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(54) **CLOTHES WASHING CONTROL METHOD, WASHING MACHINE, AND SYSTEM**

(57) The present disclosure provides a clothing washing control method, a washing machine and a control system. The method comprises: S1, a clothing material identification device scanning and identifying clothing fabric components, and obtaining identification data; S2, analyzing the identification data, and obtaining clothing component information corresponding to the identification data; S3, recommending washing parameters according to the clothing component information; and S4, the washing machine executing washing according to the washing parameters recommended. According to the clothing washing control method, the washing machine and the control system, clothing materials can be automatically identified. The corresponding washing parameters are recommended according to the clothing materials. Thus the clothing washing efficiency is improved, and the situation that clothing fails to be washed clean or excessive washing causes clothing abrasion is effectively avoided.

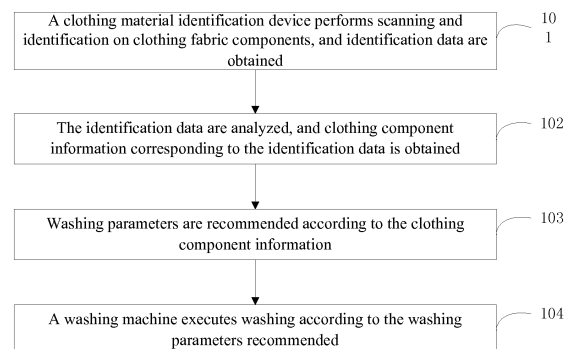


Fig. 1

Description**TECHNICAL FIELD**

5 **[0001]** The present disclosure relates to the field of washing of washing machines, in particular to a clothing washing control method, a washing machine and a system.

BACKGROUND

10 **[0002]** At present, corresponding washing procedures are usually selected according to clothing fabrics at the time of clothing washing, and different washing parameters are set in the different washing procedures, i.e., the washing time, the rotating speed, the temperature, the number of times of rinsing and the like. Therefore, appropriate washing parameters enable clothing to be washed quickly and effectively, while inappropriate washing parameters may cause the situation that the clothing fails to be washed clean or the clothing is excessively abraded after being washed, so that the clothing is quite easily damaged.

15 **[0003]** The existing washing machines do not have a clothing fabric judging function generally, the fabrics need to be distinguished by users, and the washing procedures are selected by the users according to fabric components. Certain washing machines have rough fabric identification functions and judge whether the textures of clothing are soft or common or hard according to the water absorbing capacity of the placed clothing. Specifically, the clothing needing to be washed is placed into a washing machine, after water is fed to the set water level, the clothing is stirred for a set period of time, the clothing absorbs a certain amount of water during stirring. The difference between the current water level and the set water level is detected through a water level sensor, and the textures of the clothing are judged according to the water level declining volume.

20 **[0004]** For the first treatment mode that the washing procedures are selected according to the clothing fabrics, the users need to make judgement. Different users have different capabilities for making judgement on the clothing fabrics, and therefore, the clothing fabric judging accuracy rate is extremely low. In addition, though the users make correct judgement on the clothing fabrics, when the number of varieties of the fabrics is large, the users probably fail to select or set the most appropriate washing parameters, and washing inconvenience is caused for the users.

25 **[0005]** The second mode is based on the clothing water absorbing capacity to judge the clothing textures, and the mode can only be a rough identification mode and a post-event treatment mode, that is, judgement can be made only after the clothing is wet through. The situation that the clothing fails to be washed clean or excessive washing causes severe clothing abrasion may occur unfavorably if judgement errors emerge and the clothing is washed in an incorrect mode.

30 **[0006]** Therefore, a washing machine capable of identifying clothing fabric components is urgently needed, increasing the clothing fabric identification accuracy rate, and being able to recommending the most appropriate washing parameters for the users.

35 **[0007]** For this purpose, the present disclosure is hereby provided.

SUMMARY

40 **[0008]** The key for solving the technical problem lies in overcoming shortcomings in the prior art, providing a clothing washing control method, utilizing a clothing material identification device to identify clothing fabric components, recommending the most appropriate washing parameters for users according to identification results. Thus, clothing fabrics can be accurately identified, user clothing washing operation is reduced, the clothing washing efficiency is improved, and the situation that clothing fails to be washed clean or excessive washing causes clothing abrasion is avoided.

45 **[0009]** An object of the present disclosure is to provide a washing machine adopting the method.

50 **[0010]** Another object of the present disclosure is to provide a system adopting the method.

55 **[0011]** The technical solution adopted for solving the technical problem of the present disclosure includes: the present disclosure provides the clothing washing control method comprising:

S1: a clothing material identification device scanning and identifying clothing fabric components, and obtaining identification data;

S2: analyzing the identification data, and obtaining clothing component information corresponding to the identification data;

S3: recommending washing parameters according to the clothing component information; and

S4: a washing machine executing washing according to the washing parameters recommended.

[0012] Further, the step S3 comprises:

A1: determining whether or not the clothing component information of only one piece of clothing is received; if yes, selecting washing parameters corresponding to the clothing component information, and if no, starting the step A2; and

A2: determining whether or not the identified clothing is suitable for mixed washing; if yes, selecting washing parameters corresponding to clothing component information with the highest washing requirement, and if no, prompting that the clothing is not suitable for mixed washing.

[0013] Further, a corresponding relation between the identification data and the clothing component information is stored in a first database, and the first database is arranged in the washing machine and/or in a cloud; and a corresponding relation between the clothing component information and the washing parameters is stored in a second database, and the second database is arranged in the washing machine and/or in the cloud.

[0014] Further, when the washing machine operates in an offline mode, data interaction is performed between the washing machine and the clothing material identification device in a wired or wireless mode, and the steps S2 and S3 are executed by the washing machine; and

when the washing machine operates in an online mode, the washing machine performs data exchange with the clothing material identification device and the cloud respectively, and steps S2 and S3 are executed by the cloud.

[0015] Further, when the washing machine is connected with an APP client-side, the APP client-side performs data exchange with the clothing material identification device and the washing machine respectively, and steps S2 and S3 are executed by the APP client-side; or

the APP client-side performs data exchange with the clothing material identification device, the washing machine and the cloud, step S2 is executed by the cloud, and step S3 is executed by the APP client-side.

[0016] Further, the clothing material identification device is a micro spectrum analyzer.

[0017] Further, the micro spectrum analyzer is mounted on a control panel on the washing machine; or the micro spectrum analyzer is hung on a washing machine cabinet, and performs data transmission with the washing machine in the wired or wireless mode; or the micro spectrum analyzer is handheld equipment and performs data transmission with the APP client-side in the wireless mode.

[0018] Further, the washing parameters comprise the water level, the washing time, the number of times of rinsing, the dehydration time and the rotating speed.

