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(54) **DETERGENT DELIVERY CONTROL METHOD, WASHING MACHINE, AND SYSTEM**

(57) The disclosure provides a detergent dispensing control method, a washing machine and a system. The method comprises the following steps of: S1: obtaining a current clothes load through a clothes weight detection device; detecting ingredients of a detergent through a detergent ingredient detection device, and obtaining detergent detection data; S2: analyzing the detergent detection data, and obtaining a detergent category corresponding to the detergent detection data; S3: according to the detergent category and the clothes load, recommending a detergent dispensing amount; and S4: controlling a detergent dispensing device to dispense the detergent by the washing machine. According to the present disclosure, the detergent ingredient detection device is used for identifying the detergent, clothes to be washed are automatically weighed, the most proper detergent dispensing amount is recommended according to an identification result and the clothes load, and the detergent dispensing device is controlled for dispensing the detergent. Therefore, the detergent can be accurately dispensed, the cleaning and rinsing effect of the washing machine on clothes can be improved, and a phenomenon

of insufficient or excessive dispensing amount is avoided from occurring.

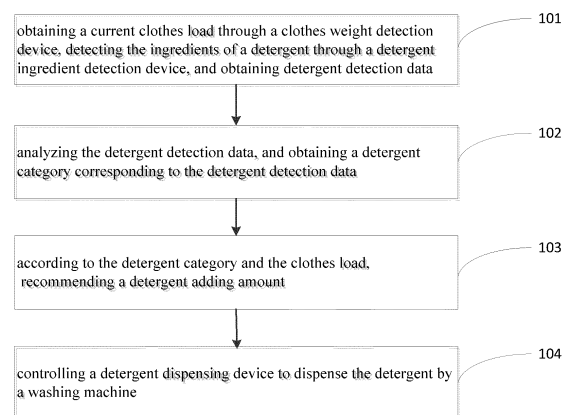


Fig. 1

Description

TECHNICAL FIELD

[0001] The present disclosure relates to the field of washing of washing machines, and particularly relates to a detergent dispensing control method, a washing machine and a system.

BACKGROUND

[0002] When a washing machine is used for washing clothes, a detergent needs to be added. At present, there are two methods for adding the detergent: 1) the detergent is manually added; and 2) a detergent dispensing device is arranged on the washing machine, the detergent is added into a detergent box in advance, and the detergent dispensing device can be controlled to automatically dispense the detergent when the washing machine executes washing.

[0003] However, the amount of clothes to be washed by a user each time is different, clothes to be washed each time are different, if the user wants to obtain the optimal washing effect, aiming at different weights and materials of clothes, the detergent dispensing amounts are different. But detergents sold in the market have various categories, for the clothes with the same weight and the same material, the detergents dispensing amounts are different according to different categories of detergents. Therefore, how to obtain an accurate detergent dispensing amount is an important factor for a clothes washing effect.

[0004] The disclosure with the patent number 201310182284.6 discloses a washing machine control method. A server is used for storing a detergent use information database, a detergent dispensing amount is obtained through a selection operation on a detergent category list at a client side and query and calculation by the server, and is synchronized to the washing machine to automatically dispense a detergent. But one whole set of process from the accurate detection to the accurate dispensing of the detergent cannot be truly realized although the problem of insufficient detergent categories is solved since clothes categories are stored through the big data of a service side; and

[0005] The disclosure with the patent number 200810122783.5 discloses a washing device and a control method thereof, detergent category information is recorded through an RFID tag, so that the category of a detergent dispensed into the washing device can be effectively and accurately determined. But a limited data size cannot meet the accurate dispensing requirement of all the detergent categories, in addition, the own storage amount of the washing device is limited, and therefore, the use range of the RFID tag is further restricted.

[0006] The above automatic dispensing modes of the detergent are all characterized in roughly calculating the detergent dispensing amount but cannot realize the true

sense of the accurate dispensing of the detergent. For different categories of detergents, a phenomenon of insufficient detergent dispensing amount or excessive detergent dispensing amount is likely to be caused, and finally, a certain influence is caused on the washing and rinsing effect of clothes.

[0007] For this purpose, the present disclosure is provided.

10 SUMMARY

[0008] An object of the present disclosure is to solve the problem that deficiencies in the prior art are overcome, and a detergent dispensing control method is provided. A detergent ingredient detection device is used for identifying a detergent, clothes to be washed are automatically weighed, a most proper detergent dispensing amount is recommended according to an identification result and a clothes load, a detergent dispensing device is controlled to dispense the detergent, so that the accurate dispensing of the detergent is realized, the cleaning and rinsing effect of a washing machine on clothes is improved, and the phenomenon of insufficient or excessive dispensing amount is avoided from occurring.

[0009] The second object of the disclosure is to provide the washing machine which adopts the above method.

[0010] The third object of the disclosure is to provide a system which adopts the above method.

[0011] The technical scheme adopted for solving the technical problem of the present disclosure is as follows.

[0012] The present disclosure provides the detergent dispensing control method, which comprises:

S1: obtaining a current clothes load through a clothes weight detection device; detecting ingredients of a detergent through a detergent ingredient detection device, and obtaining detergent detection data.

S2: analyzing the detergent detection data, and obtaining a detergent category corresponding to the detergent detection data.

S3: according to the detergent category and the clothes load, recommending a detergent dispensing amount.

S4: controlling a detergent dispensing device to dispense the detergent by a washing machine.

[0013] Furthermore, the step S1 also comprises scanning clothes fabric components through a clothes material identification device to obtain clothes identification data.

[0014] Step S2 also comprises analyzing the clothes identification data to obtain clothes component information corresponding to the clothes identification data.

Step S3 also comprises recommending the detergent dispensing amount according to the detergent category,

the clothes component information and the clothes load.

[0015] Furthermore, the detergent detection data corresponds to the detergent category, and the corresponding relationship between the detergent detection data and the detergent category is stored in the washing machine and/ or a cloud.

[0016] The detergent category, the clothes load and the detergent dispensing amount are corresponded, and corresponding relationships between the detergent category, the clothes load and the detergent dispensing amount are stored in the washing machine and/ or the cloud.

[0017] Furthermore, the clothes identification data corresponds to the clothes component information, and a corresponding relationship between the clothes identification data and the clothes component information is stored in the washing machine and/ or the cloud.

[0018] The clothes component information, the detergent category and the clothes load correspond to the detergent dispensing amount, and corresponding relationships between the clothes component information, the detergent category, the clothes load and the detergent dispensing amount are stored in the washing machine and/ or the cloud.

[0019] Furthermore, in step S3, the washing machine recommends the detergent dispensing amount according to an offline data table stored in the washing machine.

