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(54) **CLOTHING TREATMENT METHOD AND DEVICE, OPERATION CONTROL APPARATUS, AND STORAGE MEDIUM**

(57) A clothing treatment method and device, an operation control apparatus (10), and a storage medium. The clothing treatment method comprises: providing clothing within a drum (60) of a clothing treatment device with steam to remove wrinkles and odors from the clothing; providing the inside of the drum (60) with cold air for a first preset duration to reduce system temperature; and providing the clothing within the drum (60) with hot air to dry the clothing.

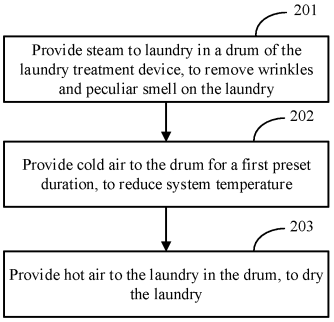

FIG. 2

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Description

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority to Chinese Patent application No. 202110633036.3 filed at China National Intellectual Property Administration (CNIPA) on June 7, 2021 and entitled "LAUNDRY TREATMENT METHOD AND APPARATUS, LAUNDRY TREATMENT DEVICE, AND STORAGE MEDIUM", the contents of which are hereby incorporated by reference in its entirety.

TECHNICAL FIELD

[0002] The application relates to the technical field of smart homes, and in particular to a laundry treatment method and apparatus, a laundry treatment device, and a storage medium.

BACKGROUND

[0003] With the gradual improvement of living standards, people have higher and higher requirements for laundry treatment. Nowadays, a clothes dryer or a washer-dryer with a drying function are present on the market today, laundries are treated by the clothes dryer or the washer-dryer after they are washed, so that trouble of hanging out is avoided, and hanging-out space of a balcony is released.

[0004] However, the laundry may inevitably generate wrinkles during washing, and the wrinkles on the laundry cannot be completely eliminated in a process of drying the laundry. Furthermore, since people are exposed in an external environment for a long time, the laundry may be mingled with peculiar smell and static electricity.

SUMMARY

[0005] In view of the above deficiencies in the related art, a purpose of the application is to provide a laundry treatment method and apparatus, a laundry treatment device and a storage medium, and the purpose is implemented by the following technical solutions.

[0006] A first aspect of the application provides a laundry treatment method, the laundry treatment method is applied to a laundry treatment device and comprises the following operations.

[0007] Steam is provided to laundry in a drum of the laundry treatment device, to remove a wrinkle and a peculiar smell on the laundry.

[0008] Cold air is provided to the drum for a first preset duration, to reduce system temperature.

[0009] Hot air is provided to the laundry in the drum, to dry the laundry.

[0010] In some embodiments of the application, the method may further comprise the following operations after providing hot air to the laundry in the drum.

[0011] Cold air is provided to the drum for a second preset duration, to reduce temperature of the laundry.

[0012] The first preset duration is greater than the second preset duration.

[0013] In some embodiments of the application, the method may further comprise the following operations after providing cold air to the drum for the first preset duration.

[0014] The laundry in the drum is blown with an alternate circulation of cold air and hot air, to remove an attachment and a peculiar smell molecule on the laundry, and smooth the wrinkles on the laundry.

[0015] In some embodiments of the application, the method may further comprise the following operations before providing steam to the laundry in the drum of the laundry treatment device.

[0016] A material type of the laundry in the drum is obtained, and a steam duration and a first heating duration are determined according to the material type.

[0017] The steam duration is a duration for continuously providing steam to the laundry in the drum, and the first heating duration is a duration for providing hot air to the laundry in the drum.

[0018] In some embodiments of the application, the method may further comprise the following operations before providing steam to the laundry in the drum of the laundry treatment device.

[0019] It is determined whether the drum needs to be preheated according to the material type, and a second heating duration corresponding to the material type is obtained.

[0020] The second heating duration is a duration for supplying hot air into the drum, to preheat the drum.

[0021] In some embodiments of the application, the operation of determining whether the laundry needs to be heated according to the material type may comprise the following operations.

[0022] It is determined that the laundry needs to be heated according to the material type belonging to a large fiber hole type.

[0023] It is determined that the laundry does not need to be heated according to the material type belonging to a small fiber hole type.

[0024] In some embodiments of the application, the method may further comprise the following operations.

[0025] In a treatment process of the laundry in the drum, the drum is controlled to rotate in a forward direction and a reverse direction alternately, so that the laundry is in a shaken and loose state.

[0026] A second aspect of the application provides an operation control apparatus, the apparatus comprises a memory, a processor, and a computer program stored on the memory and executable on the processor. The processor implements operations of the method of the above first aspect when the processor executes the computer program.

[0027] A third aspect of the application provides a laundry treatment device, the laundry treatment device comprises the operation control apparatus of the above second aspect, a steam generation structure, an air blowing structure, and a heating structure.

[0028] The steam generation structure is electrically connected to the operation control apparatus, and generates steam and convey the steam into the drum.

[0029] The air blowing structure is electrically connected to the operation control apparatus, and provides cold air to the drum.

[0030] The heating structure is electrically connected to the operation control apparatus and the air blowing structure respectively, and heats air sucked by the air blowing structure to provide hot air to the drum.

[0031] A fourth aspect of the application provides a computer-readable storage medium, having stored thereon a computer program, the program implements operations of the method of the above first aspect when the program is executed by a processor.

[0032] Based on the above laundry treatment method and apparatus, the laundry treatment device and the storage medium, the technical solutions of the application have the following advantageous effects or benefits.

[0033] Wrinkles and peculiar smell on the laundry in the drum are removed by introducing steam into the laundry, temperature of the drum is increased at this time, so that the system temperature of the laundry treatment device is also high, noise is large when other structures in the device are started and operate; according to the application, the system temperature is reduced by further introducing cold air into the drum for a period of time, so that starting and operation noise of other structures is reduced, and finally, hot air is introduced into the laundry in the drum, to achieve a purpose of drying the laundry.

