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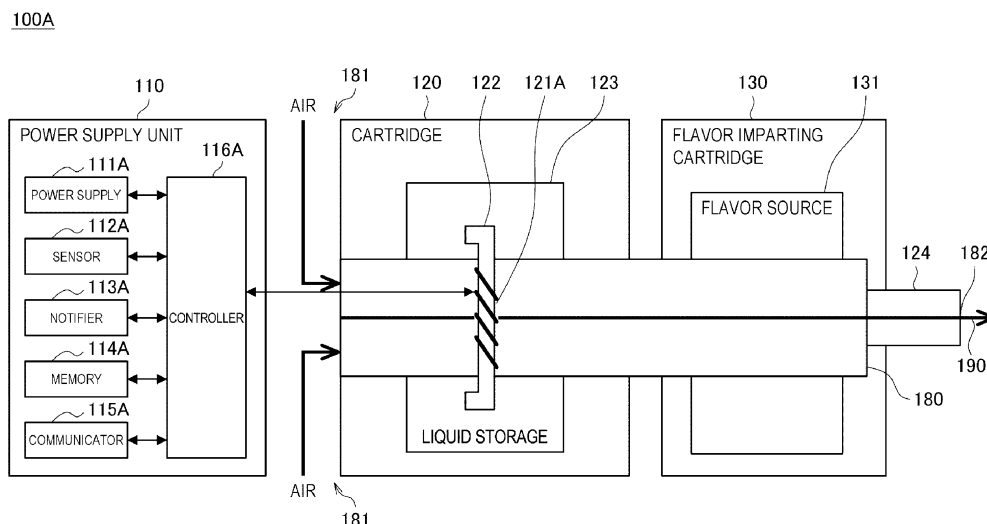
(54) **CONTROL DEVICE, CONTROL METHOD, AND PROGRAM**

(57) [Problem] To provide a mechanism capable of collecting information of a suction device even when the suction device is not in use.

[Solution] Provided is a controlling device for controlling a suction device, the controlling device comprising a controller that controls the suction device so as to

send information indicating the state of the suction device to another device when the period during which a sensor unit capable of detecting a predetermined operation relating to the suction device does not detect the predetermined operation exceeds a predetermined threshold.

FIG. 1



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Description

Technical Field

[0001] The present invention relates to a control device, a control method, and a program.

Background Art

[0002] Inhaler devices that generate material to be inhaled by users, such as electronic cigarettes and nebulizers, have become widespread. For example, an inhaler device generates an aerosol having a flavor component imparted thereto, by using an aerosol source for generating an aerosol, and a substrate including a flavor source or the like for imparting a flavor component to the generated aerosol. A user inhales the aerosol generated by the inhaler device and having the flavor component imparted thereto, thereby being able to taste a flavor.

[0003] In recent years, studies have been conducted to collect information on inhaler devices for the purpose of marketing or improved usability. For example, the following Patent Literature 1 discloses a technique in which an inhaler device transmits information in response to detection of an inhalation action performed using an inhaler device by a user.

Citation List

Patent Literature

[0004] Patent Literature 1: International Publication No. 2015/192358

Summary of Invention

Technical Problem

[0005] However, the technique described in the foregoing Patent Literature 1 has an issue that information is not transmitted unless an inhalation action is performed. Thus, it is difficult to collect information on an inhaler device, for example, when the inhaler device is left unused for a long time.

[0006] Accordingly, the present invention has been made in view of the above issue, and an object of the present invention is to provide a mechanism capable of collecting information on an inhaler device even when the inhaler device is left unused.

Solution to Problem

[0007] In order to solve the above issue, an aspect of the present invention provides a control device that controls an inhaler device. The control device includes a controller that, in response to a period during which a predetermined action regarding the inhaler device is not detected by a sensor capable of detecting the predeter-

mined action exceeding a predetermined threshold, controls the inhaler device to transmit information indicating a state of the inhaler device to another device.

[0008] The predetermined action may include an action performed on the inhaler device by a user.

[0009] The predetermined action may include at least any of an action of charging the inhaler device, an action of inhaling using the inhaler device, an action of causing the inhaler device to generate material to be inhaled by a user, an action of operating an operation unit that is provided in the inhaler device and that accepts an operation by the user, and/or an action of changing a position or attitude of the inhaler device.

[0010] The predetermined action may include an action executed by the inhaler device.