[0019] The present disclosure further provides the washing machine adopting the method, and the clothing material identification device is mounted on the washing machine; or

the washing machine and the clothing material identification device are connected in the wired or wireless mode.

[0020] The present disclosure further provides the system adopting the method, and the system comprises the washing machine connected with the clothing material identification device; or

the system comprises the washing machine respectively connected with a cloud server and the clothing material identification device; or

the system comprises the APP client-side connected with the washing machine, the clothing material identification device and the cloud server.

[0021] The technical solution provided by the embodiments of the present disclosure has the beneficial effects that:

Firstly, the clothing material identification device is utilized to identify the clothing fabric components, the identification accuracy rate of the device is higher compared with artificial clothing fabric identification or clothing material judgment based on the water content, the mode that clothing is identified after being soaked is not needed. Therefore, the identification process better saves time, operation is easier and more convenient, and the clothing identification efficiency is higher.

Secondly, the corresponding washing parameters are recommended according to the clothing materials, recommendation of the washing machine is higher in pertinence compared with artificial washing parameter selection, the washing parameters more suitable for the fabric or a plurality of mixed fabrics can be obtained. The trouble that a user does not know how to select washing procedures is eliminated, the clothing washing efficiency is also improved, washing is higher in pertinence, and the situation that the clothing fails to be washed clean or excessive washing causes clothing abrasion is effectively avoided.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022] In order to describe the technical solution in the embodiments of the present disclosure more clearly, a simple introduction on the accompanying drawings which are needed in the description of the embodiments is given below. Apparently, the accompanying drawings in the description below are merely some of the embodiments of the present disclosure, based on which other drawings can be obtained by those of ordinary skill in the art without any creative effort.

Fig. 1 is a flow diagram of a clothing washing control method provided by an embodiment of the present disclosure;
 Fig. 2 is a flow diagram of a clothing washing control method in an offline mode of a washing machine provided by an embodiment 1 of the present disclosure;
 Fig. 3 is a flow diagram of a clothing washing control method in an online mode of a washing machine provided by an embodiment 2 of the present disclosure;
 Fig. 4 is a flow diagram of a clothing washing control method in an APP connected mode of a washing machine provided by an embodiment 3 of the present disclosure;
 Fig. 5 is a washing machine provided by an embodiment 4 of the present disclosure;
 Fig. 6 is a system provided by an embodiment 5 of the present disclosure;
 Fig. 7 is another system provided by an embodiment 6 of the present disclosure;
 Fig. 8 is another system provided by the embodiment 6 of the present disclosure;
 Fig. 9 is another system provided by an embodiment 7 of the present disclosure;
 Fig. 10 is another system provided by the embodiment 7 of the present disclosure.

DETAILED DESCRIPTION

[0023] As shown in Fig. 1, the present disclosure provides a clothing washing control method comprising:

Step 101: a clothing material identification device scanning and identifying clothing fabric components, and obtaining identification data.

[0024] The clothing material identification device can be a micro spectrum analyzer, and the detecting principle is as follows. The micro spectrum analyzer can emit near infrared rays to to-be-tested substances and detects active molecules in the to-be-detected substances. Then light rays of reflected by the molecular vibration are analyzed. Chemical components of material molecules are determined and identified according to the unique optical characteristic of the light rays. Specifically, the near infrared rays emitted by the to-be-detected substances are subjected to a data acquisition and filtering by a filter, then pass through a corresponding amplifier and then are sent to a corresponding processor for processing. Processed data are analyzed according to a corresponding algorithm, and the analyzed data are finally obtained, which are the identification data.

[0025] Compared with an ordinary spectrum analyzer, the micro spectrum analyzer has the characteristics of modularization and high-speed acquisition, the size is smaller, and a spectrum system can be more flexibly set up. Therefore, the micro spectrum analyzer can be directly mounted on a control panel of a washing machine, a user can place to-be-washed clothing in front of the analyzer before washing. The micro spectrum analyzer can perform scanning and identification on clothing fabric components, the identification data are obtained, and the corresponding identification data can be obtained after each piece of clothing is scanned.

[0026] Preferably, the micro spectrum analyzer can also be hung on a washing machine cabinet and performs data transmission with the washing machine in a wired or wireless mode.

[0027] Further preferably, the micro spectrum analyzer can also be handheld equipment, when the washing machine is connected with an APP client-side, the micro spectrum analyzer and the APP client-side perform the data transmission in a wireless mode.

[0028] For the obtained identification data, the micro spectrum analyzer can directly send the data to a washing machine terminal controller for analysis. And the data can also be uploaded to a cloud through a wireless module of the washing machine for analysis and further can be sent to the APP client-side, so that the APP client-side directly analyzes the data or the APP client-side sends the data to the cloud for analysis;

Step 102: analyzing the identification data, and obtaining clothing component information corresponding to the identification data.

[0029] The clothing component information can comprise at least one of cotton cloth, linen, silk, down feather, wool fabric, leather, chemical fibers, blending, mercerized cotton, chiffon, mulberry silk, viscose, acetate rayon, dacron, modified polypropylene fibers, polypropylene fibers, spandex, vinylon, linen cambric, grass cloth, intertexture linen fabric, palace, gabardine, plush, melton, cashmere, khaki, mohair, linen-mixed cotton, polyester-mixed linen, spun silk yarn, real silk, tencel, acrylic fibers, polyester-mixed cotton and polyester-mixed spun silk yarn.

[0030] The identification data corresponds to the clothing component information, and a corresponding relation between the identification data and the clothing component information is stored in a first database. And the first database is

arranged in the washing machine and/or in the cloud.

[0031] Specifically, when the washing machine operates in an offline mode, the micro spectrum analyzer can send the identification data to the washing machine. The first database is arranged in the washing machine, and the washing machine can directly analyze the identification data and queries the clothing component information corresponding to the identification data in the first database.

[0032] When the washing machine operates in an online mode, the micro spectrum analyzer can send the identification data to the cloud through a wireless communication module on the washing machine. The first database is arranged in the cloud, and the cloud can analyze the identification data and queries the clothing component information corresponding to the identification data in the first database.

[0033] Further, when the washing machine is connected with the APP client-side, the micro spectrum analyzer can also send the identification data to the APP client-side. The APP client-side directly analyzes the identification data and obtains the clothing component information. Or the APP client-side forwards the identification data to the cloud, and the cloud analyzes the identification data and sends the obtained clothing component information to the APP client-side.

[0034] Step 103: recommending washing parameters according to the clothing component information.

[0035] The washing parameters comprise water level, washing time, the number of times of rinsing, dehydration time and rotating speed. Preferably, the washing parameters further comprise temperature and remaining time.

[0036] Each piece of clothing component information can correspond to one set of washing parameters, i.e., when the clothing component information is cotton, the corresponding set of washing parameters include that the washing time is 15 min. The number of times of rinsing is 3. The dehydration time is 3 min. The temperature is 40°C. And the rotating speed is 1000 rpm.

