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(12)   **EUROPEAN PATENT APPLICATION**

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(54)   **WASHING TREATMENT DEVICE, METHOD FOR CONTROLLING ILLUMINATION IN WASHING
         TREATMENT CHAMBER, AND PROGRAM PRODUCT**

(57)   The present invention discloses a method for
controlling illumination in a washing treatment chamber
(11) of a washing treatment device (1). The method at
least comprises the following steps: on the basis of a
trigger signal, initially setting a remaining illumination
time and starting illumination in the washing treatment
chamber (11); when the remaining illumination time is
less than a remaining time threshold, judging whether it
is necessary to prolong the remaining illumination time;
and in a situation where it is necessary to prolong the
remaining illumination time, prolonging the remaining il-
lumination time. Further disclosed are the corresponding
washing treatment device (1), such as a drum washing
machine, and a corresponding computer program prod-
uct, such as a computer-readable program carrier. Ac-
cording to certain exemplary embodiments of the present
invention, illumination in the washing treatment chamber
may be controlled reliably, flexibly, and dynamically ac-
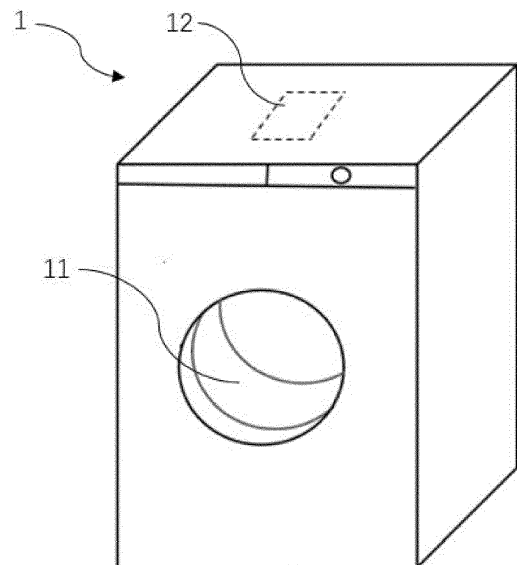cording to requirements.

Fig. 1

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Description

[0001] The present invention relates to the field of washing treatment devices, particularly drum washing machines, and in particular relates to a method for controlling illumination in a washing treatment chamber of a washing treatment device, a corresponding washing treatment device and a corresponding computer program product.

[0002] With the development of society and continuous improvement in people's living standards, washing machines, washer dryers, etc. have already entered ordinary people's homes. In particular, in recent years, drum washing machines have slowly become widespread.

[0003] In drum washing machines, since the drum is arranged approximately horizontally and at a relatively low position, the light inside is usually insufficient, and the height also makes it inconvenient for a user to observe the inside of the drum. To this end, an illuminating lamp for illuminating the inside of the drum is provided. In particular, when the user is taking out clothing from inside the drum, the illuminating lamp is turned on to make it easier for the user to take out the clothing. At present, an illumination time of the illuminating lamp is usually simply controlled by means of time, generally 300 seconds. When 300 seconds is reached, the illuminating lamp goes out, and clothing may still not have all been taken out at this time.

[0004] If the illuminating lamp is only simply controlled to constantly shine and only go out when the door is closed, in one aspect, this shows that the washing treatment device is not intelligent, and, in another aspect, it may cause a waste of resources, and wear and tear of the illuminating lamp.

[0005] To this end, in these aspects, a requirement exists for continued improvement.

[0006] In order to overcome one of the above-mentioned defects and/or other possible defects not mentioned herein, the purpose of the present invention is to provide an improved method for controlling illumination in a washing treatment chamber of a washing treatment device, a corresponding washing treatment device, particularly a drum washing machine, and a corresponding computer program product.

[0007] According to a first aspect of the present invention, a method for controlling illumination in a washing treatment chamber of a washing treatment device is provided, the method at least comprising the following steps: on the basis of a trigger signal, initially setting a remaining illumination time and starting illumination in the washing treatment chamber; when the remaining illumination time is less than a remaining time threshold, judging whether it is necessary to prolong the remaining illumination time; and in a situation where it is necessary to prolong the remaining illumination time, prolonging the remaining illumination time.

[0008] According to an optional embodiment of the present invention, the trigger signal is generated on the basis of an opening action of a door for closing the washing treatment chamber.

[0009] According to an optional embodiment of the present invention, whenever the remaining illumination time is less than a remaining time threshold, it is always judged whether it is necessary to prolong the remaining illumination time, and, in a situation where it is necessary to prolong the remaining illumination time, the remaining illumination time is prolonged.