BRIEF DESCRIPTION OF THE DRAWINGS

[0034] Various other advantages and benefits will become apparent to those of ordinary skill in the art upon reading detailed descriptions of preferred embodiments below. The drawings are only intended to illustrate the preferred embodiments and are not considered as limitation to the application. Furthermore, like reference numbers are used to refer to like components throughout the drawings. In the drawings:

FIG. 1 is a schematic structural diagram of a laundry treatment device shown according to the application;
FIG. 2 is a schematic flowchart of an embodiment of a laundry treatment method shown according to an exemplary embodiment of the application;
FIG. 3 is a schematic flowchart of an embodiment of another laundry treatment method shown according to an exemplary embodiment of the application;
FIG. 4 is a schematic flowchart of an embodiment of yet another laundry treatment method shown according to an exemplary embodiment of the application;
FIG. 5 is a specific schematic flowchart of a laundry treatment method shown according to an exemplary embodiment of the application;
FIG. 6 is a schematic structural diagram of an operation control apparatus shown according to an exemplary embodiment of the application; and
FIG. 7 is a schematic structural diagram of a storage medium shown according to an exemplary embodiment of the application.

[0035] Implementation, functional characteristics and advantages of the purpose of the application will be further described in combination with embodiments with reference to the drawings.

DETAILED DESCRIPTION

[0036] The technical solutions in the embodiments of the application will be clearly and completely described below with reference to the drawings in the embodiments of the application. It is apparent that the described embodiments are only part of the embodiments of the application, rather than all of the embodiments. Based on the embodiments of the

application, all other embodiments obtained by those of ordinary skill in the art without paying any creative work fall within the scope of protection of the application.

[0037] It should be noted that all directional indications (such as up, down, left, right, front, back....) in the embodiments of the application are only intended to explain relative positional relationships, movement conditions or the like between components at a certain specific posture (as shown in the drawings), and when the specific posture changes, the directional indication also changes correspondingly.

[0038] Furthermore, descriptions related to such as "first", "second" or the like in the application are only for the purpose of descriptions, and cannot be understood as indicating or implying their relative importance, or implicitly indicating a number of indicated technical features. Therefore, features defined with "first" and "second" may explicitly or implicitly comprise at least one of the features. In descriptions of the application, "multiple" means at least two, such as two, three, or the like, unless clearly and specifically defined otherwise.

[0039] In the application, unless clearly specified and defined otherwise, terms "connect", "fix" or the like should be understood broadly. For example, "fix" may be a fixed connection or a detachable connection, or may be integrated into a part; may be a mechanical connection or an electrical connection; may be a direct connection, or an indirect connection through an intermediate medium; may be interior communication between two elements, or an interaction relationship between two elements, unless clearly defined otherwise. Specific meanings of the above terms in the application may be understood by those of ordinary skill in the art according to specific situations.

[0040] Furthermore, the technical solutions between the embodiments of the application may be combined with each other, but such combination must be based on that those of ordinary skill in the art may implement it, and when a combination of the technical solutions is contradictory or cannot be implemented, it should be considered that such combination of the technical solutions does not exist, nor falls within the scope of protection of the application.

[0041] In order to solve problems of wrinkles, peculiar smell or the like generated when the laundry is washed and exposed in an external environment for a long time, the application proposes a laundry treatment device. With reference to FIG. 1, it is a schematic diagram of specific structures of a laundry treatment device, the laundry treatment device comprises an operation control apparatus 10, a steam generation structure 20, an air blowing structure 30, a heating structure 40, and a drum 60.

[0042] Specifically, the operation control apparatus 10 is configured to control the steam generation structure 20, the air blowing structure 30, the heating structure 40 and the drum 60, thus all these structures are electrically connected to the operation control apparatus 10.

[0043] The drum 60 is provided with an air inlet, and the air inlet is docked with the steam generation structure 20, so that the steam generation structure 20 generates steam and conveys the steam into the drum 60 through the air inlet under control of the operation control apparatus 10.

[0044] The drum 60 is further provided with an air intake, and the air intake is docked with the air blowing structure 30, so that the air blowing structure 30 blows cold air into the drum 60 through the air intake under control of the operation control apparatus 10. Furthermore, the air blowing structure 30 is further connected to the heating structure 40, so that the heating structure heats air sucked by the air blowing structure 30 under control of the operation control apparatus 10, to provide hot air to the drum 60.

[0045] That is, the air blowing structure 30 always operates when it needs to blow air into the drum 60, hot air is blown into the drum 60 during operation of the heating structure 40, and cold air is blown into the drum 60 during non-operation of the heating structure 40.

[0046] It should be noted that the drum 60 is further provided with a laundry input port.

[0047] Based on function descriptions of the above structures, a control principle of the operation control apparatus 10 is as follows.

[0048] When laundry is put into the drum 60, the steam generation structure 20 is first controlled to continuously provide steam to the drum 60, to remove wrinkles and peculiar smell on the laundry; then, the air blowing structure 30 is controlled to provide cold air to the drum 60 for a period of time, to reduce system temperature; and finally, the air blowing structure 30 and the heating structure 40 are controlled to provide hot air to the laundry in the drum 60, to dry the laundry.

[0049] Based on the above descriptions, achievable technical effects are: wrinkles and peculiar smell on the laundry in the drum are removed by introducing steam into the laundry, temperature of the drum is increased at this time, so that the system temperature of the laundry treatment device is also high, noise is large when other structures in the device are started and operate; according to the application, the system temperature is reduced by further introducing cold air into the drum for a period of time, so that starting and operation noise of other structures is reduced, and finally, hot air is introduced into the laundry in the drum, to achieve a purpose of drying the laundry.

[0050] In some embodiments, as shown in FIG. 1, the laundry treatment device may further comprise a filter 50 which is connected to an air outlet of the drum 60 and configured to filter attachments on the laundry carried by cold air and hot air.

[0051] In order for those skilled in the art to understand the solutions of the application better, the technical solutions in the embodiments of the application will be clearly and completely described below with reference to the drawings in

the embodiments of the application.

First embodiment

[0052] FIG. 2 is a schematic flowchart of an embodiment of a laundry treatment method shown according to an exemplary embodiment of the application, the laundry treatment method is applied to the operation control apparatus 10 in the laundry treatment device as shown in FIG. 1. As shown in FIG. 2, the laundry treatment method comprises the following operations 201 to 203.

[0053] At 201, steam is provided to laundry in a drum of the laundry treatment device, to remove wrinkles and peculiar smell on the laundry.

[0054] In an optional embodiment, a material type of the laundry put by a user in the drum is obtained, and a steam duration and a first heating duration are determined according to the material type, and steam is continuously provided to the laundry in the drum for the steam duration.