[0011] The predetermined action may include at least any of an action of generating, by the inhaler device, material to be inhaled, a heating action by a heater included in the inhaler device, an action of detecting, by the inhaler device, a speed of the inhaler device, and/or an action of detecting, by the inhaler device, a position of the inhaler device.

[0012] The inhaler device may consume contents stored in a first substrate to generate material to be inhaled by a user, and the information indicating the state of the inhaler device may include information indicating a state of the first substrate.

[0013] The information indicating the state of the first substrate may include at least any of information indicating a remaining amount of the contents stored in the first substrate, information indicating an elapsed time from last generation of the material using the first substrate, information indicating an elapsed time from start of a state in which generating of the material using the first substrate is possible, and/or information indicating a state of a heater included in the inhaler device.

[0014] The inhaler device may impart a component added to a second substrate to material generated by consuming contents stored in a first substrate, to generate material that has a flavor component imparted thereto and that is to be inhaled by a user, and the information indicating the state of the inhaler device may include information indicating a state of the second substrate.

[0015] The information indicating the state of the inhaler device may include information regarding inhalation previously performed using the inhaler device.

[0016] The information regarding inhalation previously performed using the inhaler device may include at least any of information indicating a total number of times of inhalation performed using the inhaler device, information indicating an elapsed time from last inhalation performed using the inhaler device, and/or information indicating a time of last inhalation performed using the inhaler device.

[0017] The information indicating the state of the inhaler device may include information indicating a remaining amount of electric power stored in the inhaler device and/or information indicating a position of the inhaler de-

vice.

[0018] The controller may set the predetermined threshold for each of predetermined actions.

[0019] In order to solve the above issue, another aspect of the present invention provides a control method executed by a control device that controls an inhaler device. The control method includes, in response to a period during which a predetermined action regarding the inhaler device is not detected by a sensor capable of detecting the predetermined action exceeding a predetermined threshold, controlling the inhaler device to transmit information indicating a state of the inhaler device to another device.

[0020] In order to solve the above issue, another aspect of the present invention provides a program for causing a computer that controls an inhaler device to function as a controller that, in response to a period during which a predetermined action regarding the inhaler device is not detected by a sensor capable of detecting the predetermined action exceeding a predetermined threshold, controls the inhaler device to transmit information indicating a state of the inhaler device to another device.

Advantageous Effects of Invention

[0021] As described above, according to the present invention, there is provided a mechanism capable of collecting information on an inhaler device even when the inhaler device is left unused.

Brief Description of Drawings

[0022]

[Fig. 1] Fig. 1 is a schematic diagram of an inhaler device according to a first configuration example.

[Fig. 2] Fig. 2 is a schematic diagram of an inhaler device according to a second configuration example.

[Fig. 3] Fig. 3 is a block diagram illustrating a configuration example of a system according to one embodiment of the present invention.

[Fig. 4] Fig. 4 is a block diagram illustrating a logical configuration example of a controller of an inhaler device according to the embodiment.

[Fig. 5] Fig. 5 is a flowchart illustrating an example of a flow of a state management process executed by the inhaler device according to the embodiment.

Description of Embodiments

[0023] Hereinafter, a preferred embodiment of the present invention will be described in detail with reference to the accompanying drawings. In the specification and drawings, structural elements having substantially the same functional configuration are denoted by the same reference signs, and a duplicate description will be omitted.

[0024] In the specification and drawings, elements

having substantially the same functional configuration may be distinguished from each other by different alphabetic characters attached to the same reference numerals. For example, a plurality of elements having substantially the same functional configuration are distinguished from each other as necessary, for example, inhaler devices 100A and 100B. However, a plurality of elements that have substantially the same functional configuration and that need not particularly be distinguished from each other are denoted by the same reference numerals. For example, when the inhaler devices 100A and 100B need not particularly be distinguished from each other, they are simply referred to as inhaler devices 100.

1. Configuration example of inhaler device

[0025] An inhaler device generates material to be inhaled by a user. In the example described below, the material generated by the inhaler device is an aerosol. Alternatively, the material generated by the inhaler device may be gas.