[0010] According to an optional embodiment of the present invention, whether it is necessary to prolong the remaining illumination time is judged by means of detecting at least one parameter.

[0011] According to an optional embodiment of the present invention, whether it is necessary to prolong the remaining illumination time is judged on the basis of the probability that a user is operating and/or about to operate the washing treatment device, particularly the washing treatment chamber.

[0012] According to an optional embodiment of the present invention, whether it is necessary to prolong the remaining illumination time is comprehensively judged by means of a plurality of sensors, particularly a plurality of sensors of different types, detecting a plurality of parameters, particularly a plurality of types of parameters.

[0013] According to an optional embodiment of the present invention, the reliability of judging that it is necessary to prolong the remaining illumination time is determined on the basis of a detection result output during sensor detection, and, whether to prolong the remaining illumination time or the amount of time by which to prolong illumination is determined on the basis of the reliability.

[0014] According to an optional embodiment of the present invention, the reliability is determined at least in view of a signal characteristic, such as signal strength, output during sensor detection.

[0015] According to an optional embodiment of the present invention, the lower the reliability, the shorter the prolongation of the remaining illumination time.

[0016] According to an optional embodiment of the present invention, the plurality of sensors or the plurality of sensors of different types comprise: at least one first sensor for detecting whether a user is in an operating region of the washing treatment device; and/or at least one second sensor for detecting whether the user is operating and/or about to operate the washing treatment chamber; and/or at least one third sensor for detecting the light conditions of the environment of the washing treatment device.

[0017] According to an optional embodiment of the present invention, the at least one first sensor comprises at least one of a radar sensor, an ultrasonic sensor and an infrared sensor.

[0018] According to an optional embodiment of the present invention, the at least one second sensor comprises at least one of an acceleration sensor for detecting vibrations of the washing treatment chamber, a displacement sensor for detecting movement of the washing

treatment chamber, a back-EMF sensor for detecting back-EMF of a driving electric motor of the washing treatment chamber, an optical sensor for detecting changes in light characteristics in the washing treatment chamber, and a clothing detection sensor for detecting whether clothing is present in the washing treatment chamber.

[0019] According to an optional embodiment of the present invention, at least one of the radar sensor, the ultrasonic sensor and the infrared sensor is arranged on the front of the washing treatment device or inside the washing treatment chamber or on the door for closing the washing treatment chamber.

[0020] According to an optional embodiment of the present invention, the optical sensor is arranged inside the washing treatment chamber or on the door for closing the washing treatment chamber.

[0021] According to an optional embodiment of the present invention, when a preset illumination termination condition is satisfied, illumination in the washing treatment chamber is ended.

[0022] According to an optional embodiment of the present invention, the preset illumination termination condition comprises at least one of the following: the remaining illumination time gradually decreases to zero; the door for closing the washing treatment chamber is closed; the total prolonged time reaches a preset upper limit; and a corresponding turn-off switch is actively triggered.

[0023] According to a second aspect of the present invention, a washing treatment device, such as a drum washing machine, is provided, wherein the washing treatment device comprises a controller, and the controller is configured to be capable of at least assisting in executing the method according to any one of the above-mentioned embodiments.

[0024] According to a third aspect of the present invention, a computer program product, such as a computer-readable program carrier, is provided, the computer program product comprising or storing a computer program instruction, wherein when the computer program instruction is executed by one or more processors, the processor can at least assist in executing the method according to any one of the above-mentioned embodiments.

[0025] According to certain embodiments of the present invention, illumination in the washing treatment chamber may be controlled reliably, flexibly, and dynamically according to requirements.

[0026] Below, the present invention is described in further detail with reference to the drawings, and the principles, characteristics and advantages of the present invention can be better understood. The drawings comprise:

Fig. 1 schematically shows a three-dimensional drawing of the washing treatment device taking a drum washing machine as an example.
Fig. 2 shows a flowchart of the method for controlling illumination in the washing treatment chamber of the

washing treatment device according to an exemplary embodiment of the present invention.
Fig. 3 shows a flowchart of the method according to a more specific exemplary embodiment of the present invention.

[0027] In order for the technical problem to be solved by the present invention, the technical solutions and the beneficial technical effects to be more clearly understood, the present invention is described in more detail below in view of the drawings and a plurality of exemplary embodiments. It should be understood that the particular embodiments described here are merely for understanding the present invention, and do not limit the scope of protection of the present invention.