[0037] The remaining time refers to the total time required for execution of the washing function of the washing machine. After the washing machine starts washing, the remaining time can be displayed on a display interface of the washing machine and is counted down. And as washing progresses, the remaining time is gradually shortened until zero, namely, it means the completion of washing.

[0038] When the washing machine operates in the offline mode, the step can be directly executed by the washing machine. When the washing machine operates in the online mode, the step can be executed by the cloud. And when the washing machine is connected with the APP client-side, the step can be executed by the APP client-side.

[0039] Specifically, the step can be implemented through the following sub-steps:

A1: determining whether or not the clothing component information of only one piece of clothing is received. If yes, selecting washing parameters corresponding to the clothing component information. And if no, starting the step A2.

[0040] When the clothing component information of the only one piece of clothing is received, the situation that whether the clothing can be subjected to mixed washing or not is inexistent. Therefore, the washing parameters corresponding to the clothing component information can be directly selected. Preferably, if a plurality of sets of washing parameters corresponds to the clothing component information, the optimal set of washing parameters can also be selected according to the big data. Or the most appropriate set of washing parameters is configured for the user according to the clothing washing history.

[0041] A corresponding relation between the clothing component information and the washing parameters is stored in a second database. And the second database is arranged in the washing machine and/or in the cloud.

A2: determining whether or not the clothing identified is suitable for mixed washing. If yes, selecting washing parameters corresponding to clothing component information with the highest washing requirement. And if no, prompting that the clothing is not suitable for mixed washing.

[0042] Whether or not a piece of clothing is suitable for mixed washing is determined by washing requirements of the clothing material. The higher the washing requirements, the lower the washing strength, and the lower the corresponding set parameters, i.e., washing parameters for the silk clothing and the polyester-mixed linen clothing are as shown in the following table 1 respectively:

Table 1

	Washing time/min	Number of times of rinsing /time	Dehydration time/min	Temperature/ °C	Rotating speed/rpm
Silk material	15	3	3	Not heated	Not spin-dried
Polyester-mixed linen	75	3	3	30	1000

[0043] It is known from the table 1 that compared with the polyester-mixed linen clothing, the silk clothing is prone to being damaged during washing, therefore, the washing requirements are higher, that is, the washing time is required to be shorter, heating is avoided in terms of the temperature requirement, spin-drying is avoided in terms of the rotating speed requirement. Therefore, during washing, if the silk clothing and the polyester-mixed linen clothing are subjected to mixed washing, the polyester-mixed linen clothing is not prone to being washed clean if the washing strength is excessively low. The silk clothing is prone to being excessively abraded and thus damaged if the washing strength is excessively high. And therefore, it is determined that the clothing made of the two materials cannot be subjected to mixed washing.

[0044] Specifically, according to the washing requirements, a data table is preset in the second database and stores conditions for avoidance of mixed washing (i.e., the silk clothing and the polyester-mixed linen clothing cannot be subjected to mixed washing). And the user is reminded that the clothing cannot be subjected to mixed washing if any two of a plurality of pieces of received clothing component information meet the conditions for avoidance of mixed washing recorded in the data table.

[0045] Preferably, the modes for reminding of no mixed washing can be that a corresponding indicator light flickers on the display interface of the washing machine. The user can be reminded that the current clothing cannot be subjected to mixed washing through voice. And the user can also be reminded that the current clothing cannot be subjected to mixed washing by giving out corresponding music.

[0046] Further, the washing parameters corresponding to the clothing component information with the highest washing requirement are selected if the clothing can be subjected to mixed washing. For example, when a piece of cotton clothing and a piece of chemical fiber clothing are subjected to mixed washing, the respective washing parameters are as shown in the following table 2:

Table 2

	Washing time/min	Number of times of rinsing /time	Dehydration time/min	Temperature/ °C	Rotating speed/rpm
Cotton material	15	3	3	40	1000
Chemical fiber blended fabric	15	3	3	30	800

[0047] It is known from the table 2 that the washing parameters for the clothing made of the two types of materials are not large in difference, mixed washing is permissible. However, the chemical fiber blended fabric is not washable, the washing requirements are higher. In order to prevent the clothing from being damaged, the washing temperature and the dehydration rotating speed shall not be too high. Therefore, the washing parameters corresponding to the chemical fiber blended fabric are selected. Thus, it can be guaranteed that the clothing is washed clean, and the situation that excessive washing causes clothing damage can also be avoided.

[0048] Step 104: executing washing of the washing machine according to the washing parameters recommended.

[0049] Specifically, the washing parameters are recommended by the washing machine. Or the washing machine receives the washing parameters sent by the cloud. Or the washing machine receives the washing parameters sent by the APP client-side. And an execution mechanism of the washing machine executes washing according to the washing parameters.

Embodiment 1

[0050] As shown in Fig. 2, the embodiment of the present disclosure provides a clothing washing control method which is applied to an offline mode of a washing machine end, and the method comprises:

Step 201: a clothing material identification device scanning and identifying clothing fabric components, and obtaining identification data.

Step 202: the clothing material identification device sending the identification data to a washing machine.

Step 203: the washing machine analyzing the identification data, and obtaining clothing component information corresponding to the identification data.

Step 204: the washing machine determining whether or not the clothing component information of only one piece of clothing is received. If yes, performing step 205, and if no, performing step 206.

Step 205: the washing machine selecting washing parameters corresponding to the clothing component information and performing washing.

Step 206: the washing machine determining whether or not the identified clothing is suitable for mixed washing. If yes, performing step 207, and if no, performing step 208.

Step 207: the washing machine selecting the washing parameters corresponding to the clothing component information with the highest washing requirement and performing washing.

Step 208: the washing machine reminding that clothing which is not suitable for mixed washing shall be taken out.

Embodiment 2

[0051] As shown in Fig. 3, the embodiment of the present disclosure provides a clothing washing control method which is applied to an online mode of a washing machine, wherein the washing machine is respectively connected with a clothing material identification device and a cloud, and the method comprises:

Step 301: the clothing material identification device scanning and identifying clothing fabric components, and obtaining identification data.

Step 302: the clothing material identification device sending the identification data to the cloud.

Step 303: the cloud analyzing the identification data, and obtaining clothing component information corresponding to the identification data.

Step 304: the cloud determining whether or not the clothing component information of only one piece of clothing is received. If yes, performing step 305, and if no, performing step 306.

Step 305: the cloud selecting washing parameters corresponding to the clothing component information and sending the washing parameters to the washing machine.

[0052] Specifically, directly performing step 308 after the step is executed.

Step 306: the cloud determining whether or not the identified clothing is suitable for mixed washing. If yes, performing step 307, and if no, performing step 309.