(1) First configuration example

[0026] Fig. 1 is a schematic diagram of the inhaler device according to the first configuration example. As illustrated in Fig. 1, an inhaler device 100A according to the present configuration example includes a power supply unit 110, a cartridge 120, and a flavor imparting cartridge 130. The power supply unit 110 includes a power supply 111A, a sensor 112A, a notifier 113A, a memory 114A, a communicator 115A, and a controller 116A. The cartridge 120 includes a heater 121A, a liquid guide 122, and a liquid storage 123. The flavor imparting cartridge 130 includes a flavor source 131 and a mouthpiece 124. In the cartridge 120 and the flavor imparting cartridge 130, an airflow path 180 is defined.

[0027] The power supply 111A stores electric power. The power supply 111A supplies electric power to the structural elements of the inhaler device 100A under the control of the controller 116A. The power supply 111A may be a rechargeable battery such as a lithium ion secondary battery.

[0028] The sensor 112A acquires various items of information regarding the inhaler device 100A. In an example, the sensor 112A may be a pressure sensor such as a microphone condenser, a flow sensor, or a temperature sensor, and acquire a value generated in accordance with the user's inhalation. In another example, the sensor 112A may be an input device that receives information input by the user, such as a button or a switch.

[0029] The notifier 113A provides information to the user. The notifier 113A may be a light-emitting device that emits light, a display device that displays an image, a sound output device that outputs sound, or a vibration device that vibrates.

[0030] The memory 114A stores various items of information for operation of the inhaler device 100A. The

memory 114A may be a non-volatile storage medium such as flash memory.

[0031] The communicator 115A is a communication interface capable of communication in conformity with any wired or wireless communication standard. Such a communication standard may be, for example, Wi-Fi (registered trademark) or Bluetooth (registered trademark).

[0032] The controller 116A functions as an arithmetic processing unit and a control circuit, and controls the overall operations of the inhaler device 100A in accordance with various programs. The controller 116A includes an electronic circuit such as a central processing unit (CPU) or a microprocessor, for example.

[0033] The liquid storage 123 stores an aerosol source. The aerosol source is atomized to generate an aerosol. The aerosol source is a liquid such as polyhydric alcohol or water. Examples of the polyhydric alcohol include glycerine and propylene glycol. The aerosol source may include a flavor component that is either derived from tobacco or not derived from tobacco. For the inhaler device 100A that is a medical inhaler such as a nebulizer, the aerosol source may include a medicine.

[0034] The liquid guide 122 guides, from the liquid storage 123, the aerosol source that is the liquid stored in the liquid storage 123, and holds the aerosol source. The liquid guide 122 is, for example, a wick formed by twining fiber material such as glass fiber or porous material such as porous ceramic. In this case, the capillary action of the wick guides the aerosol source stored in the liquid storage 123.

[0035] The heater 121A heats the aerosol source to atomize the aerosol source and generate the aerosol. In the example illustrated in Fig. 1, the heater 121A includes a coil wound around the liquid guide 122. When the heater 121A produces heat, the aerosol source held by the liquid guide 122 is heated and atomized to generate the aerosol. The heater 121A produces heat when receiving electric power from the power supply 111A. In an example, the electric power may be supplied in response to the sensor 112A detecting a start of the user's inhalation and/or an input of predetermined information. Subsequently, the supply of the electric power may be stopped in response to the sensor 112A detecting an end of the user's inhalation and/or an input of predetermined information.

[0036] The flavor source 131 is a structural element for imparting a flavor component to the aerosol. The flavor source 131 may include a flavor component that is either derived from tobacco or not derived from tobacco.

[0037] The airflow path 180 is a flow path of air to be inhaled by the user. The airflow path 180 has a tubular structure having an air inlet hole 181 and an air outlet hole 182 at both ends. The air inlet hole 181 is an inlet of air into the airflow path 180, and the air outlet hole 182 is an outlet of the air from the airflow path 180. The liquid guide 122 is on the airflow path 180 at an upstream position (closer to the air inlet hole 181), and the flavor source 131 is on the airflow path 180 at a downstream

position (closer to the air outlet hole 182). Air flowing in through the air inlet hole 181 when the user inhales mixes with the aerosol generated by the heater 121A. Subsequently, as indicated by an arrow 190, the mixture fluid of the aerosol and the air passes through the flavor source 131 and is conveyed to the air outlet hole 182. When the mixture fluid of the aerosol and the air passes through the flavor source 131, the flavor component included in the flavor source 131 is imparted to the aerosol.