[0020] The cloud recommends the detergent dispensing amount according to big data.

[0021] Furthermore, the detergent ingredient detection device is a micro spectrum analyzer.

[0022] The present disclosure also provides the washing machine in which the method above is carried out, and the washing machine comprises:

A detergent ingredient detection device for detecting ingredients of a detergent and obtaining detergent detection data.

[0023] A clothes weight detection device for automatically weighing clothes put into the washing machine and obtaining the clothes load.

[0024] A controller for receiving the signal of the clothes load and the signal of detergent ingredient detection, recommending the detergent dispensing amount according to signals received and controlling a detergent dispensing device to dispense the detergent.

[0025] The detergent dispensing device for dispensing detergent according to the dispensing amount indicated by the controller.

[0026] Furthermore, the washing machine also comprises: a clothes material identification device for detecting the clothes fabric components to obtain clothes identification data.

[0027] Furthermore, the detergent ingredient detection device is installed in a detergent box of the washing machine and is in integral arrangement with the detergent box.

[0028] A probe of the detergent ingredient detection device is in contact with the detergent, and a power con-

ductor of the detergent ingredient detection device is connected with a main power supply of the washing machine.

[0029] The present disclosure also provides a system adopting the above method, and the system comprises: The washing machine for obtaining the detergent detection data, the clothes identification data and the clothes load and uploading the detergent detection data, the clothes identification data and the clothes load to a cloud server to be analyzed.

[0030] The cloud server for recommending the detergent dispensing amount after receiving and analyzing the data information uploaded by the washing machine, and sending the detergent dispensing amount to the washing machine to dispense the detergent.

[0031] The technical scheme provided by the detailed description of the present disclosure has the beneficial effects that:

Firstly, the detergent ingredient detection device is used for identifying the ingredients of the detergent, the identification accuracy of detergent categories of the detergent ingredient detection device is higher than that of manual identification. And the operation for detergent category identification by the detergent ingredient detection device is simpler and more automatic than that by using an RFID tag.

[0032] Secondly, the clothes material identification device is used for identifying clothes fabric components, so that the identification accuracy of the clothes material identification device is higher than that of a method for manually identifying the clothes fabric or determining clothes materials based on water contents, a situation that identification is carried out after clothes are soaked is avoided. Therefore, the identification process saves more time, operation is simpler and more convenient, and clothes identification efficiency is higher.

[0033] Thirdly, according to the clothes load and the detergent category/ clothes component information, the detergent dispensing amount is recommended, recommendation pertinence is better, an accurate dispensing amount suitable for the clothes to be washed can be obtained. A trouble that users do not know how to accurately determine the detergent dispensing amount is solved, washing efficiency is improved, washing pertinence is better. A phenomenon of insufficient or excessive dispensing amount is effectively avoided from occurring, and the cleaning and rinsing effect of the washing machine on the clothes can be improved.

BRIEF DESCRIPTION OF THE DRAWINGS

[0034] In order to explain the technical scheme in the detailed description of the present disclosure more clearly, the accompanying drawings which need to be used in the detailed description are simply introduced below. Apparently, the accompanying drawings in the description below only belong to some of the embodiments of the present disclosure, and other drawings can be obtained by those of ordinary skill in the art according to

the accompanying drawings without any inventive efforts.

Fig. 1 is a flow diagram of a detergent dispensing control method provided by an embodiment of the present disclosure;

Fig. 2 is a flow diagram of a detergent dispensing control method under an offline mode of a washing machine provided by the embodiment 1 of the present disclosure;

Fig. 3 is the flow diagram of a detergent dispensing control method under an online mode of a washing machine provided by the embodiment 2 of the present disclosure;

Fig. 4 is a washing machine provided by the embodiment 3;

Fig. 5 is another washing machine provided by the embodiment 4; and

Fig. 6 is a system provided by the embodiment 5.

DETAILED DESCRIPTION

[0035] As shown in Fig 1, the present disclosure provides a detergent dispensing control method, which comprises the following steps that:

Step 101: a current clothes load is obtained through a clothes weight detection device, and ingredients of a detergent are detected through a detergent ingredient detection device, and detergent detection data is obtained.

[0036] Specifically, a washing machine is provided with the clothes weight detection device. When a user puts clothes to be washed into a washing tub, the clothes weight detection device can automatically detect the weight of the clothes to be washed, and the current clothes load of the washing machine is calculated.

[0037] Furthermore, the washing machine is also provided with the detergent ingredient detection device. When the user adds the detergent into a detergent box of the washing machine or starts a washing program of the washing machine, the detergent ingredient detection device automatically detects the detergent in the detergent box and obtains the detergent detection data.

[0038] Preferably, the detergent ingredient detection device can be a micro spectrum analyzer. And the detection principle of the detergent ingredient detection device is that the micro spectrum analyzer can emit near infrared rays to substances to be detected, active molecules in the substances to be detected are detected. And then, the ray of a light reflected by molecular vibration is analyzed to determine the chemical components of material modules according to the unique optical characteristics of the ray. Specifically, the near infrared rays emitted from the substances to be detected are subjected to data acquisition and filtering by a filter, then, the near infrared rays are sent to a corresponding processor to be processed through a corresponding amplifier. The processed data is analyzed according to a corresponding algorithm, and finally, analyzed data, i.e., the detergent

detection data, is obtained.

[0039] Compared with a common spectrum analyzer, the micro spectrum analyzer has the characteristics of modularization, high-speed acquisition and small size, a spectrum system can be more flexibly set up, so that the micro spectrum analyzer can be directly installed in the detergent box and is integrally arranged with the detergent box. A probe of the detergent ingredient detection device can be in contact with the detergent to obtain the identification data of the current detergent. A power connector of the detergent ingredient detection device is introduced out to be meshed with a position, where the detergent box is installed, on a cabinet of the washing machine, then, the power connector is connected with a main power supply of the washing machine, and the main power supply of the washing machine supplies power to the detergent ingredient detection device. Preferably, in order to make detection more accurate, after the detergent is dispensed each time, the detergent box is flushed, and the residual detergent on the probe can be flushed away completely to guarantee the accuracy of the next detection of the washing machine.

[0040] The micro spectrum analyzer can directly send the obtained detergent detection data to a washing machine terminal controller to be analyzed, and the obtained detergent detection data also can be uploaded to a cloud through a wireless module of the washing machine to be analyzed.