Step 307: the cloud selecting the washing parameters corresponding to the clothing component information with the highest washing requirement and sending the washing parameters to the washing machine.

Step 308: the washing machine executing washing after receiving the washing parameters.

Step 309: the cloud shall reminding that the clothing is not suitable for mixed washing and sending prompt information to the washing machine.

Step 310: the washing machine reminding that the clothing which is not suitable for mixed washing shall be taken out.

Embodiment 3

[0053] As shown in Fig. 4, the embodiment of the present disclosure provides a clothing washing control method, wherein a washing machine is connected with an APP client-side in a wired or wireless mode, the APP client-side is respectively connected with a cloud and a clothing material identification device, and the method comprises:

Step 401: the clothing material identification device scanning and identifying clothing fabric components, and obtaining the identification data.

Step 402: the clothing material identification device sending the identification data to the APP client-side.

Step 403: the APP client-side uploading the identification data to the cloud, the cloud analyzing the identification

data, and obtaining the clothing component information corresponding to the identification data.

Step 404: the cloud returning the clothing component information to the APP client-side.

Step 405: the APP client-side determining whether or not the clothing component information of only one piece of clothing is received. If yes, performing step 406, and if no, performing step 407.

Step 406: the APP client-side selecting washing parameters corresponding to the clothing component information and sending the washing parameters to the washing machine.

[0054] Specifically, the APP client-side querying a second database according to the returned clothing component information and obtaining the washing parameters corresponding to the clothing component information. And the second database can be arranged in the washing machine locally, or in the cloud, or in the APP client-side.

[0055] Further, directly performing step 409 after the step is executed.

Step 407: the APP client-side determining whether or not the identified clothing is suitable for mixed washing. If yes, performing step 408, and if no, performing step 410.

Step 408: the APP client-side selecting the washing parameters corresponding to the clothing component information with the highest washing requirement and sending the washing parameters to the washing machine.

[0056] Specifically, the APP client-side querying the second database according to the returned clothing component information and obtaining the washing parameters corresponding to the clothing component information with the highest washing requirement in the second database. and the second database can be arranged in the washing machine locally, or in the cloud, or in the APP client-side.

Step 409: the washing machine executing washing after receiving the washing parameters.

Step 410: the APP client-side reminding that the clothing is not suitable for mixed washing and sending prompt information to the washing machine.

Step 411: the washing machine reminding that the clothing which is not suitable for mixed washing shall be taken out.

Embodiment 4

[0057] As shown in Fig. 5, the embodiment of the present disclosure provides a washing machine. A clothing material identification device is mounted on the washing machine, can identify the clothing fabrics and obtains the identification data. The washing machine can analyze the identification data, obtains the specific clothing component information, and can recommend the corresponding washing parameters. Thus, the identification accuracy rate of clothing fabric components can be increased. The user operation is simplified, the most appropriate washing parameters can be recommended for the users. And the situation that the user selects an inappropriate washing procedure, and consequently, the clothing fails to be washed clean, or excessive washing causes clothing abrasion is avoided.

[0058] The clothing material identification device is preferably a micro spectrum analyzer. Since the micro spectrum analyzer has the characteristics of modularization and high-speed acquisition, the size is smaller, a spectrum system can be more flexibly set up. Therefore, the micro spectrum analyzer can be directly mounted on a control panel of the washing machine. When the micro spectrum analyzer is in use, the user can place to-be-washed clothing in front of the analyzer before washing, the micro spectrum analyzer can perform scanning and identification on the clothing fabric components. The identification data are obtained, and the corresponding identification data can be obtained after each piece of clothing is scanned.

[0059] Preferably, the micro spectrum analyzer can also be hung on a washing machine cabinet, and performs data transmission with the washing machine in a wired or wireless mode.

[0060] Further preferably, the micro spectrum analyzer can also be handheld equipment. And when the washing machine is connected with an APP client-side, the micro spectrum analyzer and the APP client-side perform data transmission in a wireless mode.

[0061] In terms of the washing machine capable of being connected to the internet, a communication module is further arranged on the washing machine and used for data transmission with a cloud server.

Embodiment 5

[0062] As shown in Fig. 6, the embodiment of the present disclosure provides a system. The system can identify clothing materials and automatically recommends optimal washing parameters according to the identification results. Specifically, the system comprises a clothing material identification device and a washing machine. And data interaction can be performed between the clothing material identification device and the washing machine.

[0063] The clothing material identification device can perform scanning and identification on the clothing fabric components, obtains the identification data and sends the identification data to the washing machine for analysis. The washing machine queries the clothing component information corresponding to the identification data in a first database and queries corresponding washing parameters in a second database according to the clothing component information. Then the recommended washing parameters are obtained after computation and analysis are performed, and the washing machine executes washing according to the recommended washing parameters.

[0064] The first database and the second database can be arranged in a washing machine body.

Embodiment 6

[0065] As shown in Fig. 7 and Fig. 8, the embodiment of the present disclosure provides a system. The system can identify clothing materials and automatically recommends optimal washing parameters according to identification results. Specifically, the system comprises a clothing material identification device, a washing machine and a cloud server. A communication module is arranged on the washing machine, and the washing machine can perform data interaction with the clothing material identification device and the cloud server through the communication module.

[0066] The clothing material identification device can perform scanning and identification on clothing fabric components, obtains the identification data and sends the identification data to the cloud server through the communication module on the washing machine. The cloud server queries the clothing component information corresponding to the identification data in a first database and queries corresponding washing parameters in a second database according to the clothing component information. The recommended washing parameters are obtained after computation and analysis are performed, and the recommended washing parameters are sent to the washing machine for washing.

[0067] Preferably, as shown in Fig. 7, the clothing material identification device can be arranged in the washing machine. And further preferably, as shown in Fig. 8, the clothing material identification device can also be handheld equipment, is connected with the washing machine in a wired or wireless mode and transmits data to the washing machine.

[0068] The cloud server comprises a clothing component analyzing server, and a clothing washing and care server. The first database can be arranged in the clothing component analyzing server, and the second database can be arranged in the clothing washing and care server.

Embodiment 7

[0069] As shown in Fig. 9 and Fig. 10, the embodiment of the present disclosure provides a system. The system can identify clothing materials and automatically recommends optimal washing parameters according to identification results. Specifically, the system comprises an APP client-side which is respectively connected with a clothing material identification device, a washing machine and a cloud server, and performs data interaction.

[0070] The clothing material identification device can perform scanning and identification on clothing fabric components, obtains identification data and sends the identification data to the APP client-side. The APP client-side queries the clothing component information corresponding to the identification data in a first database and queries corresponding washing parameters in a second database according to the clothing component information. The recommended washing parameters are obtained after computation and analysis are performed, and the recommended washing parameters are sent to the washing machine for washing.