[0038] The mouthpiece 124 is to be held in a mouth of the user during inhalation. The mouthpiece 124 has the air outlet hole 182. When the user inhales with the mouthpiece 124 in his/her mouth, the mixture fluid of the aerosol and the air enters the oral cavity of the user.

[0039] The configuration example of the inhaler device 100A has been described above. The inhaler device 100A is not limited to the above configuration, and may be configured in various ways as exemplified below.

[0040] In an example, the inhaler device 100A does not have to include the flavor imparting cartridge 130. In this case, the cartridge 120 includes the mouthpiece 124.

[0041] In another example, the inhaler device 100A may include various types of aerosol sources. Still another type of aerosol may be generated by mixing a plurality of types of aerosols generated from the plurality of types of aerosol sources in the airflow path 180 and causing a chemical reaction.

[0042] In addition, means for atomizing the aerosol source is not limited to heating by the heater 121A. For example, the means for atomizing the aerosol source may be vibration atomization or induction heating. Alternatively, the means for atomizing the aerosol source may be atomizing of a liquid by generating a surface acoustic wave (SAW) by using a piezoelectric element substrate having a pair of comb-shaped electrodes.

(2) Second configuration example

[0043] Fig. 2 is a schematic diagram of the inhaler device according to the second configuration example. As illustrated in Fig. 2, an inhaler device 100B according to the present configuration example includes a power supply 111B, a sensor 112B, a notifier 113B, a memory 114B, a communicator 115B, a controller 116B, a heater 121B, a holder 140, and a heat insulator 144.

[0044] The power supply 111B, the sensor 112B, the notifier 113B, the memory 114B, the communicator 115B, and the controller 116B are substantially the same as the respective corresponding structural elements included in the inhaler device 100A according to the first configuration example.

[0045] The holder 140 has an internal space 141, and holds a stick substrate 150 in a manner partially accommodated in the internal space 141. The holder 140 has an opening 142 that allows the internal space 141 to communicate with outside. The holder 140 holds the stick substrate 150 that is inserted into the internal space 141 through the opening 142. For example, the holder 140

may be a tubular body having the opening 142 and a bottom 143 on its ends, and may define the pillar-shaped internal space 141. The holder 140 can also define a flow path of air to be supplied to the stick substrate 150. For example, the bottom 143 has an air inlet hole that is an inlet of air into the flow path. The opening 142 serves as an air outlet hole that is an outlet of the air from the flow path.

[0046] The stick substrate 150 includes a substrate 151 and an inhalation port 152. The substrate 151 includes an aerosol source. The aerosol source according to the present configuration example is not limited to a liquid. The aerosol source may be a solid. The stick substrate 150 held by the holder 140 includes the substrate 151 at least partially accommodated in the internal space 141 and the inhalation port 152 at least partially protruding from the opening 142. When the user inhales with the inhalation port 152 protruding from the opening 142 in his/her mouth, air flows into the internal space 141 through the air inlet hole (not illustrated), and the air and an aerosol generated from the substrate 151 reach inside the mouth of the user.

[0047] The heater 121B has a configuration similar to that of the heater 121A according to the first configuration example. However, in the example illustrated in Fig. 2, the heater 121B has a film-like shape and surrounds the outer circumference of the holder 140. Subsequently, heat produced from the heater 121B heats the substrate 151 of the stick substrate 150 from the outer circumference, generating the aerosol.

[0048] The heat insulator 144 prevents heat from transferring from the heater 121B to the other structural elements. For example, the heat insulator 144 may be a vacuum heat insulator or an aerogel heat insulator.

[0049] The configuration example of the inhaler device 100B has been described above. The inhaler device 100B is not limited to the above configuration, and may be configured in various ways as exemplified below.

[0050] In an example, the heater 121B may have a blade-like shape, and may be disposed so that the heater 121B protrudes from the bottom 143 of the holder 140 toward the internal space 141. In this case, the heater 121B having the blade-like shape is inserted into the substrate 151 of the stick substrate 150 and heats the substrate 151 of the stick substrate 150 from its inside. In another example, the heater 121B may be disposed so that the heater 121B covers the bottom 143 of the holder 140. In still another example, the heater 121B may be implemented as a combination of two or more selected from a first heater that covers the outer circumference of the holder 140, a second heater having the blade-like shape, and a third heater that covers the bottom 143 of the holder 140.