[0055] In an optional embodiment, the laundry treatment device is usually provided with a display panel for the user to operate, and selection buttons of a variety of different processing programs and/or selection buttons of laundry material types are provided on the display panel, for example, selection buttons of laundry material types such as "shirt/silk/mink", "cashmere type", "school uniform type", "suit/wind clothes type", "cotton and linen/large piece", or the like are provided on the display panel.

[0056] Based on this, when the user opens an inlet of the drum to put the laundry in the drum, a signal that the laundry is put in the inlet of the drum may be detected, then reception of a selection signal that the user presses the selection button of the laundry material type on the display panel is triggered, and the material type of the laundry put by the user is obtained based on the received selection signal.

[0057] Before operation 201 is executed, steam operation parameters and hot air operation parameters of laundry with different material types may be determined in advance by way of experimental calibration, and steam duration and first heating duration corresponding to each material type obtained by the experimental calibration are added to a control parameter library, to facilitate direct search and usage subsequently.

[0058] Based on this, in the control parameter library obtained in advance, the steam duration and first heating duration corresponding to the material type selected by the user are searched.

[0059] In the embodiment of the application, the steam duration represents a duration required for continuously introducing steam into the laundry in the drum. The first heating duration is a duration for providing hot air to the laundry in the drum.

[0060] Optionally, high-temperature steam may be provided to the drum, to achieve an effect of wetting the laundry, while the laundry is sterilized, ironed, heated, and roughness of fibers are smoothed.

[0061] It should be noted that steam durations required by the laundry with different material types are different. For example, the laundry with shirt/silk/mink, cashmere and school uniform types which belong to a small fiber hole material type are not suitable for long-time steam, and when the steam time is too long, it may damage the laundry; and the laundry with suit/wind clothes, cotton and linen/large piece types which belong to a large fiber hole material type require steam to be introduced for a long time, so that treatment effect may be ensured.

[0062] At 202, cold air is provided to the drum for a first preset duration, to reduce system temperature.

[0063] Based on the above descriptions of operation 201, after the laundry in the drum are fumigated by the high-temperature steam, temperature of the whole system is high, and when hot air is directly introduced for drying, operation noise of other structures in the laundry treatment device is high, especially for a compressor in the system. There are many mechanical structures arranged inside the closed system, and starting noise thereof may be high due to high temperature expansion. Therefore, temperature of the whole system is reduced by further introducing cold air into the drum for a period of time, so that starting and operation noise of other structures is reduced. Then, hot air is introduced to dry the laundry, and operation noise of the whole system is small.

[0064] Optionally, the time for providing cold air to the drum may be set according to practical experience, for example, the preset duration may be set to be 10 minutes.

[0065] At 203, hot air is provided to the laundry in the drum, to dry the laundry.

[0066] Specifically, based on the above descriptions of operation 201, hot air may be continuously provided to the laundry in the drum for the first heating duration, to dry the laundry.

[0067] With the above treatment solution, when oil stains exist on the laundry, a cleaning agent may also be applied to an area with the oil stains, the laundry is wetted by steam, then the laundry is blown and dried through hot air, so that mild oil stains of the laundry may be further removed, such manner is particularly suitable for furs which are not suitable for washing in water.

[0068] In an optional embodiment, after hot air is provided to the laundry in the drum, cold air may also be provided to the drum for a second preset duration, to reduce temperature of the laundry, so that the user is not scalded when the user takes the laundry out of the drum, and may directly try on the laundry.

[0069] Preferably, the second preset duration may be less than the above first preset duration required for reducing the system temperature.

[0070] It should be noted that in the whole treatment process of the laundry, the drum may be controlled to rotate in a forward direction and a reverse direction alternately, so that the laundry is always in a shaken and loose state in the whole treatment process, to ensure that laundry treatment application conditions (i.e., introducing steam, blowing cold air, blowing hot air) are in full contact with the laundry, and achieve an optimal treatment effect.

[0071] In a particular implementation, the drum may rotate in the reverse direction for a period of time, every a certain period.

[0072] For example, the drum rotates once in the reverse direction, every 5 minutes.

[0073] So far, the treatment process shown in FIG. 2 is completed. According to the treatment process shown in FIG. 2, wrinkles and peculiar smell on the laundry in the drum are removed by introducing steam into the laundry, temperature of the drum is increased at this time, so that the system temperature of the laundry treatment device is also high, noise is large when other structures in the device are started and operate; according to the application, the system temperature is reduced by further introducing cold air into the drum for a period of time, so that starting and operation noise of other structures is reduced, and finally, hot air is introduced into the laundry in the drum, to achieve a purpose of drying the laundry.

Second embodiment

[0074] FIG. 3 is a schematic flowchart of an embodiment of another laundry treatment method shown according to an exemplary embodiment of the application. Based on the embodiment shown in FIG. 2, as shown in FIG. 3, the laundry treatment method comprises the following operations 301 to 306.

[0075] At 301, a material type of the laundry in the drum is obtained.

[0076] The process of operation 301 may refer to relevant descriptions in the above embodiment, which are not elaborated here.

[0077] At 302, it is determined whether the drum needs to be preheated according to the material type. If yes, operation 303 is performed; if no, operation 304 is performed.

[0078] In an optional specific embodiment, the laundry belonging to the large fiber hole type has large fiber holes at a surface thereof, for example, suit/wind clothes, cotton and linen/large piece types belong to the large fiber hole type, when steam is directly introduced into the laundry at normal temperature, it is not easy for the steam to directly go deep into the laundry; the laundry belonging to the small fiber hole type has small fiber holes at a surface thereof, for example, shirt/silk/mink, cashmere and school uniform types belong to the small fiber hole type, even though steam is introduced into the laundry at normal temperature, it is easy for the steam to go deep into the laundry.

[0079] Based on this, when the material type belongs to the large fiber hole type, it is determined that the drum needs to be preheated; and when the material type belongs to the small fiber hole type, it is determined that the drum does not need to be preheated.

[0080] At 303, a second heating duration corresponding to the material type is obtained, and hot air is continuously provided to the drum for the second heating duration.

[0081] The second heating duration is a duration for supplying hot air into the drum, to preheat the drum.

[0082] In the embodiment, in order to further improve the treatment effect of the laundry, the drum may be preheated in advance, to improve an effect of introducing steam deep into the laundry subsequently, and thus promote an effect of drying the laundry with hot air.