[0041] Preferably, in the step, clothes fabric components can be scanned through a clothes material identification device, and clothes identification data is obtained. Preferably, the clothes material identification device is also a micro spectrum analyzer, the detection principle of the micro spectrum analyzer is the same with that of the micro spectrum analyzer for detecting the detergent, but detection ways are different. The micro spectrum analyzer for detecting clothes materials can scan and identify the cloth fabric components, and can be installed on a control panel of the washing machine; and the micro spectrum analyzer for detecting clothes materials also can be hung on the cabinet of the washing machine or be handheld equipment to perform transmission with the washing machine in a wired or wireless way.

[0042] Step 102: the detergent detection data is analyzed to obtain a detergent category corresponding to the detergent detection data.

[0043] Wherein, the ingredients of the detergent mainly comprise surfactant, auxiliaries, enzyme, cosolvent, fluorescent brightener, fungicide and the like. The detergents with different ingredients have different washing effects. The ingredients of the detergent can be analyzed through the detergent ingredient detection device, corresponding data is obtained, the data can be analyzed to determine the detergent category.

[0044] Wherein, the detergent detection data corresponds to the detergent category, and the corresponding relationship between the detergent detection data and the detergent category is stored in a first database. And

the first database is arranged in the washing machine and/ or the cloud.

[0045] Specifically, when the washing machine is under an offline mode, the detergent ingredient detection device can send the detergent detection data to the washing machine. The washing machine is provided with the first database, and therefore, the washing machine can directly analyze the detergent detection data and query the detergent category corresponding to the detergent detection data in the first database.

[0046] When the washing machine is under an online mode, the detergent ingredient detection device can send the detergent detection data to the cloud through a wireless communication module on the washing machine. The cloud is provided with the first database, and therefore, the cloud can analyze the detergent detection data and query the detergent category corresponding to the detergent detection data in the first database.

[0047] Preferably, the step also comprises analyzing the clothes identification data to obtain the clothes component information corresponding to the clothes identification data.

[0048] Furthermore, the clothes identification data corresponds to the clothes component information, the corresponding relationship between the clothes identification data and the clothes component information is stored in a second database, and the second database is arranged in the washing machine and/ or the cloud.

[0049] Specifically, when the washing machine is under the offline mode, the clothes material identification device can send the clothes identification data to the washing machine. The washing machine is provided with the second database, and therefore, the washing machine can directly analyze the clothes identification data and query the clothes component information corresponding to the clothes identification data in the second database.

[0050] When the washing machine is under the online mode, the clothes material identification device can send the clothes identification data to the cloud through the wireless communication module on the washing machine. The cloud is provided with the second database, and therefore, the cloud can analyze the clothes identification data and query the clothes component information corresponding to the clothes identification data in the second database.

[0051] Step 103: according to the detergent category and the clothes load, a detergent dispensing amount is recommended.

[0052] Specifically, for each detergent category, the corresponding relationship between the clothes load and the detergent dispensing amount under the category is preset. The detergent category can be firstly determined, the corresponding relationship between the clothes load and the detergent dispensing amount under the detergent category is found, and the corresponding detergent dispensing amount is determined according to the clothes load obtained by the washing machine.

[0053] Wherein, the detergent category, the clothes load and detergent dispensing amount are corresponded. And the corresponding relationships between the detergent category, the clothes load and detergent dispensing amount are stored in a third database, and the third database is arranged in the washing machine and/ or the cloud.

[0054] Specifically, when the washing machine is under the offline mode, the third database is arranged in the washing machine. Furthermore, the third database comprises an offline data table, and the washing machine can query the detergent dispensing amount corresponding to the clothes load under the corresponding detergent category, according to the locally stored offline data table.

[0055] When the washing machine is under the online mode, the third database is arranged on the cloud. Furthermore, the third database stores a great quantity of data related to the corresponding relationships between the detergent category, the clothes load and the detergent dispensing amount, and the cloud can utilize the big data to recommend the detergent dispensing amount corresponding to the detergent category and the clothes load.

[0056] Preferably, the cloud can obtain current weather information and determine whether or not it is suitable for washing clothes according to the current weather. The cloud can also obtain current water quality hardness according to the position of the washing machine, determine whether or not the current selected detergent is proper according to the water quality hardness situation and determine the accurate detergent dispensing amount. The cloud can also obtain the current electricity utilization peak situation of a community and prompt the user to avoid the electricity utilization peak. Preferably, in the step, the detergent dispensing amount can be recommended according to the detergent category, the clothes component information and the clothes load. Various detergent categories can correspond to each type of clothes component information, and the corresponding relationship between the clothes load and the detergent dispensing amount is preset under each detergent category.

[0057] The corresponding relationships between the clothes component information, the detergent category, the clothes load and the detergent dispensing amount are stored in a fourth database, and the fourth database is arranged in the washing machine and/ or the cloud.

[0058] Specifically, when the washing machine is under the offline mode, the fourth database is arranged in the washing machine. Furthermore, the fourth database comprises an offline data table, and the washing machine can query the detergent category corresponding to the clothes component information according to the locally stored offline data table, and query the detergent dispensing amount corresponding to the clothes load under the detergent category.

[0059] When the washing machine is under the online mode, the fourth database is arranged in the cloud. Fur-

thermore, the fourth database stores a great quantity of data related to the corresponding relationships between the clothes component information, the detergent category, the clothes load and the detergent dispensing amount. And the cloud can utilize the big data to recommend the detergent dispensing amount corresponding to the clothes component information, the detergent category and the clothes load.

[0060] Step 104: a detergent dispensing device is controlled to dispense the detergent by the washing machine.

[0061] Specifically, the washing machine or the cloud sends the numerical value of the detergent dispensing amount to a bottom plate, the bottom plate converts the numerical value of the detergent dispensing amount into a corresponding electric signal according to a preset form, and controls the detergent dispensing device to carry out accurate dispensing.

[0062] In the present disclosure, the detergent ingredient detection device is used for identifying the ingredients of the detergent, the clothes material identification device is used for scanning clothes fabric components, the clothes to be washed are automatically weighed. The most proper detergent dispensing amount is recommended according to the identification result and the clothes load, the detergent dispensing device is controlled for dispensing the detergent. So that the accurate dispensing of the detergent is realized, a washing effect is improved, the phenomenon of insufficient or excessive dispensing amount is avoided from occurring, and the cleaning and rinsing effect of the washing machine on the clothes is improved.

[0063] Further description is carried out through specific embodiments and accompanying drawings below.

Embodiment 1

[0064] As shown in Fig. 2, the present embodiment provides a detergent dispensing control method which is applied to an offline mode of a washing machine side, and the method comprises the following steps that:

Step 201: a current clothes load is obtained through a clothes weight detection device and is sent to the washing machine.