[0051] In another example, the holder 140 may include an opening/closing mechanism that at least partially opens and closes an outer shell defining the internal space 141. Examples of the opening/closing mechanism include a hinge. In addition, the holder 140 may sandwich

the stick substrate 150 inserted into the internal space 141 by opening and closing the outer shell. In this case, the heater 121B may be at the sandwiching position of the holder 140 and may produce heat while pressing the stick substrate 150.

[0052] In addition, means for atomizing the aerosol source is not limited to heating by the heater 121B. For example, the means for atomizing the aerosol source may be induction heating.

[0053] In addition, the inhaler device 100B may also include the heater 121A, the liquid guide 122, the liquid storage 123, and the airflow path 180 according to the first configuration example. The air outlet hole 182 of the airflow path 180 may also serve as an air inlet hole to the internal space 141. In this case, a mixture fluid of air and an aerosol generated by the heater 121A flows into the internal space 141, mixes further with an aerosol generated by the heater 121B, and then reaches the oral cavity of the user.

2. One embodiment

2.1. Configuration example

[0054] Fig. 3 is a block diagram illustrating a configuration example of a system 1 according to one embodiment of the present invention. As illustrated in Fig. 3, the system 1 includes an inhaler device 100 and a terminal device 200.

[0055] The inhaler device 100 and the terminal device 200 are related to each other. For example, the inhaler device 100 and the terminal device 200 are related to each other in terms of being used by the same user. In addition, for example, the inhaler device 100 and the terminal device 200 are related to each other in terms of being associated with each other in advance by an authentication connection or the like for wireless communication. In addition, the inhaler device 100 and the terminal device 200 are related to each other in terms of being capable of communication.

[0056] The authentication connection is means for establishing a connection between the inhaler device 100 and the terminal device 200. The authentication connection includes, for example, a process of exchanging pieces of identification information (for example, service set identifiers (SSIDs)) between the inhaler device 100 and the terminal device 200, and a process of sharing key information for encoding/decoding information transmitted and received between the inhaler device 100 and the terminal device 200.

(1) Inhaler device

[0057] The inhaler device 100 generates material to be inhaled by a user. The user's inhalation of the material generated by the inhaler device 100 using the inhaler device 100 will be hereinafter also simply referred to as inhalation (puff) or an inhalation action.

[0058] In the present embodiment, the inhaler device 100 may adopt any configuration example of the above-described first configuration example and second configuration example. That is, the inhaler device 100 according to the present embodiment has a configuration similar to that of either the inhaler device 100A or the inhaler device 100B or that of a modification of these configuration examples.

[0059] Hereinafter, a description will be given mainly of, regarding the configuration of the inhaler device 100 according to the present embodiment, points to be added or emphasized for the configurations of the inhaler device 100A and the inhaler device 100B described above in the respective configuration examples.

Supplemental description of first configuration example

[0060] The power supply unit 110 and the cartridge 120 can be electrically and/or mechanically (including physically) connected to each other. The power supply unit 110 and the cartridge 120 are configured so as to be attachable to and detachable from each other. Typically, inhalation is performed by a user, with the power supply unit 110 and the cartridge 120 being connected to each other. Connecting of the power supply unit 110 and the cartridge 120 to each other will be hereinafter also referred to as attaching the cartridge 120.

[0061] As the number of times of inhalation increases, the aerosol source stored in the cartridge 120 may be depleted. When the aerosol source stored in the cartridge 120 is depleted, the cartridge 120 is removed and replaced with a new cartridge 120.

[0062] The cartridge 120 and the flavor imparting cartridge 130 can be electrically and/or mechanically (including physically) connected to each other. The cartridge 120 and the flavor imparting cartridge 130 are configured so as to be attachable to and detachable from each other. Typically, inhalation is performed by a user, with the power supply unit 110 and the cartridge 120 being connected to each other and the cartridge 120 and the flavor imparting cartridge 130 being connected to each other. Connecting of the cartridge 120 and the flavor imparting cartridge 130 to each other will be hereinafter also referred to as attaching the flavor imparting cartridge 130.

[0063] As the number of times of inhalation increases, the flavor component stored in the flavor imparting cartridge 130 may be depleted. When the flavor component stored in the flavor imparting cartridge 130 is depleted, the flavor imparting cartridge 130 is removed and replaced with a new flavor imparting cartridge 130.