[0083] In some embodiments, experimental calibration may also be used in a process of obtaining the second heating duration corresponding to the material type, and a corresponding second heating duration is preset for the material type belonging to the large fiber hole type, so that the second heating duration corresponding to the material type may be directly obtained.

[0084] Furthermore, preheating durations required for different material types are also different, for example, a preheating duration required for the material type of suit/wind clothes is shorter than a preheating duration required for the material type of cotton and linen/large piece.

[0085] At 304, a steam duration and a first heating duration are determined according to the material type, and steam is continuously provided to the drum for the steam duration, to remove wrinkles and peculiar smell on the laundry.

[0086] At 305, cold air is provided to the drum for a first preset duration, to reduce system temperature.

[0087] At 306, hot air is continuously provided to the laundry in the drum for the first heating duration, to dry the laundry.

[0088] Processes of operations 304 to 306 may refer to relevant descriptions in the above embodiment, which are not elaborated here.

[0089] So far, the treatment process shown in FIG. 3 is completed. According to the treatment process shown in FIG. 3, in order to further improve the treatment effect of the laundry, in order to further improve the treatment effect of the laundry, the drum may be preheated in advance for a period of time, to improve an effect of introducing steam deep into

the laundry subsequently, and remove wrinkles and peculiar smell molecules on the laundry better.

Third embodiment

[0090] FIG. 4 is a schematic flowchart of an embodiment of yet another laundry treatment method shown according to an exemplary embodiment of the application. Based on the embodiments shown in FIG. 2 and FIG. 3, as shown in FIG. 4, the laundry treatment method comprises the following operations 401 to 403.

[0091] At 401, steam is provided to laundry in the drum, to remove wrinkles and peculiar smell on the laundry.

[0092] At 402, cold air is provided to the drum for a first preset duration, to reduce system temperature.

[0093] Processes of operations 401 and 402 may refer to relevant descriptions in the above embodiments, which are not elaborated here.

[0094] At 403, the laundry in the drum is blown with alternate circulation of cold air and hot air, to remove attachments, peculiar smell and wrinkles on the laundry better while dry the laundry.

[0095] Under an action of blowing the laundry wetted by steam with alternate circulation of cold air and hot air, non-persistent and solidified dust mites, smoke odor, hot pot odor or other peculiar smell molecules, and attachments attached to the laundry may be carried away by alternate circulation of cold air and hot air. Meanwhile, under an action of blowing force of cold air and hot air, wrinkles and roughness of fibers on the laundry may be smoothed, so that the laundry is fluffier and softer, and ready to be used and worn immediately, thereby achieving light dry-cleaning treatment function of the laundry.

[0096] It should be noted that alternate manners of cold air and hot air may be that hot air is blown first, and then cold air is blown, or cold air is blown first, and then hot air is blown, which is not specifically limited in the application.

[0097] It should be further noted that in a process of blowing the laundry with alternation of cold air and hot air, time for blowing hot air may be different each time, and correspondingly, time for blowing cold air may also be different each time.

[0098] So far, the treatment process shown in FIG. 4 is completed. According to the treatment process shown in FIG. 4, after steam and cold air are provided to the drum, the laundry is blown with alternate circulation of cold air and hot air, to further remove attachments and peculiar smell molecules on the surface of the laundry; and in the process of blowing the laundry, assistance is that the introduced steam may go deep into the laundry, to smooth roughness of fibers and remove wrinkles, so that the laundry is fluffier and softer.

Fourth embodiment

[0099] FIG. 5 is a specific schematic flowchart of a laundry treatment method shown according to an exemplary embodiment of the application. Based on the embodiments shown in FIG. 2 to FIG. 4, as shown in FIG. 5, the laundry treatment method comprises the following operations 501 to 507.

[0100] At 501, a material type of the laundry put by the user in the drum is obtained.

[0101] At 502, it is determined whether the drum needs to be preheated according to the material type. If yes, operation 503 is performed; if no, operation 504 is performed.

[0102] At 503, a second heating duration corresponding to the material type is obtained, and hot air is continuously provided to the drum for the second heating duration.

[0103] At 504, a steam duration and a first heating duration of the laundry are determined according to the material type.

[0104] At 505, steam is continuously provided to the laundry in the drum for the steam duration, to remove wrinkles and peculiar smell on the laundry.

[0105] At 506, cold air is provided to the drum for a first preset duration, to reduce system temperature.

[0106] At 507, hot air is continuously provided to the laundry in the drum for the first heating duration, or the laundry in the drum is blown with alternate circulation of cold air and hot air.

[0107] At 508, cold air is provided to the drum for a second preset duration, to reduce temperature of the laundry.

[0108] Processes of operations 501 to 508 may refer to relevant descriptions in the above embodiments, which are not described in detail one by one here.

[0109] Based on the laundry treatment solutions described in the above embodiments, exemplary descriptions for specific treatment of a variety of different material types of laundry are given below. As shown in Table 1 below, specific treatment solutions for five material types, i.e., shirt/silk/mink, cashmere, school uniform, suit/wind clothes, cotton and linen/large piece types are given, material types of suit/wind clothes, cotton and linen/large piece belong to the large fiber hole type, and they need to be heated for a period of time before introducing steam into them, a heating time for the material type of suit/wind clothes is shorter than a heating time for the material type of cotton and linen/large piece.

Table 1

treatment solutions of different materials of laundry					
shirt/silk/mink type		1 minute of steam	10 minutes of cold air, to reduce temperature	4 minutes of hot air	1 minute of cold air
cashmere type		1 minute of steam	10 minutes of cold air, to reduce temperature	7 minutes of hot air	1 minute of cold air
school uniform type		3 minutes of steam	10 minutes of cold air, to reduce temperature	12 minutes of hot air	1 minute of cold air
suit/wind clothes type	5 minutes of hot air, to heat laundry	4 minutes of steam	10 minutes of cold air, to reduce temperature	15 minutes of hot air	1 minute of cold air
cotton and linen/ large piece type	8 minutes of hot air, to heat laundry	5 minutes of steam	10 minutes of cold air, to reduce temperature	17 minutes of hot air	1 minute of cold air

[0110] So far, the treatment process shown in FIG. 5 is completed. According to the treatment process shown in FIG. 5, after the material type of the laundry put by the user is obtained, the steam duration and cold and hot air parameters required to process the laundry are determined according to the material type; then, steam is provided to the drum according to the steam duration and cold and hot air parameters; then, the system temperature is reduced by cold air, to reduce starting and operation noise of other structures; then, the laundry is blown with alternate circulation of cold air and hot air, or directly dried by hot air, and the manner of blowing with alternate circulation of cold air and hot air may dry the laundry, while attachments and peculiar smell molecules on the surface of the laundry may be further removed; and in the process of blowing the laundry, assistance is that the introduced steam may go deep into the laundry, to smooth roughness of fibers and remove wrinkles, so that the laundry is fluffier and softer. Furthermore, by considering different material types of the laundry, the laundry is reasonably treated by using different treatment parameters, so that a problem of damage of the laundry caused by excessive treatment is prevented. Furthermore, in order to further improve the treatment effect of the laundry, the drum is preheated in advance, to improve an effect of introducing steam deep into the laundry subsequently.