[0028] Firstly, in order to facilitate understanding, the descriptions made in the background art section of the present invention may be recalled or recollected. In order to be capable of dynamically adjusting the illumination time of the illuminating lamp and better adapt to actual situations, the present invention provides a method for controlling illumination in a washing treatment chamber of a washing treatment device. Before starting with providing descriptions, it must be pointed out that, for convenience, orientational terms or directional terms may be used herein to provide descriptions; the orientational terms or directional terms are relative to the conventional usage state of the washing treatment device, and those skilled in the art can clarify this point from the descriptions of the present invention, with no confusion caused. In this type of situation, the orientational terms and directional terms should not be simply read as orientations or directions in any state.

[0029] Fig. 1 schematically shows a three-dimensional drawing of the washing treatment device taking a drum washing machine as an example, the washing treatment device 1 comprising the washing treatment chamber 11, such as a drum. For simplicity, Fig. 1 does not show the door used for closing the washing treatment chamber 11.

[0030] Fig. 2 shows a flowchart of the method for controlling illumination in the washing treatment chamber 11 of the washing treatment device 1 according to an exemplary embodiment of the present invention.

[0031] As shown in Fig. 2, the method at least comprises the following steps: S1) on the basis of a trigger signal, initially setting a remaining illumination time and starting illumination in the washing treatment chamber 11; S2) when the remaining illumination time is less than a remaining time threshold, judging whether it is necessary to prolong the remaining illumination time; and S3) in a situation where it is necessary to prolong the remaining illumination time, prolonging the remaining illumination time. In this way, the illumination time in the washing treatment chamber 11 may be dynamically adjusted, so as to satisfy actual requirements. Moreover, by using the means of initially setting the remaining illumination time (counting down), unnecessary waste and wear and tear of the illuminating lamp itself, brought about by inessen-

tial constant illumination in the washing treatment chamber 11, are also avoided. In other words, the washing treatment device of the present invention may "considerately" prolong the illumination time when required by a user, and finally end illumination when not required.

[0032] Those skilled in the art can understand that the initial setting of the remaining illumination time is performed in a corresponding controller, for example, the initial setting may be achieved by means of a timer. Once a trigger signal is provided, the timer resets to the initial value and starts counting down. In particular, the initial value of the remaining illumination time may be fixed, for example at 300 seconds.

[0033] Above, the basic concept of the present invention is described. In order to more clearly or comprehensively illustrate the present invention, Fig. 3 shows a flowchart of the method according to a more specific exemplary embodiment of the present invention.

[0034] As shown in Fig. 3, at step S0, serving as the start, the door is opened and the trigger signal is generated, for example. Generally, it is only necessary to cause the illumination lamp to turn on when the door is opened from a closed state. In particular, the trigger signal may be generated by means of providing a sensor to detect the opening action of the door. Of course, it can be understood that, according to requirements, the generation of the trigger signal is not limited to this.

[0035] At step S1-1, on the basis of the trigger signal, the remaining illumination time T is initially set, and, at step S1-2, the illuminating lamp is turned on and the countdown of the remaining illumination time T is started. Those skilled in the art can understand that, although steps S 1-1 and S1-2 are independently shown in Fig. 3, they can occur simultaneously in actuality; this may also be true for the other steps, and unnecessary details are not given below.

[0036] Next, at step S2-1, whether the remaining illumination time is less than or equal to a remaining time threshold T0, for example 10 seconds, may be judged. If the remaining illumination time is still greater than the remaining time threshold T0, then step S1-2 is returned to, and the illuminating lamp still remains on and the countdown is continued. Otherwise, step S2-2 is advanced to, so as to start a process of judging whether it is necessary to prolong the remaining illumination time. Specifically, according to an exemplary embodiment of the present invention, whether it is necessary to prolong the remaining illumination time is judged by means of detecting at least one parameter, the parameter detection is automatically performed by the controller, and the judgement is also automatically performed by the controller. In particular, the parameter detection is mainly used for judging whether a user is operating and/or about to operate the washing treatment device 1. In other words, according to an exemplary embodiment of the present invention, whether it is necessary to prolong the remaining illumination time is judged on the basis of the probability that a user is operating and/or about to operate

the washing treatment device 1, particularly the washing treatment chamber 11.

[0037] In order to increase the reliability and accuracy of the judgment, as shown in Fig. 3, according to an exemplary embodiment of the present invention, at steps S2-3 - S2-9, a plurality of detections are respectively performed.