Sensor 112

[0064] The sensor 112 includes a position information acquirer that acquires position information indicating the position of the inhaler device 100. For example, the position information acquirer receives a Global Navigation

Satellite System (GNSS) signal from a GNSS satellite (for example, a Global Positioning System (GPS) signal from a GPS satellite), and detects position information including a latitude and a longitude of the device. The position information acquirer does not have to have a function of detecting position information by itself and may acquire position information detected by the terminal device 200, which will be described below.

[0065] The sensor 112 may detect information indicating a motion of the inhaler device 100. The information indicating a motion of the inhaler device 100 includes a speed, an acceleration, an angular speed, and the like. For example, the sensor 112 may include a speed sensor, an acceleration sensor, and a gyro sensor.

[0066] The sensor 112 may detect the state of the power supply 111. In an example, the sensor 112 may be configured to detect a state of charge (SOC), an integrated current value, a voltage, and the like of the power supply 111. The integrated current value may be obtained by using a current integration method, an SOC-OCV (Open Circuit Voltage) method, or the like.

[0067] The sensor 112 may detect whether an interface provided in the inhaler device 100 is being used. In an example, the sensor 112 may detect insertion or removal of a universal serial bus (USB) cable.

[0068] The sensor 112 may detect the state of the heater 121. In an example, the sensor 112 may detect the temperature of the heater 121 on the basis of an electric resistance value of a conductive track of the heater 121. In the inhaler device 100B according to the second configuration example, the temperature of the stick substrate 150 may be estimated on the basis of the temperature of the heater 121, or the temperature of the heater 121 may be regarded as the temperature of the stick substrate 150.

[0069] The sensor 112 may detect the state of the cartridge 120. In an example, the sensor 112 may detect the weight of the aerosol source stored in the liquid storage 123. In another example, the sensor 112 may detect the height of the liquid surface in the liquid storage 123. In addition, the sensor 112 may detect whether the cartridge 120 has been attached and identification information of the cartridge 120 that has been attached, and may detect, on the basis of these detection results, whether the cartridge 120 has been replaced. Furthermore, the sensor 112 may detect the state of the heater 121, and may detect, on the basis of the detected state of the heater 121, the state of the cartridge 120.

[0070] The sensor 112 may detect the state of the flavor imparting cartridge 130. In an example, the sensor 112 may detect the weight of the flavor source 131. Furthermore, the sensor 112 may detect whether the flavor imparting cartridge 130 has been attached and identification information of the flavor imparting cartridge 130 that has been attached, and may detect, on the basis of these detection results, whether the flavor imparting cartridge 130 has been replaced.

[0071] The sensor 112 includes an operation unit that

accepts a user operation. An example of the operation unit is a button. One of buttons provided as the operation unit in the inhaler device 100 will be hereinafter also referred to as a power supply button. Upon the power supply button being pressed, for example, the operation state of the inhaler device 100 is changed. The operation unit may be a touch sensor. In this case, upon a touch on the touch sensor being detected, the operation state of the inhaler device 100 is changed. Of course, the configuration of the operation unit is not limited to the button or the touch sensor, and may have any configuration, such as a toggle switch or a rotation switch.

[0072] In addition, the operation state of the inhaler device 100 may change in accordance with detection of inhalation by the user. In addition, the operation state of the inhaler device 100 may change in accordance with detection of an action of changing the position or attitude of the inhaler device 100, such as an action of adding a predetermined motion to the inhaler device 100 by the user.

[0073] The operation state of the inhaler device 100 is classified to a sleep state, a standby state, an aerosol generation state (inhalation state), a low-voltage state (LowVol state), a charging state, or an error state.

[0074] The sleep state is a state in which one or some of the functions of the inhaler device 100 are executable. For example, in the sleep state, among the functions of the sensor 112, only the function of detecting an action of bringing the inhaler device 100 into an activated state may be executable. Accordingly, it is possible to minimize power consumption while making it possible to shift to the standby state at any timing.

[0075] The standby state is a state in which all the functions of the inhaler device 100 are executable. For example, the standby state is a state in which the heater 121 is not performing heating. In the standby state, the inhaler device 100 is capable of executing heating by the heater 121, notification by the notifier 113, and communication by the communicator 115.

[0076] The aerosol generation state (inhalation state) is a state in which an aerosol to be inhaled by the user is being generated. For example, the aerosol generation state is a state in which the heater 121 is performing heating.