[0111] An embodiment of the application further provides an operation control apparatus corresponding to the laundry treatment methods provided in the foregoing embodiments, to perform the above laundry treatment methods.

[0112] FIG. 6 is a hardware structure diagram of an operation control apparatus shown according to an exemplary embodiment of the application, the operation control apparatus comprises a communication interface 701, a processor 702, a memory 703 and a bus 704. The communication interface 701, the processor 702, and the memory 703 implement communication there-between through the bus 704. The processor 702 may perform the above laundry treatment methods, by reading and executing machine-executable instructions in the memory 703 corresponding to control logics of the laundry processing methods. Specific contents of the methods may refer to the above embodiments, which are not elaborated here.

[0113] The memory 703 mentioned in the application may be any electronic, magnetic, optical or other physical storage devices, and may comprise storage information such as executable instructions, data, etc. Specifically, the memory 703 may be a Random Access Memory (RAM), a flash memory, a storage driver (such as a hard disk drive), any type of storage disk (such as an optical disk, a Digital Versatile Disk (DVD), etc.), or a similar storage medium, or a combination thereof. Communication connection between system network elements and at least one of other network elements may be implemented by at least one communication interface 701 (which may be a wired or wireless communication interface), in which Internet, a wide area network, a local network, a metropolitan area network, or the like may be used.

[0114] The bus 704 may be an Industry Standard Architecture (ISA) bus, a Peripheral Component Interconnect (PCI) bus, or an Extended Industry Standard Architecture (EISA) bus, etc. The bus may be divided into an address bus, a data bus, a control bus, etc. The memory 703 is configured to store a program, and the processor 702 executes the program after receiving execution instructions.

[0115] The processor 702 may be an integrated circuit chip with signal processing capability. During implementation, operations of the above methods may be completed by an integrated logic circuit of the processor 702 in form of hardware or instructions in form of software. The above processor 702 may be a general-purpose processor comprising a Central Processing Unit (CPU), a Network Processor (referred to as NP for abbreviation), or the like; or, may be a Digital Signal Processor (DSP), an Application Specific Integrated Circuit (ASIC), a Field Programmable Gate Array (FPGA), or other programmable logic devices, discrete gates or transistor logic devices, discrete hardware components. The methods, operations and logic block diagrams disclosed in the embodiments of the application may be implemented or performed. The general-purpose processor may be a microprocessor or any conventional processor, etc. Operations of the methods

disclosed in combination with the embodiments of the application may be directly embodied as being performed and completed by a hardware decoding processor, or by a combination of hardware in the decoding processor and software modules.

[0116] The operation control apparatus provided in the embodiment of the application belongs to the same inventive concept as the laundry treatment methods provided in the embodiments of the application, and has the same advantageous effect as the method used, executed or implemented by the operation control apparatus.

[0117] An embodiment of the application further provides a computer-readable storage medium corresponding to the laundry treatment methods provided in the foregoing embodiments. With reference to FIG. 7, a computer-readable storage medium shown there is an optical disk 30 having stored thereon a computer program (i.e., a program product), the computer program executes the laundry treatment method provided in any one of the foregoing embodiments when the computer program is executed by a processor.

[0118] It should be noted that examples of the computer-readable storage medium may further comprise, but are not limited to a Phase-change RAM (PRAM), a Static RAM (SRAM), a Dynamic RAM (DRAM), other types of RAMs, a Read-Only Memory (ROM), an Electrically Erasable Programmable ROM (EEPROM), a flash memory, or other optical, magnetic storage media, which are not elaborated one by one here.

[0119] The computer-readable storage medium provided in the above embodiment of the application belongs to the same inventive concept as the laundry treatment methods provided in the embodiments of the application, and has the same advantageous effect as the method used, executed or implemented by the application program stored in the computer-readable storage medium.

[0120] Other embodiments of the application will be easily conceived by those skilled in the art after considering descriptions and practicing the application disclosed here. The application is intended to cover any variation, usage or adaptive variation of the application, and such variation, usage or adaptive variation follows general principles of the application, and comprises common knowledge or customary technical means in the technical field which are not disclosed here. Descriptions and embodiments are considered as examples only, the true scope and spirit of the application are indicated by claims below.

[0121] The above descriptions are only preferred embodiments of the application, and are not intended to limit the application. Any modification, equivalent replacement, improvement, or the like made within the spirit and principle of the application should be comprised in the scope of protection of the application.

Claims

1. A laundry treatment method, applied to a laundry treatment device, comprising:

providing steam to laundry in a drum of the laundry treatment device, to remove wrinkles and peculiar smell on the laundry;
providing cold air to the drum for a first preset duration, to reduce system temperature; and
providing hot air to the laundry in the drum, to dry the laundry.

2. The method of claim 1, further comprising after providing hot air to the laundry in the drum:

providing cold air to the drum for a second preset duration, to reduce temperature of the laundry,
wherein the first preset duration is greater than the second preset duration.

3. The method of claim 1, further comprising after providing cold air to the drum for the first preset duration:
blowing the laundry in the drum with alternate circulation of cold air and hot air, to remove attachments and peculiar smell molecules on the laundry, and smooth the wrinkles on the laundry.

4. The method of claim 1, further comprising before providing steam to the laundry in the drum of the laundry treatment device:

obtaining a material type of the laundry in the drum, and determining a steam duration and a first heating duration according to the material type,
wherein the steam duration is a duration for continuously providing steam to the laundry in the drum, and the first heating duration is a duration for providing hot air to the laundry in the drum.