[0038] For example, at step S2-3, whether a user is in the operating region of the washing treatment device 1 is detected by means of the radar sensor. If the user is in front of the washing treatment device 1 (that is, in the operating region), the user will often move, and this movement action may be detected by the radar sensor. The specific boundaries of the operating region may be preset; for example, the detection capability of the radar sensor itself may be taken into consideration during setting.

[0039] For example, at step S2-4, whether the user is in the operating region of the washing treatment device 1 is detected by means of the ultrasonic sensor.

[0040] For example, at step S2-5, whether the user is in the operating region of the washing treatment device 1 is detected by means of the infrared sensor.

[0041] Those skilled in the art can understand that the three steps S2-3, S2-4 and S2-5 mentioned above are all for detecting whether a user is in front of the washing treatment device 1. If the user is not in front of the washing treatment device 1, this indicates with high probability that the user might not operate the washing treatment device 1. For example, clothing in the drum has already been taken out, and the user has left the washing treatment device 1.

[0042] For example, at step S2-6, whether the washing treatment chamber 11 is being operated by the user is judged by means of the acceleration sensor for detecting vibrations of the washing treatment chamber 11. When the user operates the washing treatment chamber 11, for example when taking clothing from inside the washing treatment chamber 11, vibrations of the washing treatment chamber 11 will necessarily be brought about.

[0043] For example, at step S2-7, whether the washing treatment chamber 11 is being operated by the user is judged by means of the displacement sensor for detecting movement (rotation) of the washing treatment chamber 11. It can be understood that, when operating the washing treatment chamber 11, the user will also often drive the washing treatment chamber 11 to move.

[0044] For example, at step S2-8, whether the washing treatment chamber 11 is being operated by the user is judged by means of the back-EMF sensor for detecting back-EMF of a driving electric motor of the washing treatment chamber 11. Due to the principles of rotating electric motors, when a rotating electric motor is in a powered-off stopped state, if the operation of the user causes the washing treatment chamber 11 to drive the rotating electric motor to rotate, back-EMF will be generated, and this back-EMF may be detected by means of the corresponding sensor.

[0045] For example, at step S2-9, whether the washing treatment chamber 11 is being operated or about to be operated by the user is judged by means of the optical sensor for detecting changes in light characteristics in the washing treatment chamber 11. It can be understood that when the user operates the washing treatment chamber 11, the arms, hands and other parts of the body or the retrieved clothing will at least temporarily affect, for example block, the light of the illuminating lamp, thereby causing light characteristics in the washing treatment chamber 11 to change.

[0046] It can be seen that steps S2-6, S2-7, S2-8 and S2-9 use different sensors to judge, from multiple perspectives, whether the washing treatment chamber 11 is being operated by the user or about to be operated by the user. Of course, the present invention is not limited to this. For example, whether the user is about to operate the washing treatment chamber 11 may also be judged by means of the clothing detection sensor for detecting whether clothing is present in the washing treatment chamber 11. When clothing remains, the user will with high probability operate the washing treatment chamber 11 again. The clothing detection sensor, for example, may be a weight sensor, an optical sensor, etc.

[0047] In addition, those skilled in the art can understand that detecting the light conditions of the environment of the washing treatment device 1 may further be used to assist in judging whether it is necessary to prolong illumination of the illuminating lamp, and can even help in judging whether it is necessary to turn on the illuminating lamp. For example, in principle, if the environment of the washing treatment device 1 is very bright, the illuminating lamp may not even be turned on, or illumination of the illuminating lamp may not be prolonged. This further improves the intelligence of the washing treatment device.

[0048] Above, how to judge whether it is necessary to prolong illumination of the illuminating lamp is explained by citing a plurality of examples, but the present invention is clearly not limited to this and can further use any other appropriate means. However, it is beneficial that the washing treatment device 1 is itself generally already fitted with the types of sensors mentioned above, and therefore it is not necessary to pay additional costs.

[0049] In theory, although whether it is necessary to prolong illumination of the illuminating lamp may be judged by individually relying on one sensor or one type of sensor, this is perhaps not reliable. For example, when the radar sensor detects that a user is in the operating region of the washing treatment device 1, this does not imply that the user is definitely about to operate the washing treatment device 1, particularly the washing treatment chamber 11 thereof; perhaps the user just happens to be passing in front of the washing treatment device 1.