[0077] The low-voltage state (LowVol state) is a state in which the inhaler device 100 is unable to operate due to power shortage. Upon the remaining amount of the electric power stored in the power supply 111 becoming below a predetermined threshold, the inhaler device 100 shifts to the low-voltage state.

[0078] The charging state is a state in which the inhaler device 100 is being charged by an external power supply (not illustrated). For example, the charging state is a state in which the power supply 111 is charged by an external power supply (not illustrated).

[0079] The error state is a state in which an error is detected in the inhaler device 100. For example, the error state is a state in which an error caused in one or some

of the functions of the inhaler device 100 is detected.

[0080] There are various triggers for the operation state to shift. Hereinafter, the present embodiment will be described under the assumption that the inhaler devices 100 of first to third types have different triggers for the operation state to shift.

[0081] The inhaler device 100 of the first type is configured as the inhaler device 100A according to the first configuration example. The inhaler device 100 of the first type shifts to an aerosol generation state in response to an inhalation action by the user being detected in a standby state. On the other hand, the inhaler device 100 of the first type shifts to a standby state in response to end of the inhalation action by the user being detected in the aerosol generation state.

[0082] The inhaler device 100 of the second type is configured as the inhaler device 100A according to the first configuration example. The inhaler device 100 of the second type shifts to a standby state in response to the power supply button being pressed in a sleep state. The inhaler device 100 of the second type shifts to an aerosol generation state in response to an inhalation action by the user being detected in the standby state. On the other hand, the inhaler device 100 of the second type shifts to a standby state in response to end of the inhalation action by the user being detected in the aerosol generation state. The inhaler device 100 of the second type shifts to a sleep state in response to the power supply button being pressed in the standby state.

[0083] The inhaler device 100 of the third type is configured as the inhaler device 100B according to the second configuration example. The inhaler device 100 of the third type shifts to an aerosol generation state in response to the power supply button being pressed in a sleep state. The user becomes able to perform inhalation in response to the temperature of the stick substrate 150 (more precisely, the temperature of the substrate 151, which is a target to be heated by the heater 121) reaching (for example, exceeding) a predetermined temperature (hereinafter also referred to as an inhalation-enabled temperature). The heating executed by the inhaler device 100 of the third type until the temperature of the stick substrate 150 reaches the predetermined temperature is also referred to as preliminary heating. Also after the temperature of the stick substrate 150 has reached the inhalation-enabled temperature by preliminary heating, heating for maintaining the temperature may be performed. On the other hand, the inhaler device 100 of the third type shifts to a standby state in response to a predetermined time elapsing in the aerosol generation state. The inhaler device 100 of the third type shifts to a sleep state in response to the stick substrate 150 being pulled out in the standby state.

Controller 116

[0084] The controller 116 of the inhaler device 100 according to the present embodiment includes the structur-

al elements illustrated in Fig. 4. Fig. 4 is a block diagram illustrating a logical configuration example of the controller 116 of the inhaler device 100 according to the present embodiment. As illustrated in Fig. 4, the controller 116 includes a system controller 301, a power supply controller 303, a sensor controller 305, a notification controller 307, a storage controller 309, and a communication controller 311.

[0085] The system controller 301 controls, for example, the individual functions of the controller 116 (in the example in Fig. 4, the power supply controller 303, the sensor controller 305, the notification controller 307, the storage controller 309, and the communication controller 311). The system controller 301 also controls, for example, execution of various control programs, an incorporated operating system (OS) program, and the like. For example, in response to detection of various request signals including a startup instruction, the system controller 301 reads a program, an OS code, and the like, and assigns a processing time and resources necessary for the execution, thereby performing a process, which is an execution unit of the program. The system controller 301 is not limited to these examples and is capable of controlling various functions and various processes necessary for operation of the inhaler device 100.

[0086] The power supply controller 303 controls, for example, supply of electric power from the power supply 111 to another structural element included in the inhaler device 100, and charging of the power supply 111. The power supply controller 303 controls, for example, supply of electric power from the power supply 111 to the heater 121. For example, the power supply controller 303 supplies electric power to the heater 121 in response to an inhalation action being detected or in response to a predetermined button being pressed. Furthermore, the power supply controller 303 may control the amount of electric power to be supplied from the power supply 111 to the heater 121 to control the amount of heating by the heater 121. In addition, for example, the power supply controller 303 controls charging of the power supply 111 by an external power supply (not illustrated). In addition, the power supply controller 303 may execute, for example, a function of protecting the power supply 111. The power supply controller 303 is not limited to these examples and is capable of executing various types of control for the power supply 111.