5. The method of claim 4, further comprising before providing steam to the laundry in the drum of the laundry treatment device:

determining that the drum needs to be preheated according to the material type, and obtaining a second heating duration corresponding to the material type,
wherein the second heating duration is a duration for supplying hot air into the drum, to preheat the drum.

6. The method of claim 5, wherein determining that the drum needs to be preheated according to the material type comprises:

determining that the drum needs to be preheated according to the material type belonging to a large fiber hole type; and
determining that the drum does not need to be preheated according to the material type belonging to a small fiber hole type.

7. The method of claim 1, further comprising:
in a treatment process of the laundry in the drum, controlling the drum to rotate in a forward direction and a reverse direction alternately, so that the laundry is in a shaken and scattered state.

8. An operation control apparatus, comprising a memory, a processor, and a computer program stored on the memory and executable on the processor,
wherein the processor implements steps of the method of any one of claims 1 to 7 when the processor executes the computer program.

9. A laundry treatment device, comprising:

the operation control apparatus of claim 8;
a steam generation structure, electrically connected to the operation control apparatus, and configured to generate steam and convey the steam into the drum;
an air blowing structure, electrically connected to the operation control apparatus, and configured to provide cold air to the drum; and
a heating structure, electrically connected to the operation control apparatus and the air blowing structure respectively, and configured to heat air sucked by the air blowing structure to provide hot air to the drum.

10. A computer-readable storage medium, having stored thereon a computer program, wherein the program implements steps of the method of any one of claims 1 to 7 when the program is executed by a processor.

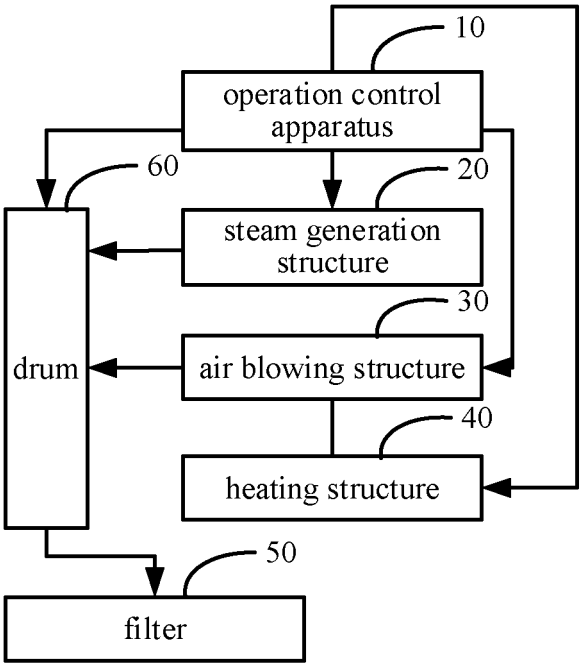
10
operation control apparatus
60
20
steam generation structure
30
drum
air blowing structure
40
heating structure
50
filter

FIG. 1

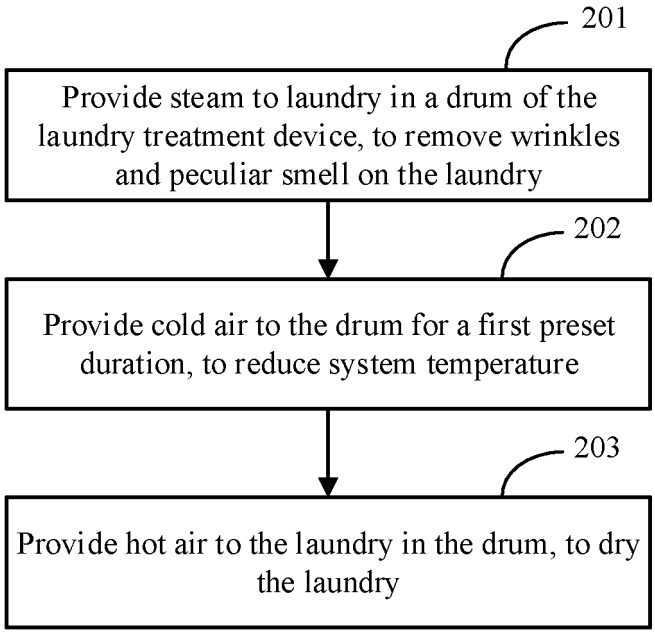
201
Provide steam to laundry in a drum of the laundry treatment device, to remove wrinkles and peculiar smell on the laundry
202
Provide cold air to the drum for a first preset duration, to reduce system temperature
203
Provide hot air to the laundry in the drum, to dry the laundry

FIG. 2

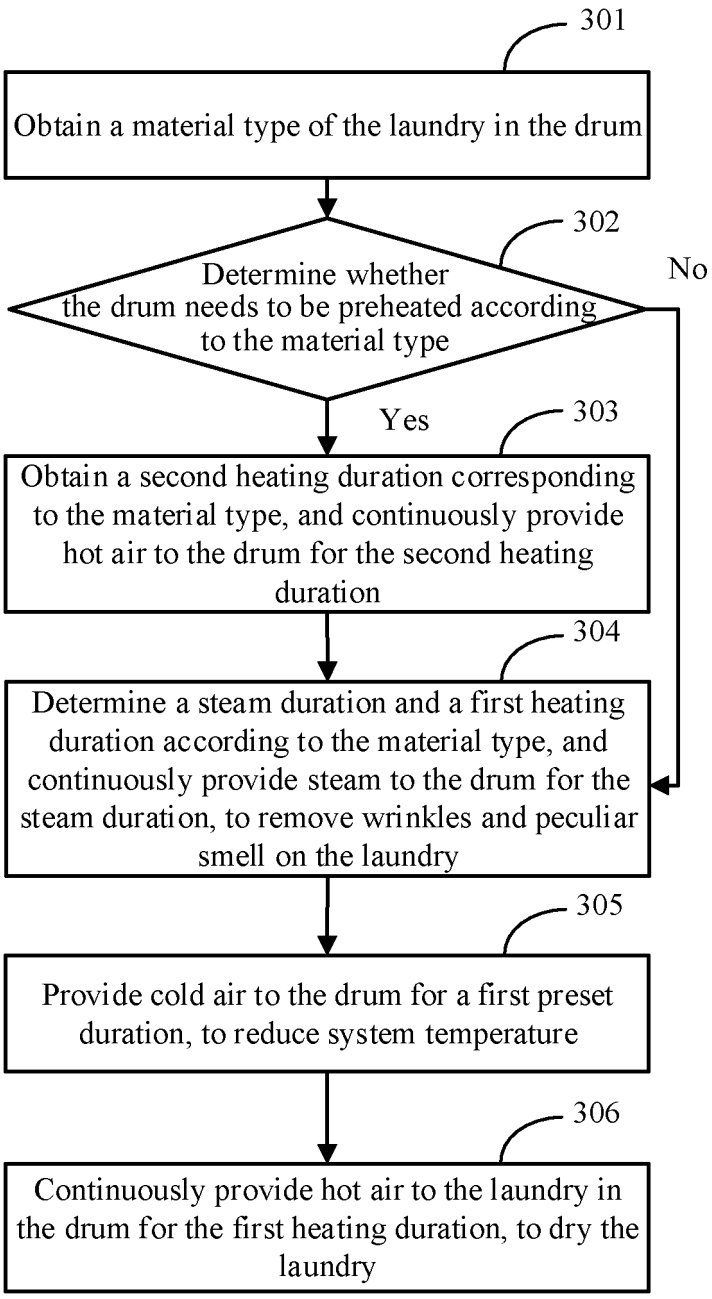
301
Obtain a material type of the laundry in the drum
302
Determine whether the drum needs to be preheated according to the material type
No
Yes
303
Obtain a second heating duration corresponding to the material type, and continuously provide hot air to the drum for the second heating duration
304
Determine a steam duration and a first heating duration according to the material type, and continuously provide steam to the drum for the steam duration, to remove wrinkles and peculiar smell on the laundry
305
Provide cold air to the drum for a first preset duration, to reduce system temperature
306
Continuously provide hot air to the laundry in the drum for the first heating duration, to dry the laundry