[0050] Therefore, according to an exemplary embodiment of the present invention, whether it is necessary to prolong the remaining illumination time is comprehensively judged by means of a plurality of sensors, and/or a plurality of sensors of different types, detecting a plurality of parameters and/or a plurality of types of parameters. In other words, when it is judged whether it is necessary to prolong the remaining illumination time, detection results of a plurality of sensors, particularly a plurality of sensors of different types, are simultaneously taken into consideration, which may greatly increase the reliability of the judgment.

[0051] To this end, as shown in Fig. 3, at step S2-10, the detection results of the plurality of sensors and/or the plurality of types of sensors are comprehensively analyzed, that is fusion-processed. After step S2-10, step S2-11 is advanced to, and whether it is necessary to prolong the remaining illumination time is judged according to a fusion result. If so, then step S3 is advanced to, and the remaining illumination time is prolonged. If not, then step S1-2 is returned to, and the illuminating lamp continues to stay on for the current remaining time, and then the next cycle is entered. To this end, according to an exemplary embodiment of the present invention, even if the remaining illumination time is not prolonged, whether it is necessary to prolong the remaining illumination time may still be cyclically detected in the remaining time, so that the remaining illumination time is prolonged in a timely manner when necessary. In other words, in the final remaining time, for example in the final 10 seconds, detections can be performed cyclically multiple times to judge whether it is necessary to prolong the remaining illumination time.

[0052] If the remaining illumination time is prolonged, when the remaining illumination time is again less than or equal to the remaining time threshold T0, detection may again be performed to judge whether it is necessary to prolong the remaining illumination time. To this end, according to an exemplary embodiment of the present invention, whenever the remaining illumination time is less than the remaining time threshold, it is always judged whether it is necessary to prolong the remaining illumination time, and, in a situation where it is necessary to prolong the remaining illumination time, the remaining illumination time is prolonged.

[0053] The above describes comprehensively analyzing detection results of a plurality and/or plurality of types of sensors to increase the reliability of the judgment. When it is judged necessary to prolong the remaining illumination time, the remaining illumination time is prolonged by a preset duration. However, the duration of each prolongation may also be related to the reliability of the judgment that it is necessary to prolong the remaining illumination time, that is, a higher reliability indicates a higher probability that it is indeed necessary to prolong the remaining illumination time, and, in this type of situation, the prolongation may be longer; and a lower reliability indicates a possible misjudgment and a comparatively shorter prolongation may be granted. To this end, according to an exemplary embodiment of the present invention, the duration of the prolongation is determined on the basis of the reliability of the judgment that it is

necessary to prolong the remaining illumination time.

[0054] The judgment reliability is related to the detection results of the plurality of sensors and is also related to characteristics of signals output by the sensors. For example, when a stronger detection signal is output by the infrared sensor, the probability of misjudgment is lower, and this indicates that a user is closer to the washing treatment device 1; therefore, the signal characteristics output by the sensors not only reflect "presence or absence" but also reflect the reliability of "presence or absence". To this end, according to an exemplary embodiment of the present invention, the reliability of the judgment that it is necessary to prolong the remaining illumination time is determined at least in view of a signal characteristic, such as signal strength, output during sensor detection, and whether to prolong the remaining illumination time or the amount of time by which to prolong illumination is determined on the basis of the reliability. As described above, the lower the reliability, the shorter the prolongation of the remaining illumination time. The reliability may be represented by a confidence level.

[0055] Those skilled in the art can understand that a model for judging whether it is necessary to prolong the remaining illumination time may be established, wherein input parameters of the model are output parameters of the sensors, and, on the basis of the output parameters of the sensors, the model may output a judgment result of whether it is necessary to prolong the remaining illumination time and/or the amount of time by which to prolong illumination.

[0056] The above discusses how detection may be performed by means of some sensors to judge the probability that a user is operating or about to operate the washing treatment device 1. In order to increase the accuracy of detection, the positions in which the sensors are arranged also need to be considered.

[0057] For example, according to an exemplary embodiment of the present invention, at least one of the radar sensor, the ultrasonic sensor and the infrared sensor may be arranged on the front of the washing treatment device 1 or in the washing treatment chamber 11 or on the door. In addition, the optical sensor may be arranged in the washing treatment chamber 11 or on the door.

[0058] Although it may be necessary to prolong the illumination of the illuminating lamp, it is also necessary to ensure that the illuminating lamp is turned off at an appropriate time. To this end, according to an exemplary embodiment of the present invention, when a preset illumination termination condition is satisfied, illumination in the washing treatment chamber 11 is ended.