[0071] Preferably, as shown in Fig. 9, the clothing material identification device can be arranged in the washing machine and performs data interaction with the APP client-side through a communication module on the washing machine. And further preferably, as shown in Fig. 10, the clothing material identification device can also be handheld equipment, is directly connected with the APP client-side in a wired or wireless mode and transmits data to the APP client-side.

[0072] The cloud server comprises a clothing component analyzing server, and a clothing washing and care server. The first database can be arranged in the APP client-side or the clothing component analyzing server, and the second database can be arranged in the APP client-side or the clothing washing and care server.

[0073] The above embodiments are merely preferable embodiments of the present disclosure rather than limiting the present disclosure in any form. Although the present disclosure has been described with reference to the aforementioned preferable embodiments, it is not intended to define the scope of the present disclosure. It should be understood by those skill in the art that modifications or substitutions may still be made on the technical solution disclosed in the aforementioned respective embodiments as equivalent embodiments with equivalent substitutions. And these modifi-

cations or substitutions do not make the nature of the corresponding technical solution depart from the spirit and scope of the technical solution of the respective embodiments of the present disclosure.

Claims

1. A clothing washing control method, comprising:

S1: a clothing material identification device scanning and identifying clothing fabric components, and obtaining identification data;
 S2: analyzing the identification data, and obtaining clothing component information corresponding to the identification data;
 S3: recommending washing parameters according to the clothing component information; and
 S4: a washing machine executing washing according to the washing parameters recommended.

2. The clothing washing control method according to claim 1, wherein step S3 comprises:

A1: determining whether or not the clothing component information of only one piece of clothing is received; if yes, selecting the washing parameters corresponding to the clothing component information, and if no, starting step A2; and
 A2: determining whether or not the clothing identified is suitable for mixed washing; if yes, selecting the washing parameters corresponding to the clothing component information with a highest washing requirement, and if no, prompting that the clothing is not suitable for mixed washing.

3. The clothing washing control method according to claim 1, wherein a corresponding relation between the identification data and the clothing component information is stored in a first database, and the first database is arranged in the washing machine and/or in a cloud; and a corresponding relation between the clothing component information and the washing parameters is stored in a second database, and the second database is arranged in the washing machine and/or in the cloud.

4. The clothing washing control method according to any one of claims from 1 to 3, wherein when the washing machine operates in an offline mode, data interaction is performed between the washing machine and the clothing material identification device in a wired or wireless mode, and steps S2 and S3 are executed by the washing machine; and when the washing machine operates in an online mode, the washing machine performs data exchange with the clothing material identification device and the cloud respectively, and steps S2 and S3 are executed by the cloud.

5. The clothing washing control method according to any one of claims from 1 to 3, wherein when the washing machine is connected with an APP client-side, the APP client-side performs data exchange with the clothing material identification device and the washing machine respectively, and steps S2 and S3 are executed by the APP client-side; or the APP client-side performs data exchange with the clothing material identification device, the washing machine and the cloud, step S2 is executed by the cloud, and step S3 is executed by the APP client-side.

6. The clothing washing control method according to claim 1, wherein the clothing material identification device is a micro spectrum analyzer.

7. The clothing washing control method according to claim 6, wherein the micro spectrum analyzer is mounted on a control panel on the washing machine; or the micro spectrum analyzer is hung on a washing machine cabinet and performs data transmission with the washing machine in the wired or wireless mode; or the micro spectrum analyzer is handheld equipment and performs data transmission with the APP client-side in the wireless mode.

8. The clothing washing control method according to claim 1, wherein the washing parameters comprise water level, washing time, the number of times of rinsing, dehydration time and rotating speed.

9. A washing machine adopting the method of any one of claims from 1 to 8, wherein the clothing material identification device is mounted on the washing machine; or the washing machine and the clothing material identification device are connected in the wired or wireless mode.

10. A system adopting the method of any one of claims from 1 to 8, comprises the washing machine connected with the clothing material identification device; or
the system comprises the washing machine connected with a cloud server and the clothing material identification device; or
5 the system comprises the APP client-side respectively connected with the washing machine, the clothing material identification device and the cloud server.

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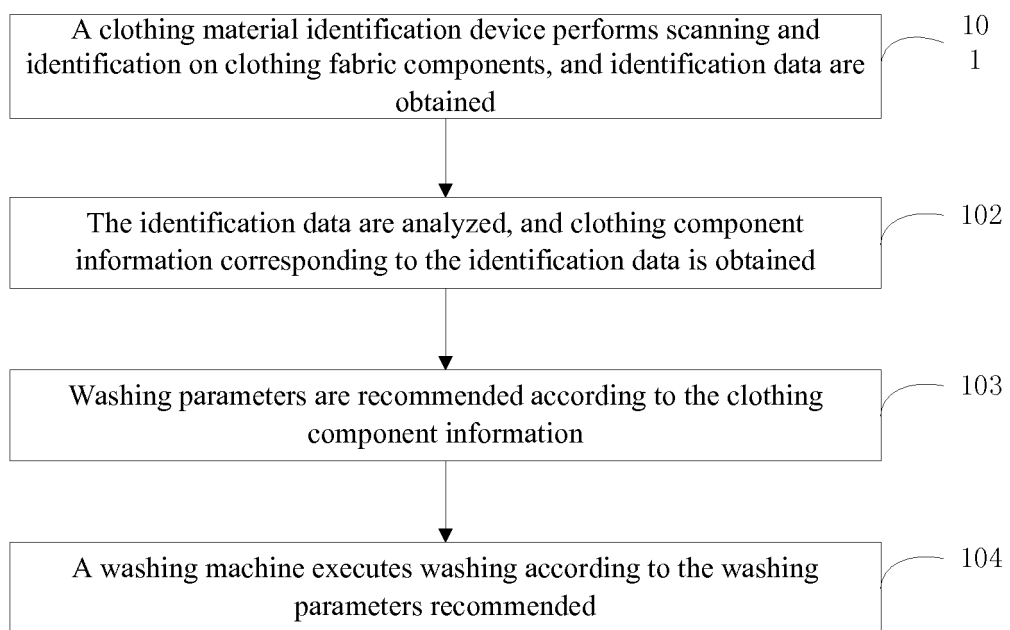