FIG. 3

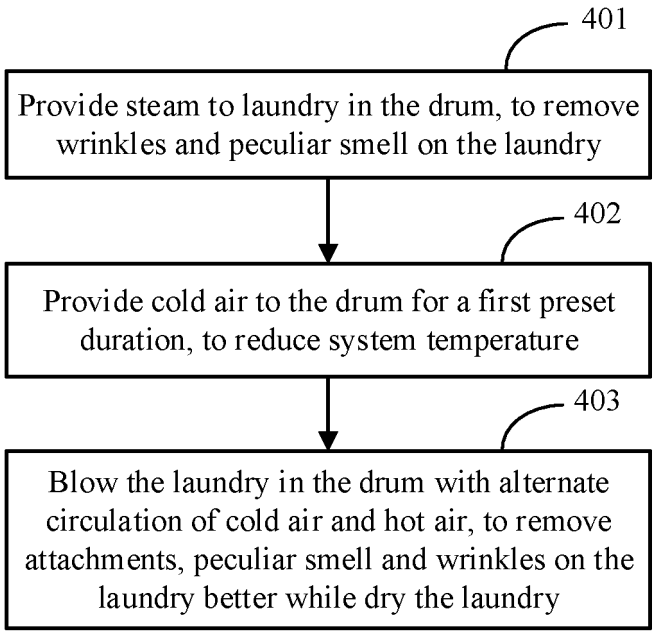
401
Provide steam to laundry in the drum, to remove wrinkles and peculiar smell on the laundry
402
Provide cold air to the drum for a first preset duration, to reduce system temperature
403
Blow the laundry in the drum with alternate circulation of cold air and hot air, to remove attachments, peculiar smell and wrinkles on the laundry better while dry the laundry

FIG. 4

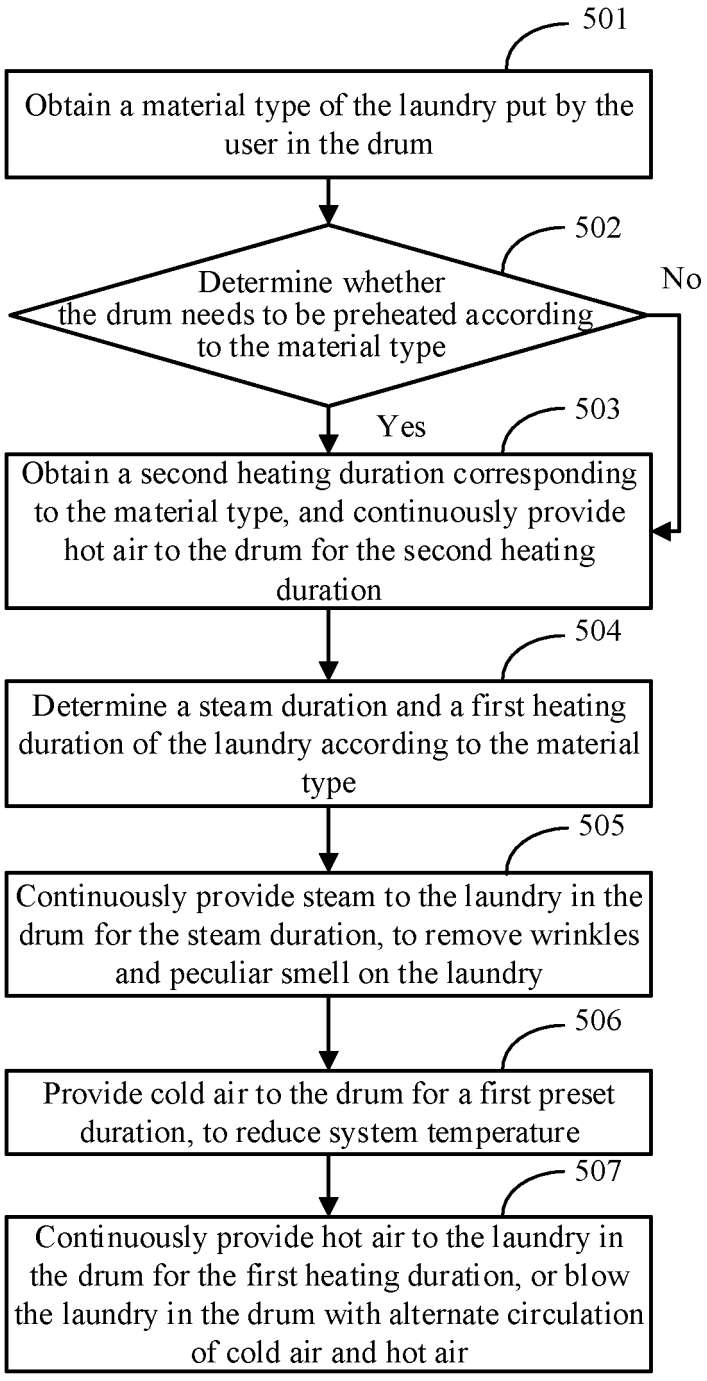
501
Obtain a material type of the laundry put by the user in the drum
502
Determine whether the drum needs to be preheated according to the material type
No
Yes
503
Obtain a second heating duration corresponding to the material type, and continuously provide hot air to the drum for the second heating duration
504
Determine a steam duration and a first heating duration of the laundry according to the material type
505
Continuously provide steam to the laundry in the drum for the steam duration, to remove wrinkles and peculiar smell on the laundry
506
Provide cold air to the drum for a first preset duration, to reduce system temperature
507
Continuously provide hot air to the laundry in the drum for the first heating duration, or blow the laundry in the drum with alternate circulation of cold air and hot air