[0059] According to an exemplary embodiment of the present invention, the preset illumination termination condition comprises at least one of the following: the remaining illumination time gradually decreases to zero; the door is closed; the total prolonged time reaches a preset upper limit; and a corresponding turn-off switch is actively triggered. For example, a turn-off switch may be provided, so that a user may actively turn off the illumi-

nation of the illuminating lamp according to the situation.

[0060] Below, returning to Fig. 1, the washing treatment device 1 may further comprise a controller 12, wherein the controller 12 is configured to be capable of at least assisting in executing the method of any one of the above-mentioned embodiments.

[0061] The present invention further relates to a computer program product, such as a computer-readable program carrier, which comprises or stores a computer program instruction, wherein when the computer program instruction is executed by one or more processors, the processor can at least assist in executing the method of any one of the above-mentioned embodiments.

[0062] Although the preceding text already describes particular implementation solutions, these implementation solutions do not limit the scope of the disclosure of the present invention, and this remains so even in a situation where a single implementation solution is merely described with respect to a specific feature. The features provided in the disclosure of the present invention are cited as examples for the purpose of explanation with examples, and are not limiting, unless clearly stated otherwise. In the particular embodiments, in technically feasible situations, a plurality of features may be combined with each other according to actual requirements. On the condition that the spirit and scope of the present invention are not departed from, various replacements, modifications and changes may also be conceived of.

Claims

1. A method for controlling illumination in a washing treatment chamber (11) of a washing treatment device (1), the method at least comprising the following steps:

   on the basis of a trigger signal, initially setting a remaining illumination time and starting illumination in the washing treatment chamber (11);
   when the remaining illumination time is less than a remaining time threshold, judging whether it is necessary to prolong the remaining illumination time; and
   in a situation where it is necessary to prolong the remaining illumination time, prolonging the remaining illumination time.

2. The method as claimed in claim 1, wherein:

   the trigger signal is generated on the basis of an opening action of a door used for closing the washing treatment chamber (11); and/or
   whenever the remaining illumination time is less than a remaining time threshold, it is always judged whether it is necessary to prolong the remaining illumination time, and, in a situation where it is necessary to prolong the remaining

illumination time, the remaining illumination time is prolonged.

3. The method as claimed in claim 1 or 2, wherein: whether it is necessary to prolong the remaining illumination time is judged by means of detecting at least one parameter.

4. The method as claimed in claim 1 or 2, wherein: whether it is necessary to prolong the remaining illumination time is judged on the basis of a probability that a user is operating and/or about to operate the washing treatment device (1), particularly the washing treatment chamber (11).

5. The method as claimed in claim 1 or 2, wherein: whether it is necessary to prolong the remaining illumination time is comprehensively judged by means of a plurality of sensors, particularly a plurality of sensors of different types, detecting a plurality of parameters, particularly a plurality of types of parameters.

6. The method as claimed in any one of the preceding claims, wherein: the reliability of judging that it is necessary to prolong the remaining illumination time is determined on the basis of a detection result output during sensor detection, and whether to prolong the remaining illumination time or the amount of time by which to prolong illumination is determined on the basis of the reliability.

7. The method as claimed in claim 6, wherein: the reliability is determined at least in view of a signal characteristic, such as signal strength, output during sensor detection.

8. The method as claimed in claim 6 or 7, wherein: the lower the reliability, the shorter the prolongation of the remaining illumination time.

9. The method as claimed in any one of claims 5-8, wherein: the plurality of sensors or the plurality of sensors of different types comprise:

   at least one first sensor for detecting whether a user is in an operating region of the washing treatment device (1); and/or
   at least one second sensor for detecting whether the user is operating and/or about to operate the washing treatment chamber (11); and/or
   at least one third sensor for detecting the light conditions of the environment of the washing treatment device (1).

10. The method as claimed in claim 9, wherein:

the at least one first sensor comprises at least one of a radar sensor, an ultrasonic sensor and an infrared sensor; and/or
the at least one second sensor comprises at least one of an acceleration sensor for detecting vibrations of the washing treatment chamber (11), a displacement sensor for detecting movement of the washing treatment chamber (11), a back-EMF sensor for detecting back-EMF of a driving electric motor of the washing treatment chamber (11), an optical sensor for detecting changes in light characteristics in the washing treatment chamber (11), and a clothing detection sensor for detecting whether clothing is present in the washing treatment chamber (11).