[0065] Specifically, the clothes weight detection device is installed in the washing machine and is integrally arranged with a detergent. When a user puts the clothes to be washed into a washing tub, the clothes weight detection device can automatically detect the current clothes load, and send a specific numerical value to the washing machine.

[0066] Step 202: the ingredients of the detergent are detected through a detergent ingredient detection device, and detergent detection data is obtained and sent to the washing machine.

[0067] Specifically, the detergent ingredient detection device is arranged in a detergent box, a probe of the detergent ingredient detection device is in contact with

the detergent. When the user adds the detergent into the detergent box of the washing machine or a washing program of the washing machine is started, the detergent in the detergent box is automatically detected by the detergent ingredient detection device, detergent detection data is obtained, and the detergent detection data is sent to the washing machine.

[0068] Step 203: clothes fabric components are scanned through a clothes material identification device to obtain clothes identification data, and the clothes identification data is sent to the washing machine.

[0069] Specifically, the clothes material identification device is arranged on a control panel of the washing machine or is hung on a cabinet of the washing machine to be connected with the washing machine through a wired or wireless mode. The user can put the clothes to be washed in front of the clothes material identification device to be scanned, the clothes material identification device identifies the materials of the clothes to be washed to obtain clothes identification data, and send the clothes identification data to the washing machine.

[0070] In the embodiment, the above steps 201, 202 and 203 are parallel steps, and the execution sequence of the above steps 201, 202 and 203 is not restricted.

[0071] Step 204: the detergent detection data and the clothes identification data are analyzed by the washing machine to obtain a detergent category corresponding to the detergent detection data and obtain clothes component information corresponding to the clothes identification data.

[0072] Specifically, the washing machine stores the corresponding relationship between the detergent detection data and the detergent category and also stores the corresponding relationship between the clothes identification data and the clothes component information. And the washing machine can directly query a corresponding relationship table stored in the washing machine when the washing machine is under the offline mode, to obtain the detergent category and the clothes component information.

[0073] Step 205: a detergent dispensing amount is recommended by the washing machine according to the clothes component information, the detergent category and the clothes load.

[0074] Specifically, the corresponding relationships between the clothes component information, the detergent category, the clothes load and the detergent dispensing amount are stored in the washing machine. And the washing machine can directly query the corresponding relationship table stored in the washing machine when the washing machine is under the offline mode, to obtain the accurate detergent dispensing amount.

[0075] Step 206: a detergent dispensing device is controlled by the washing machine for dispensing the detergent.

[0076] Specifically, the detergent dispensing amount is fed back to a bottom plate by the washing machine, a corresponding control signal is obtained by the bottom

plate according to the dispensing amount, and the detergent dispensing device is controlled to dispense the detergent.

Embodiment 2

[0077] As shown in Fig. 3, the present embodiment provides a detergent dispensing control method which is applied to an online mode of a washing machine side, wherein the washing machine can perform data interaction with a cloud through a communication module on the washing machine. The method comprises the following steps that:

Step 301: a current clothes load is obtained through a clothes weight detection device and is sent to the cloud.

[0078] Specifically, the clothes weight detection device is installed in the washing machine and is integrally arranged with the detergent. When a user puts clothes to be washed into a washing tub, the clothes weight detection device can automatically detect the current clothes load and send a specific numerical value to the cloud.

[0079] Step 302: the ingredients of a detergent are detected through a detergent ingredient detection device, and detergent detection data is obtained and sent to the cloud.

[0080] Specifically, the detergent ingredient detection device is arranged in a detergent box, a probe of the detergent ingredient detection device is in contact with the detergent. When the user adds the detergent into the detergent box of the washing machine or a washing program of the washing machine is started, the detergent ingredient detection device automatically detects the detergent in the detergent box to obtain the detergent detection data, and send the detergent detection data to the cloud.

[0081] Step 303: the clothes fabric components are scanned through a clothes material identification device, and clothes identification data is obtained and sent to the cloud.

[0082] Specifically, the clothes material identification device is arranged on a control panel of the washing machine or hung on a cabinet of the washing machine to be connected with the washing machine through a wired or wireless mode. The user can put the clothes to be washed in front of the clothes material identification device to be scanned, the clothes material identification device identifies the materials of the clothes to be washed to obtain the clothes identification data, and sends the clothes identification data to the cloud.

[0083] In the present embodiment, the above steps 301, 302 and 303 are parallel steps, and the execution sequence of the above steps 301, 302 and 303 is not restricted.

[0084] Step 304: the detergent detection data and the clothes identification data are analyzed through the cloud, and a detergent category corresponding to the detergent detection data and clothes component information corresponding to the clothes identification data are

obtained.

[0085] Specifically, a great quantity of data related to the corresponding relationship between the detergent detection data and the detergent category is stored in the cloud, a great quantity of data related to the corresponding relationship between the clothes identification data and the clothes component information is also stored in the cloud. And the cloud can query a corresponding relationship table through the big data so as to obtain the detergent category and the clothes component information.

[0086] Step 305: a detergent dispensing amount is recommended by the cloud according to the clothes component information, the detergent category and the clothes load.

[0087] Specifically, a great quantity of data which relates to the corresponding relationships between the clothes component information, the detergent category, the clothes load and the detergent dispensing amount is stored in the cloud. And the cloud can utilize the big data to recommend the detergent dispensing amount corresponding to the clothes component information, the detergent category and the clothes load.

[0088] Step 306: the detergent dispensing amount is fed back to the washing machine through the cloud.

[0089] Specifically, the detergent dispensing amount is fed back to a bottom plate of the washing machine through a wireless module.

[0090] Step 307: a detergent dispensing device is controlled by the washing machine for dispensing the detergent.

[0091] Specifically, a corresponding control signal is obtained by the bottom plate of the washing machine according to the detergent dispensing amount, and the detergent dispensing device is controlled for dispensing the detergent.

Embodiment 3

[0092] As shown in Fig. 4, the present embodiment provides a washing machine, which comprises: a detergent ingredient detection device which can detect the ingredients of a detergent and obtain detergent detection data.

[0093] Preferably, the detergent ingredient detection device is a micro spectrum analyzer. Compared with a common spectrum analyzer, the micro spectrum analyzer has the characteristics of modularization, high-speed of acquisition and small size, a spectrum system can be more flexibly set up, so that the detergent ingredient detection device can be directly installed in a detergent box, and is integrally arranged with the detergent box. A probe of the detergent ingredient detection device can be in contact with the detergent to obtain identification data of the current detergent. A power connector of the detergent ingredient detection device is introduced out to be meshed with a position, where the detergent box is installed, on a cabinet of the washing machine, then, the

power connector is connected with a main power supply of the washing machine, and the main power supply of the washing machine supplies power to the detergent ingredient detection device. Preferably, in order to make detection more accurate, after the detergent is dispensed each time, the detergent box is flushed, and the residual detergent on the probe can be flushed away completely to guarantee the accuracy of the next detection of the washing machine.

