-8</td> </tr> <tr> <td>A</td> <td>CN 111270479 A (QINGDAO HAIER WASHING MACHINE CO., LTD. et al.) 12 June 2020 (2020-06-12) description, paragraph 17, and figure 1</td> <td>9-10</td> </tr> <tr> <td>A</td> <td>CN 201915260 U (WUXI LITTLE SWAN CO., LTD.) 03 August 2011 (2011-08-03) entire document</td> <td>1-10</td> </tr> <tr> <td>A</td> <td>CN 210085841 U (QINGDAO HAIGAO DESIGN & MANUFACTURING CO., LTD. et al.) 18 February 2020 (2020-02-18) entire document</td> <td>1-10</td> </tr> <tr> <td>A</td> <td>JP 2002018183 A (TOSHIBA K. K.) 22 January 2002 (2002-01-22) entire document</td> <td>1-10</td> </tr> </tbody> </table>	Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	Y	CN 101680152 A (BSH BOSCH SIEMENS HAUSGERAETE) 24 March 2010 (2010-03-24) description, pages 5-8, and figures 1-2	1-8	Y	CN 109750457 A (QINGDAO HAIER DRUM WASHING MACHINE CO., LTD.) 14 May 2019 (2019-05-14) description, paragraphs 23-29, and figure 1	1-8	A	CN 111270479 A (QINGDAO HAIER WASHING MACHINE CO., LTD. et al.) 12 June 2020 (2020-06-12) description, paragraph 17, and figure 1	9-10	A	CN 201915260 U (WUXI LITTLE SWAN CO., LTD.) 03 August 2011 (2011-08-03) entire document	1-10	A	CN 210085841 U (QINGDAO HAIGAO DESIGN & MANUFACTURING CO., LTD. et al.) 18 February 2020 (2020-02-18) entire document	1-10	A	JP 2002018183 A (TOSHIBA K. K.) 22 January 2002 (2002-01-22) entire document	1-10
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Date of the actual completion of the international search 29 August 2022	Date of mailing of the international search report 14 September 2022																				
Name and mailing address of the ISA/CN China National Intellectual Property Administration (ISA/CN) No. 6, Xitucheng Road, Jimenqiao, Haidian District, Beijing 100088, China Facsimile No. (86-10)62019451	Authorized officer Telephone No.																				

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PCT/CN2022/100077

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A	CN 109112773 A (QINGDAO HAIER WASHING MACHINE CO., LTD.) 01 January 2019 (2019-01-01) entire document	1-10

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Information on patent family members

International application No.

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		EP 2152950 A1	17 February 2010
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REFERENCES CITED IN THE DESCRIPTION

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