11. The method as claimed in claim 10, wherein:

   at least one of the radar sensor, the ultrasonic sensor and the infrared sensor is arranged on the front of the washing treatment device (1) or inside the washing treatment chamber (11) or on the door for closing the washing treatment chamber (11); and/or
   the optical sensor is arranged inside the washing treatment chamber (11) or on the door for closing the washing treatment chamber (11).

12. The method as claimed in any one of claims 1-11, wherein:
when a preset illumination termination condition is satisfied, illumination in the washing treatment chamber (11) is ended.

13. The method as claimed in claim 12, wherein the preset illumination termination condition comprises at least one of the following:

   the remaining illumination time gradually decreases to zero;
   the door for closing the washing treatment chamber (11) is closed;
   the total prolonged time reaches a preset upper limit; and
   a corresponding turn-off switch is actively triggered.

14. A washing treatment device (1), such as a drum washing machine, wherein the washing treatment device (1) comprises a controller (12), and the controller (12) is configured to be capable of at least assisting in executing the method as claimed in any one of claims 1-13.

15. A computer program product, such as a computer-readable program carrier, which comprises or stores a computer program instruction, and, when the computer program instruction is executed by one or more

processors, the processor can at least assist in executing the method as claimed in any one of claims 1-13.
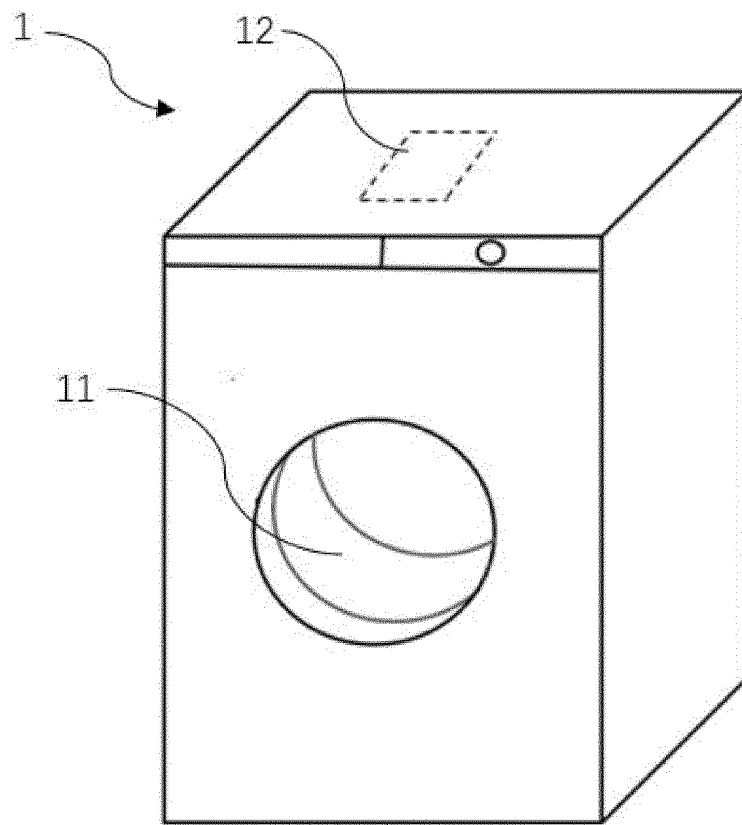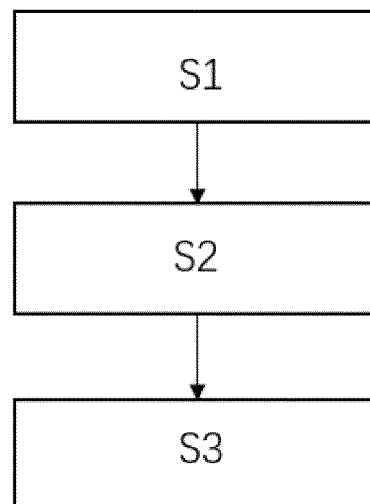
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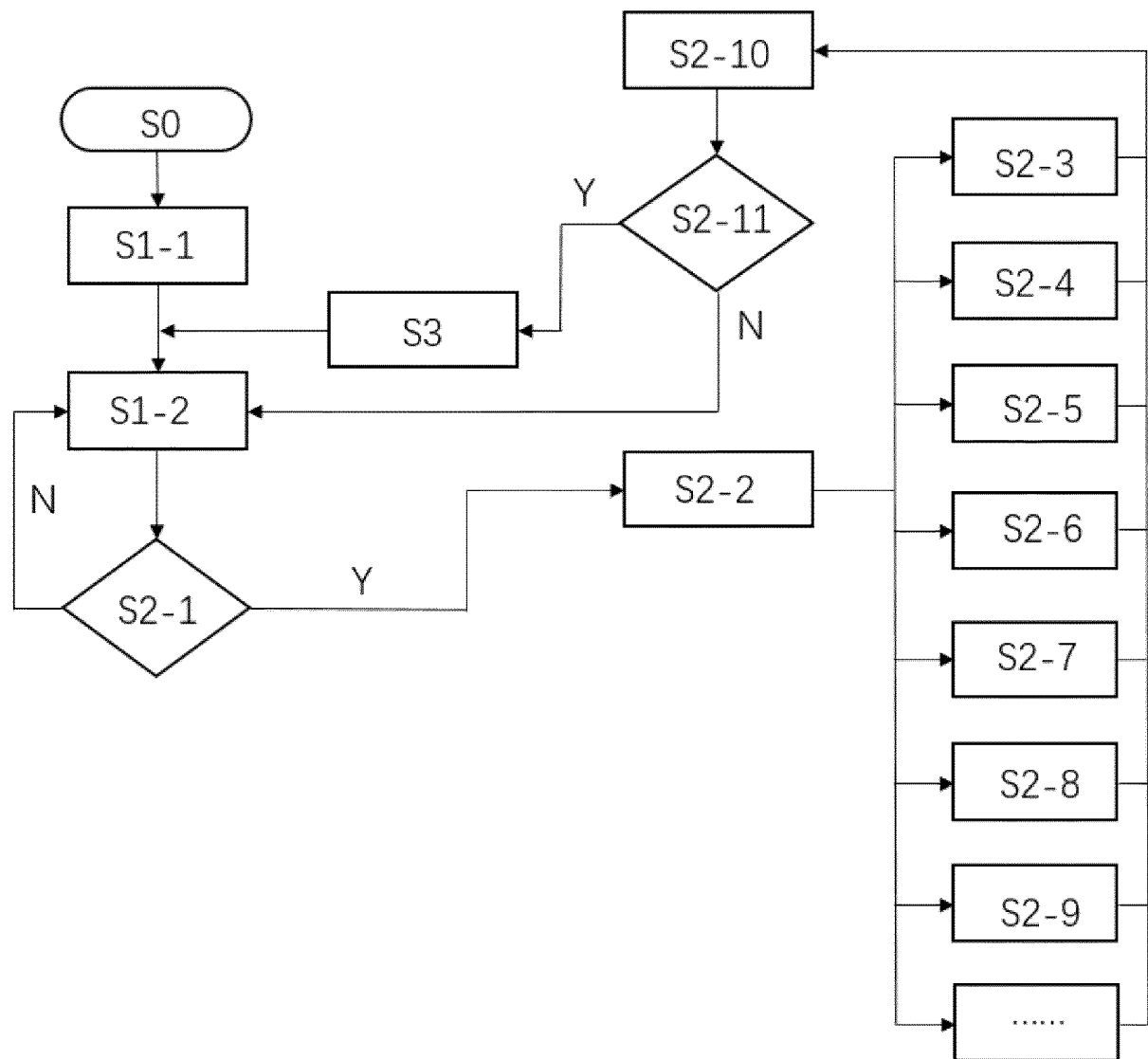
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Fig. 1

Fig. 2

Fig. 3

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EUROPEAN SEARCH REPORT

Application Number

EP 23 18 8489

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	WO 2007/021082 A2 (LG ELECTRONICS INC [KR]; CHO HAN KI [KR] ET AL.) 22 February 2007 (2007-02-22) * paragraph [0033] – paragraph [0035]; figures * * paragraph [0072] – paragraph [0187] *	1-15	INV. D06F33/30
A	WO 2021/125430 A1 (LG ELECTRONICS INC [KR]) 24 June 2021 (2021-06-24) * paragraph [0123] – paragraph [0404]; figures *	1-15	
A	US 9 702 619 B2 (WHIRLPOOL CO [US]) 11 July 2017 (2017-07-11) * column 6, line 26 – column 27, line 22; figures *	1-15	
A	CN 112 522 905 B (GREE ELECTRIC APPLIANCES INC ZHUHAI) 26 November 2021 (2021-11-26) * paragraph [0041] – paragraph [0084]; figures *	1-15	

TECHNICAL FIELDS SEARCHED (IPC)

D06F
F21V

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	7 November 2023	Sangiorgi, Massimo

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
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E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons
....
& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

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ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.

EP 23 18 8489

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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