[0094] Furthermore, the detected detergent detection data can be directly sent to a processor of the washing machine to be processed when the washing machine is under an offline mode, and the detected detergent detection data can also be sent to a cloud to be processed through a wireless module of the washing machine when the washing machine is under an online mode.

[0095] A clothes weight detection device which automatically weighs the clothes put into the washing machine and obtains a clothes load.

[0096] Specifically, when a user puts the clothes to be washed into a washing tub, the clothes weight detection device can automatically detect the weight of the clothes to be washed, and the clothes load of the current washing machine is calculated.

[0097] Furthermore, the detected clothes load can be directly sent to the processor of the washing machine to be processed when the washing machine is under the offline mode, and also can be sent to the cloud to be processed through the wireless module of the washing machine when the washing machine is under the online mode.

[0098] A controller which receives a clothes load signal and a detergent ingredient detection signal, recommends a detergent dispensing amount according to the received signals and controls a detergent dispensing device to dispense the detergent.

[0099] Preferably, when the washing machine is under the online mode, the received signals can be sent to the cloud, the cloud recommends the detergent dispensing amount according to the received signals by the big data, and the detergent dispensing amount is sent to the washing machine through the wireless module for accurate detergent dispensing.

[0100] The detergent dispensing device dispenses the detergent according to the detergent dispensing amount indicated by the controller.

[0101] Specifically, the numerical value of the detergent dispensing amount is sent to a bottom plate through the washing machine or the cloud, the bottom plate converts the numerical value of the detergent dispensing amount into a corresponding electric signal according to a preset form, and the detergent dispensing device is controlled to perform accurate dispensing of the detergent.

Embodiment 4

[0102] As shown in Fig. 5, differences between the

present embodiment and the embodiment 3 are that, on the basis of the embodiment 3, a washing machine also comprises the following: a clothes material identification device which detects clothes fabric components to obtain clothes identification data.

[0103] Specifically, the clothes material identification device is a micro spectrum analyzer, the detection principle of the micro spectrum analyzer is the same with that of the micro spectrum analyzer for detecting a detergent, but detection ways are different. The micro spectrum analyzer for detecting clothes materials can scan and identify clothe fabric components, and can be installed on a control panel of the washing machine; and the micro spectrum analyzer for detecting clothes materials can also be hung on a cabinet of the washing machine or be handheld equipment to perform transmission with the washing machine in a wired or wireless way.

[0104] Furthermore, the detected clothes identification data can be directly sent to a processor of the washing machine to be processed when the washing machine is under an offline mode, and can be sent to a cloud to be processed through a wireless module of the washing machine when the washing machine is under an online mode.

[0105] Correspondingly, a controller of the washing machine can also receive a clothes identification signal and recommend a detergent dispensing amount according to the received signal, i.e., the detergent dispensing amount is recommended according to clothes component information, a detergent category and a clothes load.

[0106] Preferably, when the washing machine is under the online mode, the received clothes identification signal can be sent to the cloud, the cloud recommends the detergent dispensing amount according to the received signal by the big data, and the detergent dispensing amount is sent to the washing machine through the wireless module for accurate dispensing of the detergent.

Embodiment 5

[0107] As shown in Fig. 6, the present embodiment provides a system, which comprises a washing machine and a cloud server, the washing machine is connected with the cloud server through a communication module and performs data exchange.

[0108] Wherein, the washing machine can obtain detergent detection data and a clothes load, and preferably, the washing machine can also obtain clothes identification data, the detergent detection data, the clothes load and the clothes identification data are uploaded to the cloud server to be analyzed. After the cloud server receives and analyzes the data information uploaded by the washing machine, a detergent dispensing amount is recommended and sent to the washing machine to execute the dispensing of the detergent with the corresponding dosage.

[0109] Specifically, the washing machine is provided

with a controller, a communication module, a detergent dispensing device, a detergent ingredient detection device used for detecting the ingredients of the detergent, and a clothes weight detection device used for weighing the clothes to be washed; and preferably. The washing machine also comprises a clothes material identification device used for detecting the clothes fabric components. The washing machine uploads the detected detergent detection data, the clothes load and the clothes identification data to the cloud server through the communication module, the cloud server carries out analysis to obtain the accurate detergent dispensing amount and sends the detergent dispensing amount to a bottom plate of the washing machine. And the bottom plate converts the detergent dispensing amount into a corresponding electric signal according to a preset form, and the detergent dispensing device is controlled to carry out accurate dispensing of the detergent.

[0110] The above mentioned embodiments are only preferred embodiments of the present disclosure but are not the restriction of any form of the present disclosure. Although the preferred embodiments of the present disclosure are disclosed as above, the embodiments are not used for restricting the present disclosure, any one skilled in the art may utilize the above prompted technical contents to make certain changes or modifications to obtain equivalent embodiments which has equal changes without departing from the scope of the technical scheme scope of the present disclosure. But all simple amendments, equivalent changes and modifications made to the above embodiments according to the technical essence of the present disclosure without departing from the technical scheme scope of the present disclosure all still fall within the protection scope of the present disclosure.

Claims

1. A detergent dispensing control method comprising:

S 1: obtaining a current clothes load through a clothes weight detection device; detecting ingredients of a detergent through a detergent ingredient detection device, and obtaining detergent detection data;

S2: analyzing the detergent detection data, and obtaining a detergent category corresponding to the detergent detection data;

S3: according to the detergent category and the clothes load, recommending a detergent dispensing amount; and

S4: controlling a detergent dispensing device to dispense the detergent by a washing machine.

2. The detergent dispensing control method according to claim 1, wherein step S1 also comprises scanning clothes fabric components through a clothes mate-

rial identification device to obtain clothes identification data;

step S2 also comprises analyzing the clothes identification data to obtain clothes component information corresponding to the clothes identification data; and

step S3 also comprises recommending the detergent dispensing amount according to the detergent category, the clothes component information and the clothes load.

3. The detergent dispensing control method according to claim 1 or 2, wherein the detergent detection data corresponds to the detergent category, and a corresponding relationship between the detergent detection data and the detergent category is stored in the washing machine and/ or a cloud; and

the detergent category and the clothes load correspond to the detergent dispensing amount, and corresponding relationships between the detergent category, the clothes load and the detergent dispensing amount are stored in the washing machine and/ or the cloud.