Fig. 1

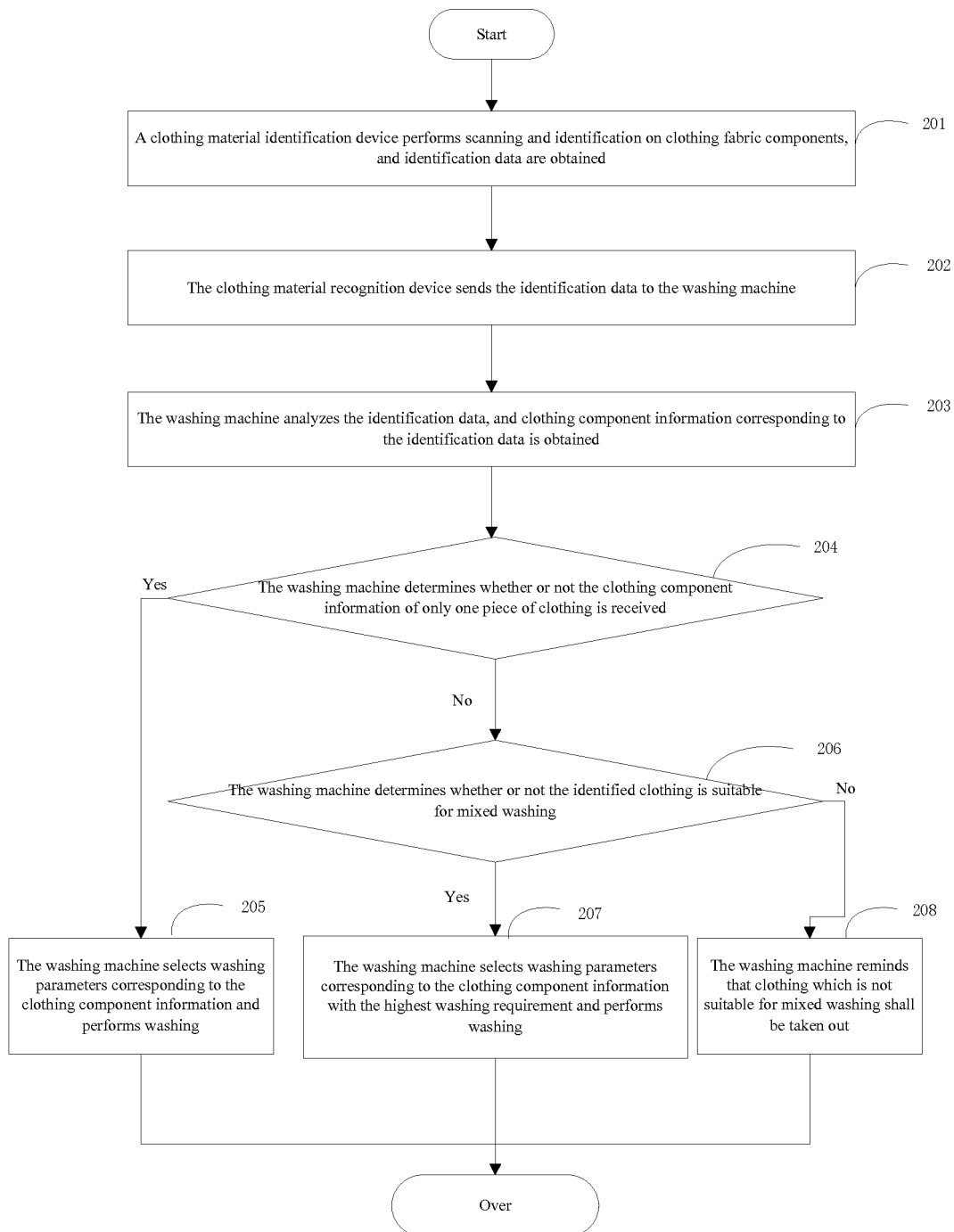


Fig. 2

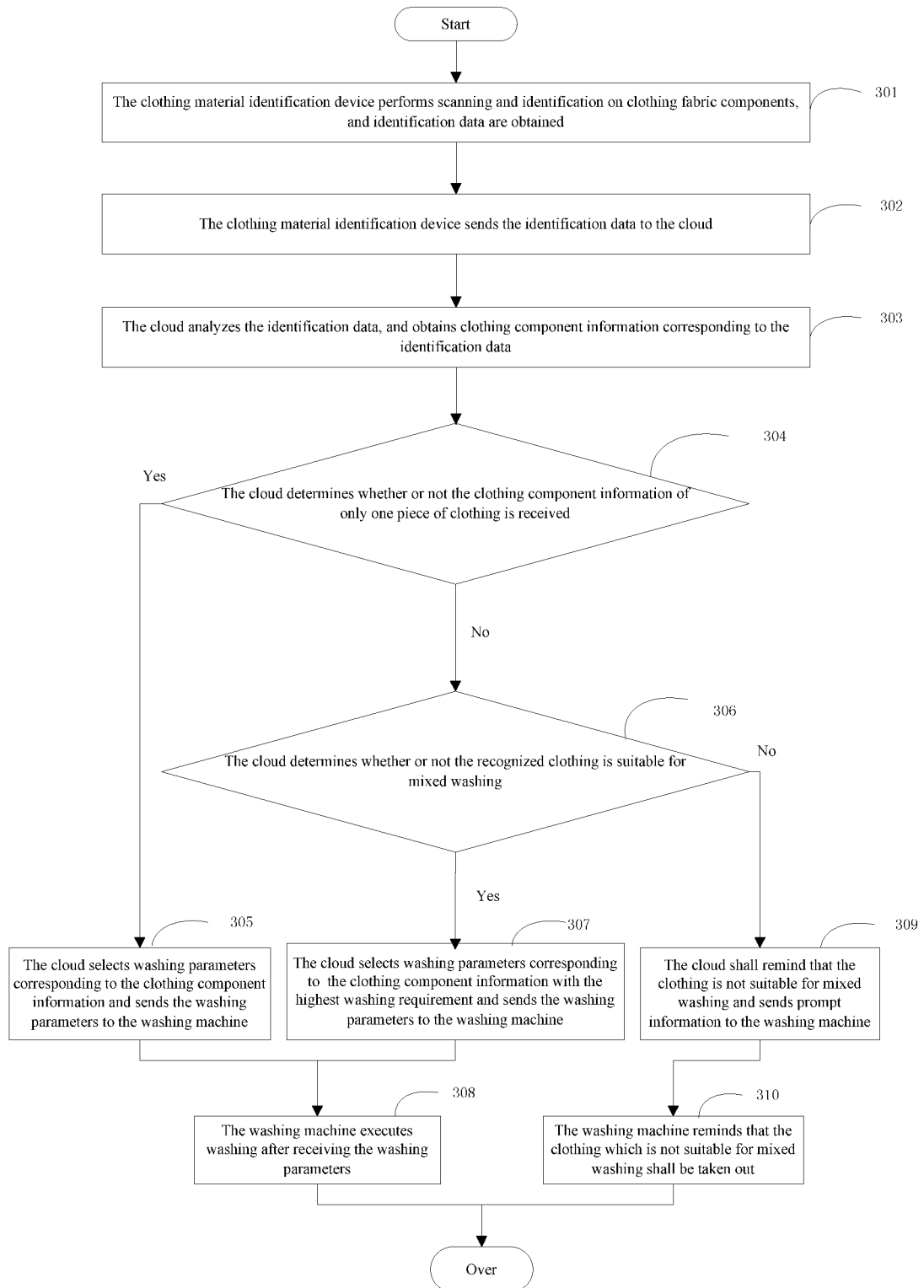


Fig. 3

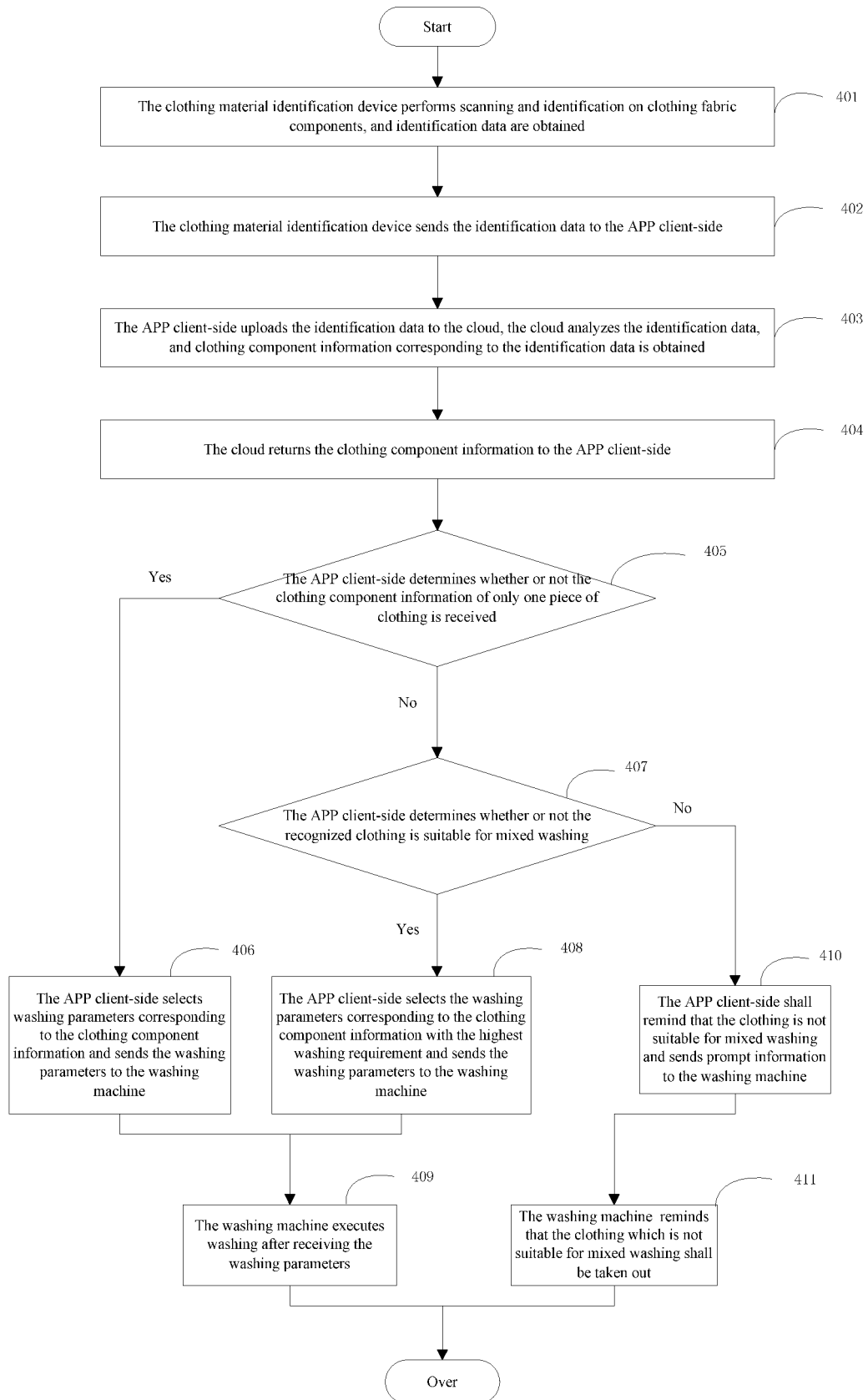


Fig. 4

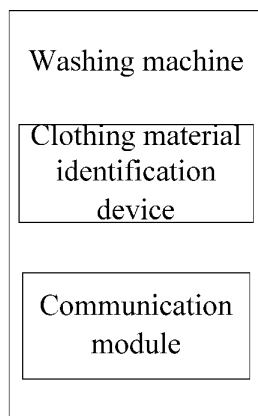


Fig. 5

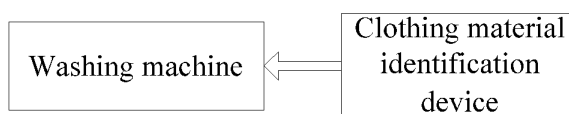


Fig. 6

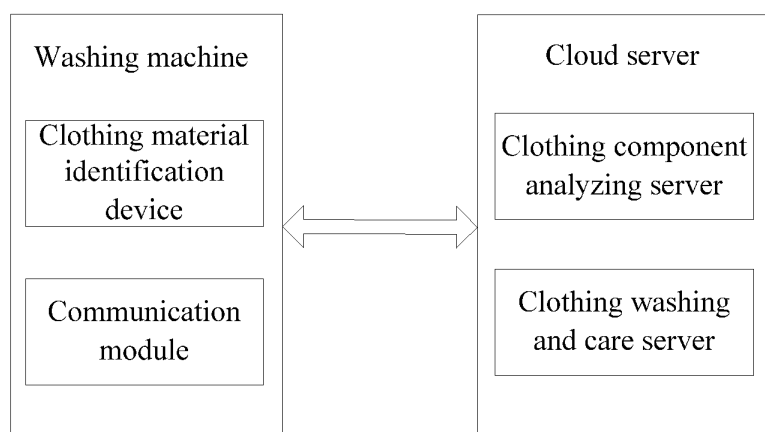


Fig. 7

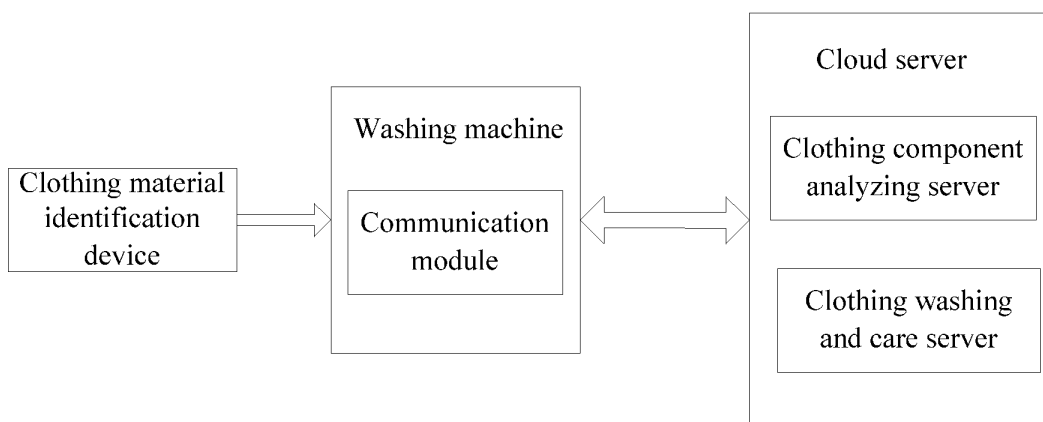


Fig. 8

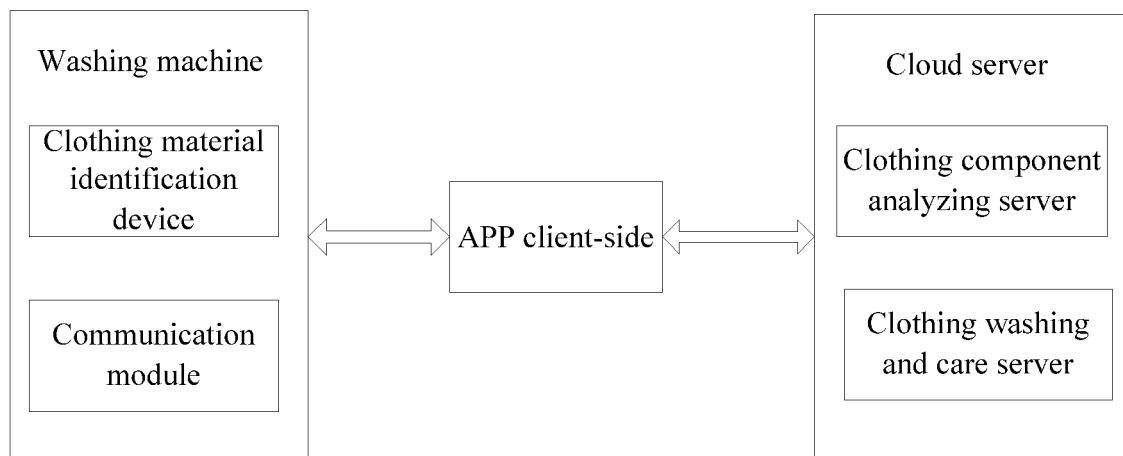


Fig. 9

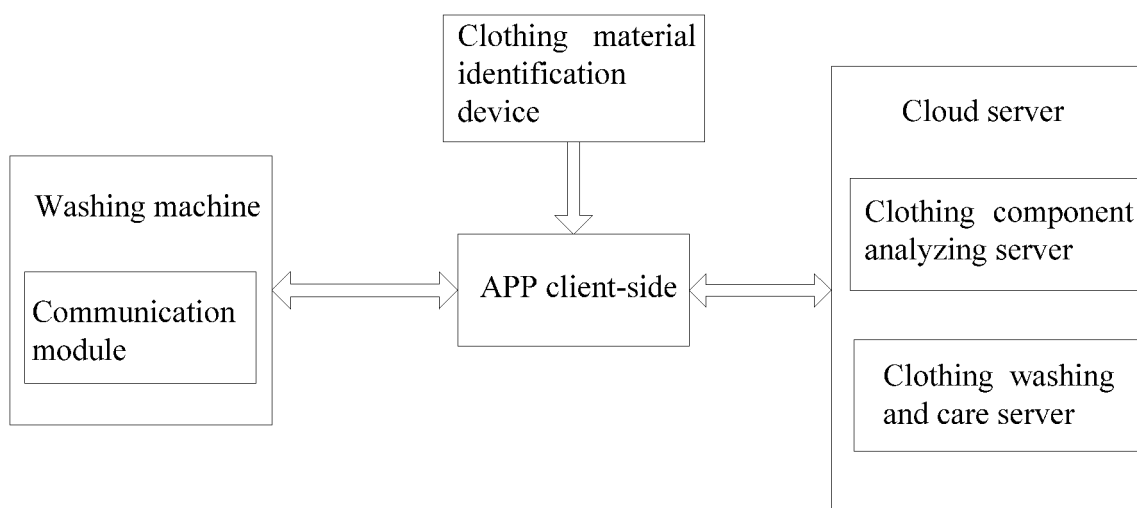


Fig. 10

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2016/111420

A. CLASSIFICATION OF SUBJECT MATTER

D06F 33/02 (2006.01) i

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

D06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CNABS, DWPI, SIPOABS: wash???, material, laundry, clothes, distinguish???, identif???, recogni???, detect???, judg+, spectrum,
distinguish, analysis, composition, type, lining, texture, classes, component, spectrum

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 102517842 A (HAIER GROUP CORP. et al.) 27 June 2012 (27.06.2012) description, paragraphs [0017]-[0045]	1-10