FIG. 5

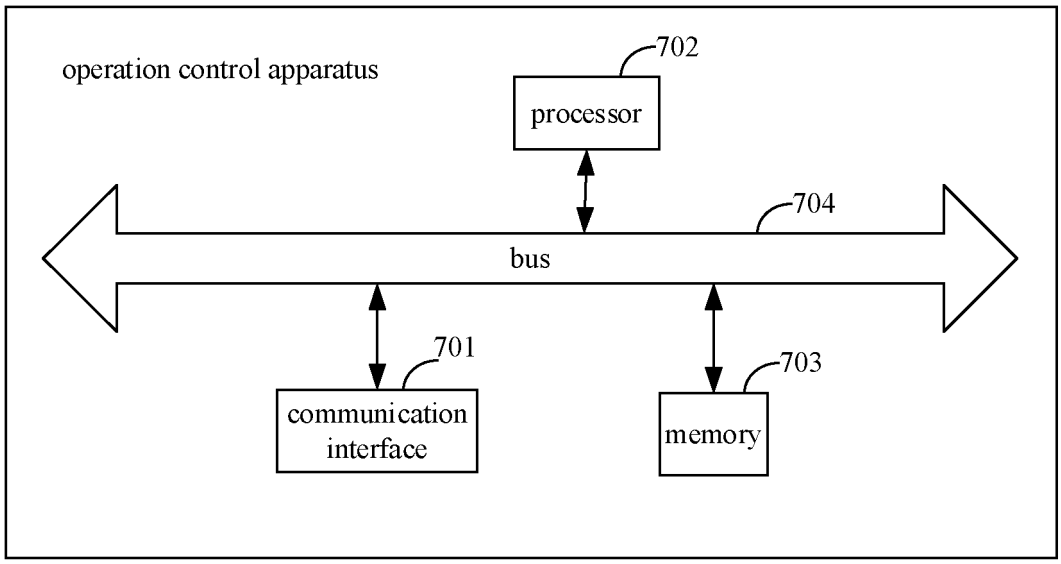
operation control apparatus
702
processor
704
bus
701
communication interface
703
memory

FIG. 6

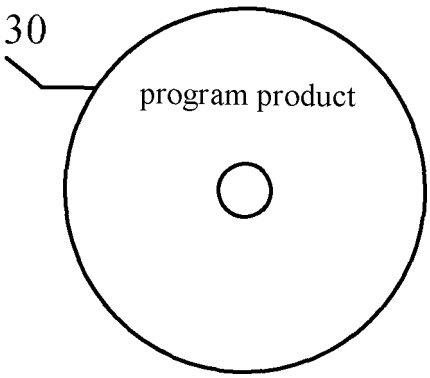

FIG. 7

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2022/070981

A. CLASSIFICATION OF SUBJECT MATTER

D06F 58/36(2020.01)i; D06F 58/44(2020.01)i; D06F 34/04(2020.01)i; D06F 105/28(2020.01)n; D06F 105/32(2020.01)n; D06F 105/40(2020.01)n; D06F 105/46(2020.01)n

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; CNTXT; CNKI; VEN; WOTXT; EPTXT; USTXT: 小天鹅, 海尔, 格力, 褶皱, 去皱, 祛皱, 除皱, 气味, 异味, 去味, 除味, 蒸汽, 蒸气, 湿气, 雾, 冷风, 热风, 干燥, 烘干, 冷却, 降温, 降低, 温度, 压缩机, 噪音, wrinkle, odor, moisture, steam, vapo?r, mist, cloth, dry, air, cold, cool, refrigerate, noise, sound

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	CN 211596100 U (ZHUHAI GREE ELECTRIC APPLIANCES INC.) 29 September 2020 (2020-09-29) description, paragraphs [0015]-[0028], and figures 1 and 2	1-10
Y	US 2011005097 A1 (MOON, J. W. et al.) 13 January 2011 (2011-01-13) description, paragraphs [0019]-[0061], and figures 1-4	1-10
Y	CN 111206402 A (QINGDAO HAIER DRUM WASHING MACHINE CO., LTD.) 29 May 2020 (2020-05-29) description, paragraphs [0037]-[0076], and figures 1-3	1-10
Y	CN 112832000 A (TSANN KUEN (ZHANGZHOU) ENTERPRISE CO., LTD.) 25 May 2021 (2021-05-25) description, paragraphs [0048]-[0059], and figure 1	1-10
A	CN 208907180 U (QINGDAO HAIER DRUM WASHING MACHINE CO., LTD.) 28 May 2019 (2019-05-28) entire document	1-10
A	US 2006117596 A1 (SAMSUNG ELECTRONICS CO., LTD.) 08 June 2006 (2006-06-08) entire document	1-10

☐ 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
"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)
"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	Date of mailing of the international search report
09 March 2022	**31 March 2022**

Name and mailing address of the ISA/CN	Authorized officer
China National Intellectual Property Administration (ISA/CN) **No. 6, Xitucheng Road, Jimenqiao, Haidian District, Beijing 100088, China**	
Facsimile No. **(86-10)62019451**	Telephone No.

Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2022/070981

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		EP 2191057 B1	06 July 2016
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		EP 1666655 A3	27 September 2006
		EP 1666655 B1	07 January 2015

Form PCT/ISA/210 (patent family annex) (January 2015)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- CN 202110633036 **[0001]**