4. The detergent dispensing control method according to claim 2, wherein the clothes identification data corresponds to the clothes component information, and a corresponding relationship between the clothes identification data and the clothes component information is stored in the washing machine and/ or the cloud; and

the clothes component information, the detergent category and the clothes load correspond to the detergent dispensing amount, and corresponding relationships between the clothes component information, the detergent category, the clothes load and the detergent dispensing amount are stored in the washing machine and/ or the cloud.

5. The detergent dispensing control method according to claim 1 or claim 2, wherein in step S3, the washing machine recommends the detergent dispensing amount according to an offline data table stored in the washing machine; or the cloud recommends the detergent dispensing amount according to big data.

6. The detergent dispensing control method according to claim 1, wherein the detergent ingredient detection device is a micro spectrum analyzer.

7. A washing machine, in which the method of any one of claims 1-6 is carried out, wherein the washing machine comprises:

a detergent ingredient detection device for detecting ingredients of a detergent and obtaining detergent detection data;

a clothes weight detection device for automatically weighing clothes put into the washing machine and obtaining the clothes load;
 a controller for receiving the signal of the clothes load and the signal of detergent ingredient detection, recommending the detergent dispensing amount according to signals received and controlling a detergent dispensing device to dispense the detergent; and
 the detergent dispensing device for dispensing detergent according to the dispensing amount indicated by the controller.

8. The washing machine according to claim 7, further comprises:

a clothes material identification device for detecting the clothes fabric components to obtain clothes identification data.

9. The washing machine according to claim 7, wherein the detergent ingredient detection device is installed in a detergent box of the washing machine and is in integral arrangement with the detergent box; and a probe of the detergent ingredient detection device is in contact with the detergent, and a power connector of the detergent ingredient detection device is connected with a main power supply of the washing machine.

10. A system, in which the method of any one of claims 1-6 is carried out, wherein the system comprises:

the washing machine for obtaining the detergent detection data, the clothes identification data and the clothes load and uploading the detergent detection data, the clothes identification data and the clothes load to a cloud server to be analyzed; and
 the cloud server for recommending the detergent dispensing amount after receiving and analyzing the data information uploaded by the washing machine, and sending the detergent dispensing amount to the washing machine to dispense the detergent.

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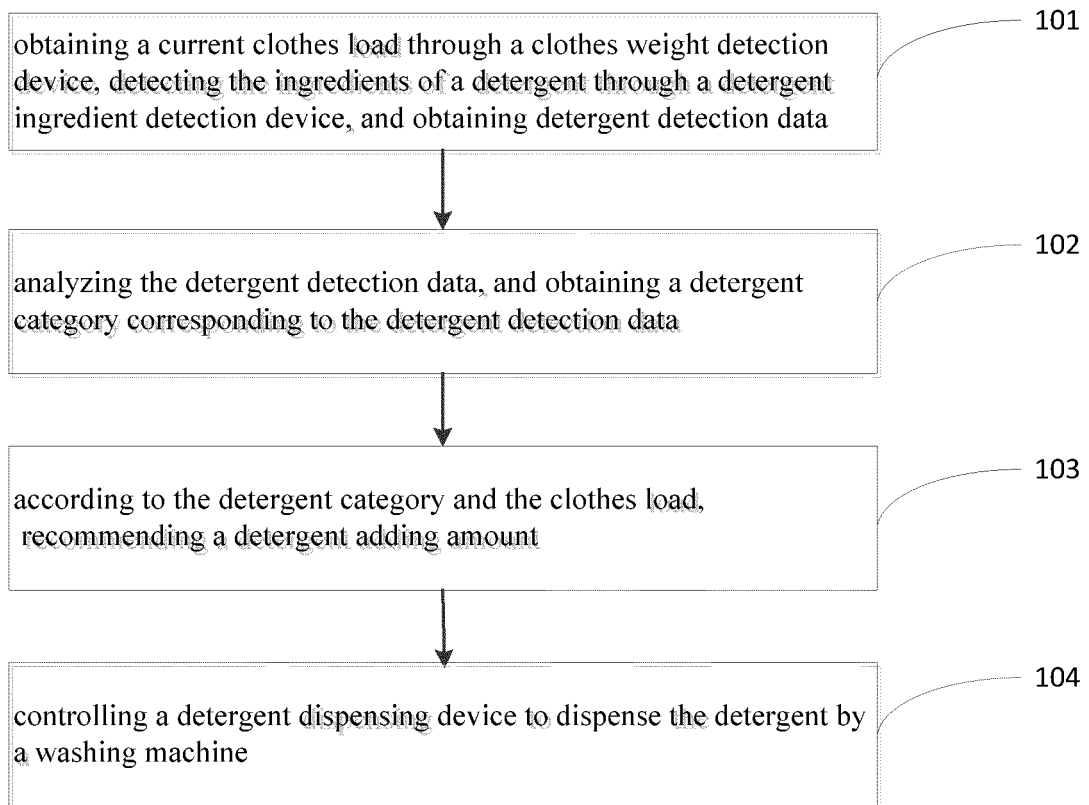