X	CN 102720034 A (WUXI LITTLE SWAN CO., LTD.) 10 October 2012 (10.10.2012) description, paragraphs [0004]-[0008]	1, 3-10
X	CN 202671887 U (WUXI LITTLE SWAN CO., LTD.) 16 January 2013 (16.01.2013) description, paragraphs [0006]-[0010]	1, 3-10
X	CN 204738145 U (WEIHAI TONSLOAD POWER TECHNOLOGY CO., LTD.) 04 November 2015 (04.11.2015) description, paragraphs [0006]-[0010]	1, 3-10

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

* Special categories of cited documents:

“A” document defining the general state of the art which is not considered to be of particular relevance

“E” earlier application or patent but published on or after the international filing date

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

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

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

“X” document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

“Y” document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

“&” document member of the same patent family

Date of the actual completion of the international search

17 March 2017

Date of mailing of the international search report

24 March 2017

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2016/111420

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2001054204 A1 (WHIRLPOOL CORP et al.) 27 December 2001 (27.12.2001) the whole document	1-10
A	CN 203334040 U (HARBIN NORMAL UNIVERSITY) 11 December 2013 (11.12.2013) the	1-10

Form PCT/ISA/210 (continuation of second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT
 Information on patent family members

 International application No.
 PCT/CN2016/111420

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN 102517842 A	27 June 2012	CN 102517842 B	02 March 2016
CN 102720034 A	10 October 2012	CN 102720034 B	29 January 2014
CN 202671887 U	16 January 2013	None	
CN 204738145 U	04 November 2015	None	
US 2001054204 A1	27 December 2001	EP 1167611 A3	13 August 2003
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		EP 1167611 B1	11 May 2005
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		BR 0102585 A	05 February 2002
		EP 1167611 A2	02 January 2002
CN 203334040 U	11 December 2013	None	