Fig. 1

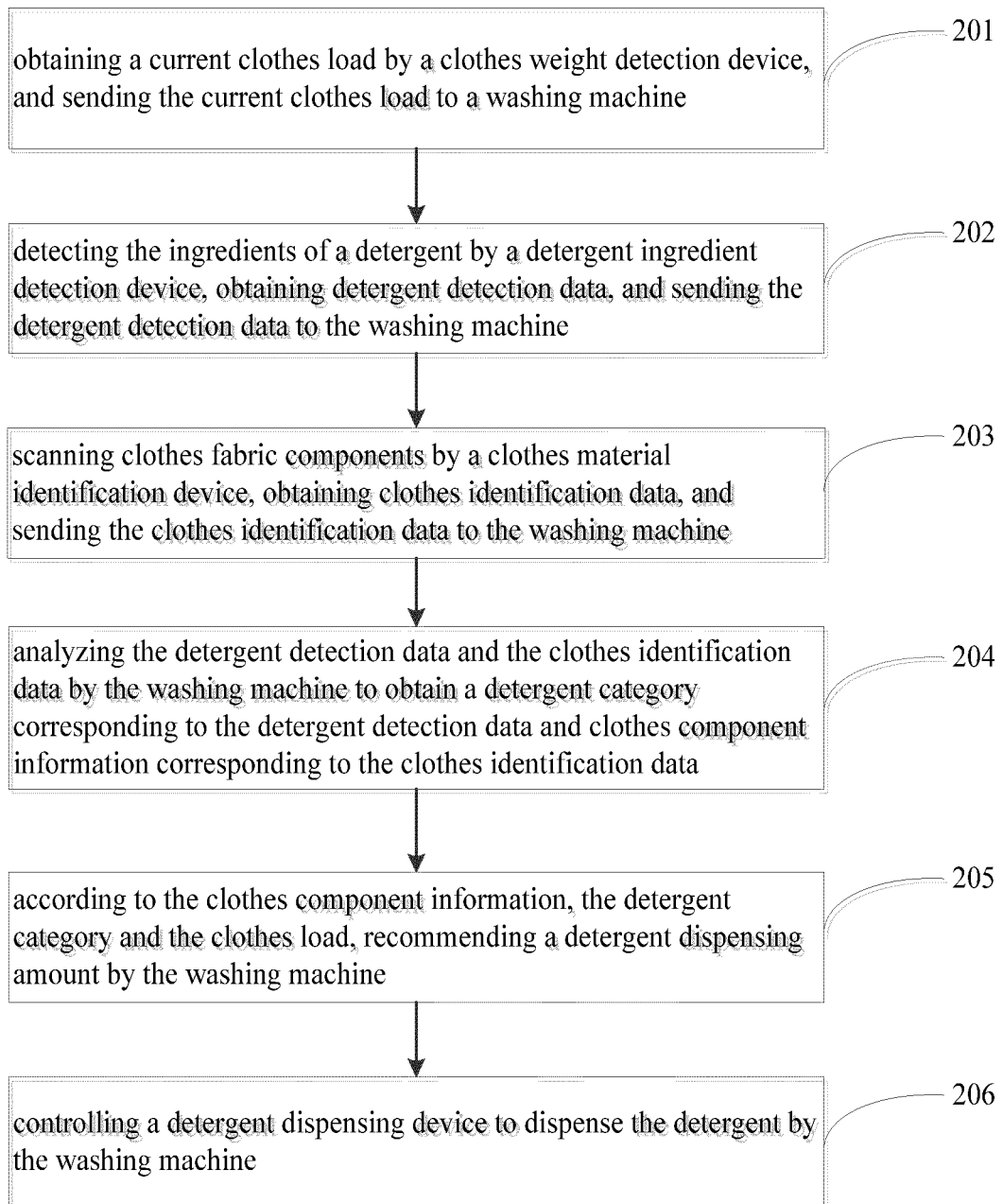


Fig. 2

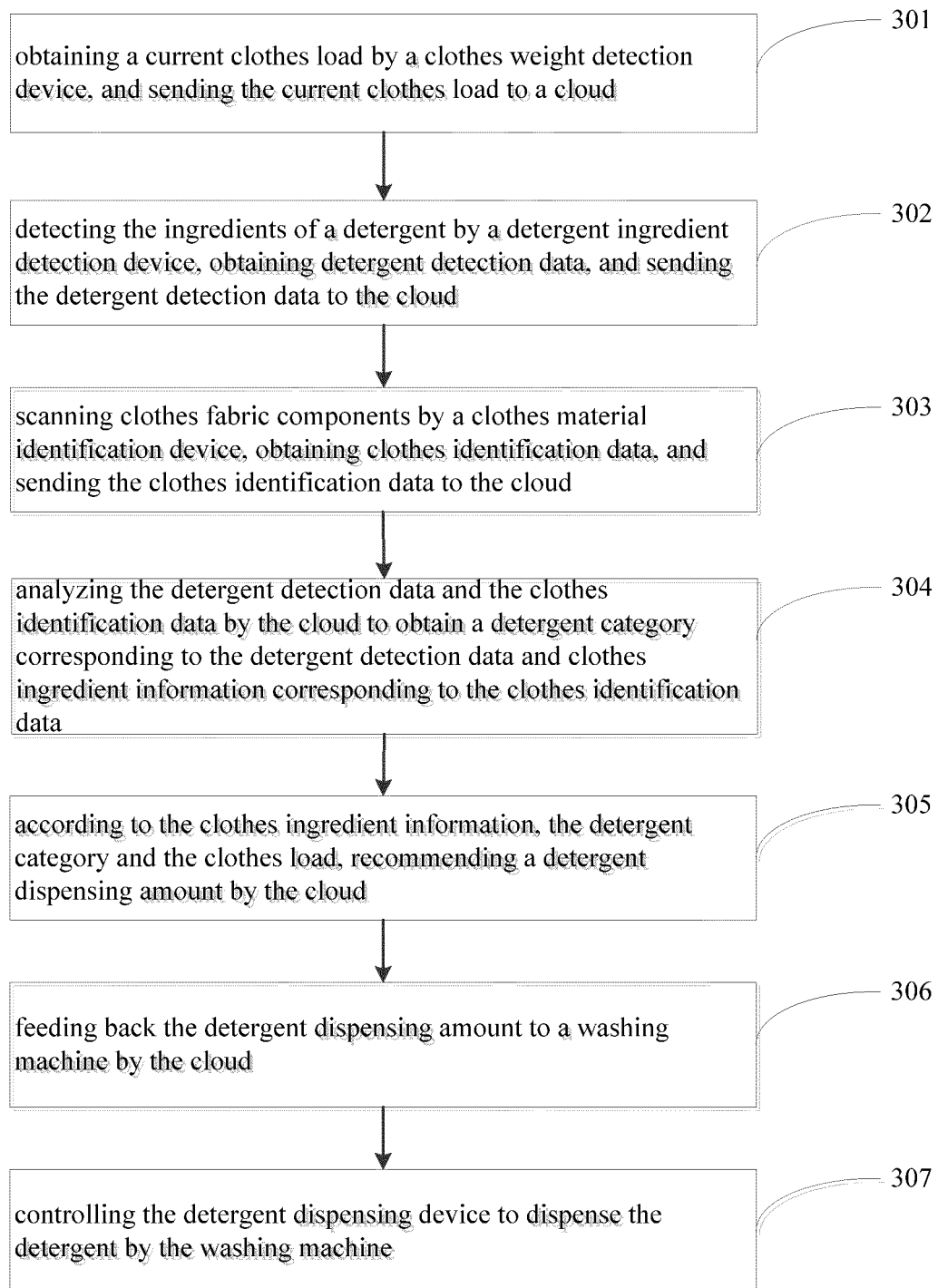


Fig. 3

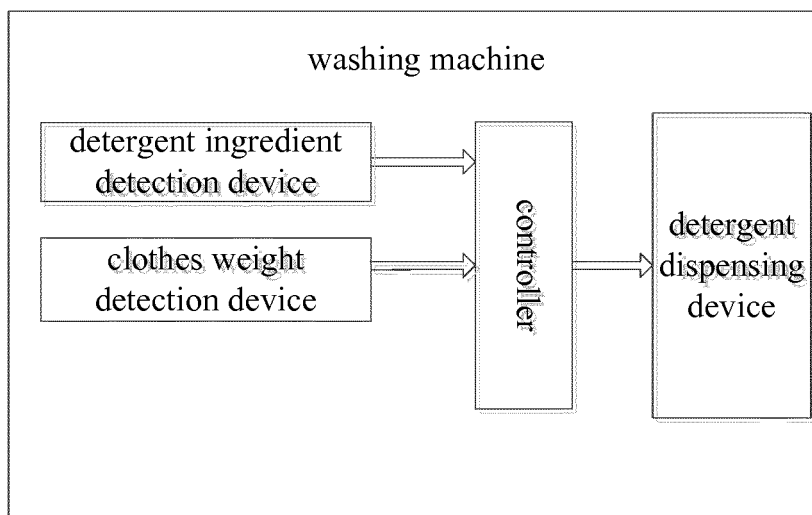


Fig.4

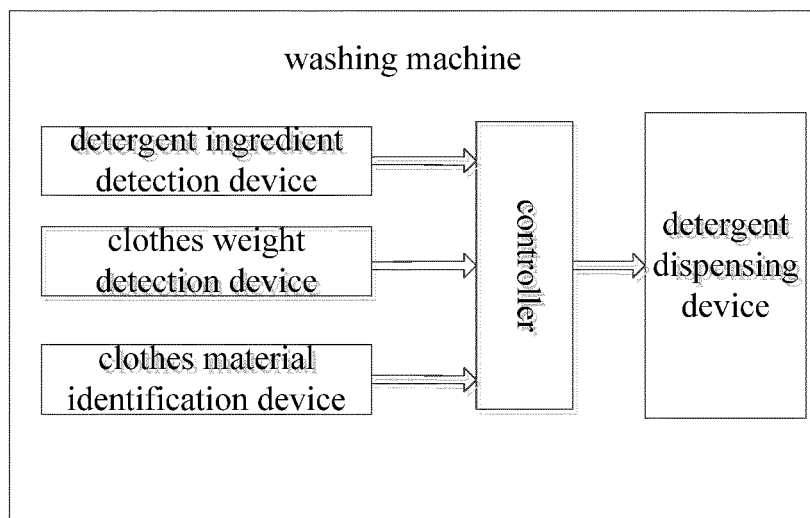


Fig.5

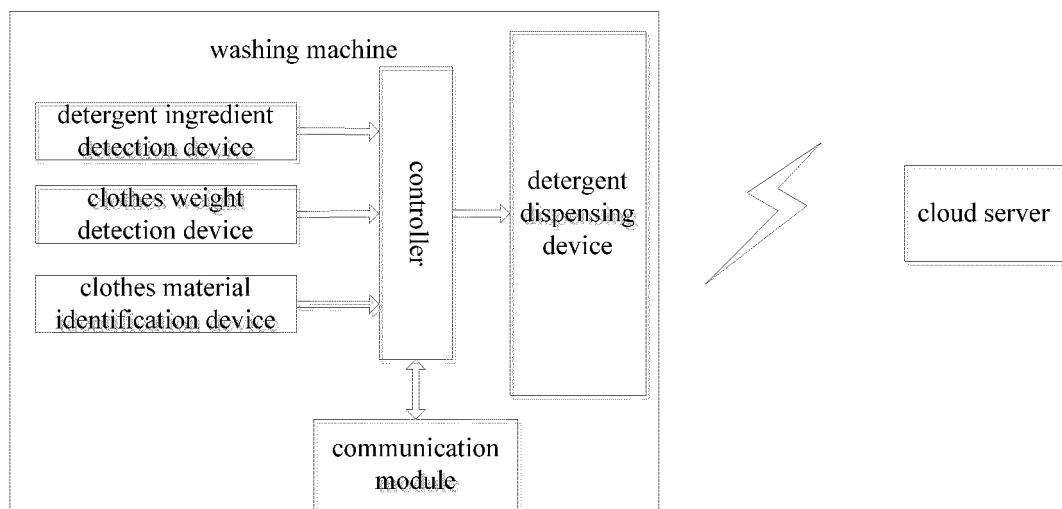


Fig.6

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2016/111421

A. CLASSIFICATION OF SUBJECT MATTER

D06F 33/02 (2006.01) i; 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

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)

CNABS; SIPOABS; DWPI; CNKI: detergent, abstergent, abluent, deterative, wash???, agent, type, kind, variety, liquid, solid, powder, concentrat+, composition?, component+, ingredient, constituent, laundry, cloth, fabric???, load, quantity, amount, washing capacity, cloth capacity, fabric capacity, load, weight, measure, amount, fabric, texture, character, lining, cloud, cloud services

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	CN 103266452 A (HAIER GROUP CO. et al.) 28 August 2013 (28.08.2013) claims 1-7 and 9, description, figures 2-4	1-10
Y	CN 101961236 A (BSH BOSCH & SIEMENS HAUSGERAETE GMBH) 02 February 2011 (02.02.2011) description, paragraphs [0008], [0015]-[0018]	1-10
Y	CN 103334256 A (WUXI LITTLE SWAN CO., LTD.) 02 October 2013 (02.10.2013) claim 6	3, 4, 10
Y	CN 104762801 A (FOSHAN SHUNDE MIDEA ELECTRICAL HEATING APPLIANCES et al.) 08 July 2015 (08.07.2015) description, paragraphs [0047] and [0053]	2, 4, 8

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

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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"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
"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	"&" document member of the same patent family

Date of the actual completion of the international search 17 March 2017	Date of mailing of the international search report 27 March 2017
Name and mailing address of the ISA State Intellectual Property Office of the P. R. China No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088, China Facsimile No. (86-10) 62019451	Authorized officer LIU, Jing Telephone No. (86-10) 62084545

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2016/111421

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN 101298733 A (NANJING LG PANDA APPLIANCES CO.) 05 November 2008 (05.11.2008) the whole document	1-10
A	DE 102007011119 A1 (BSH BOSCH SIEMENS HAUSGERAETE) 11 September 2008 (05.11.2008) the whole document	1-10

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INTERNATIONAL SEARCH REPORT **Information on patent family members**

International application No.
PCT/CN2016/111421

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CN 103266452 A	28 August 2013	None	
CN 101961236 A	02 February 2011	DE 102009027950 A1	27 January 2011
		EP 2277431 A2	26 January 2011
CN 103334256 A	02 October 2013	None	
CN 104762801 A	08 July 2015	None	
CN 101298733 A	05 November 2008	CN 101298733 B	06 October 2010
DE 102007011119 A1	11 September 2008	None	

REFERENCES CITED IN THE DESCRIPTION

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