[0087] The sensor controller 305 controls the sensor 112. For example, the sensor controller 305 causes the sensor 112 to detect various items of information. The sensor controller 305 may control the timing to detect information by the sensor 112. In an example, the sensor controller 305 may cause the sensor 112 to detect the state of the cartridge 120 and the state of the flavor imparting cartridge 130 at a predetermined time interval or every time the number of times of inhalation reaches a predetermined number. In another example, the sensor controller 305 may cause the sensor 112 to detect position information or the state of the heater 121 in response

to an inhalation action being detected.

[0088] The notification controller 307 controls the notifier 113. The notification controller 307 controls the notifier 113 to provide information by using an image, sound, light, or vibration. For example, the notification controller 307 provides information indicating an operation state or information indicating information detected by the sensor 112.

[0089] The storage controller 309 controls the memory 114. The storage controller 309 causes the memory 114 to store information or reads information stored in the memory 114.

[0090] The communication controller 311 controls the communicator 115. Specifically, the communication controller 311 controls communication between the inhaler device 100 and the terminal device 200. For example, the communication controller 311 executes the above-described authentication connection. Thereafter, the communication controller 311 transmits information to or receives information from the terminal device 200.

[0091] The controller 116 according to the present embodiment controls the inhaler device 100 by using the above-described structural elements. That is, the power supply unit 110 including the controller 116 is an example of the control device according to the present invention.

(2) Terminal device

[0092] The terminal device 200 is an information processing device operated by a user. The terminal device 200 functions as a device serving as an interface for the user (hereinafter also referred to as a UI device). The terminal device 200 is an example of another device according to the present invention. For example, the terminal device 200 may be a smartphone, a tablet terminal, a wearable device, or the like.

[0093] As illustrated in Fig. 3, the terminal device 200 includes a sensor 210, a notifier 220, a communicator 230, a memory 240, and a controller 250.

[0094] The sensor 210 detects various items of information regarding the terminal device 200. The sensor 210 outputs the detected information to the controller 250. The sensor 210 includes an input unit that receives information input by the user. The input unit includes, for example, at least any of a button, a keyboard, a touch screen, or a microphone. The sensor 210 further includes a position information acquirer that acquires position information indicating the position of the terminal device 200. For example, the position information acquirer receives a GNSS signal from a GNSS satellite (for example, a GPS signal from a GPS satellite), and detects position information including a latitude and a longitude of the device.

[0095] The notifier 220 provides information to the user. The notifier 220 includes at least any of a display device that displays information, a light-emitting device that emits light, a vibration device that vibrates, or a sound output device that outputs sound. An example of the dis-

play device is a display. An example of the light-emitting device is a light-emitting diode (LED). An example of the vibration device is an eccentric motor. An example of the sound output device is a speaker. The notifier 220 outputs information received from the controller 250, thereby providing the information to the user. For example, the notifier 220 displays information to be provided to the user, emits light in a light emission pattern corresponding to information to be provided to the user, vibrates in a vibration pattern corresponding to information to be provided to the user, or outputs sound corresponding to information to be provided to the user.

[0096] The communicator 230 is a communication interface for transmitting and receiving information between the terminal device 200 and another device. The communicator 230 performs communication in conformity with any wired or wireless communication standard. Such a communication standard may be, for example, a wireless local area network (LAN), a wired LAN, Wi-Fi (registered trademark), or Bluetooth (registered trademark). Typically, the communicator 230 transmits information to or receives information from the inhaler device 100 in a wireless manner.

[0097] The memory 240 stores various items of information for operation of the terminal device 200. The memory 240 may be a non-volatile storage medium such as flash memory.

[0098] The controller 250 functions as an arithmetic processing unit and a control circuit, and controls the overall operations of the terminal device 200 in accordance with various programs. The controller 250 includes an electronic circuit such as a central processing unit (CPU) or a microprocessor, for example. In addition, the controller 250 may include a read only memory (ROM) that stores a program, an arithmetic parameter, and the like to be used, and a random access memory (RAM) that temporarily stores a parameter or the like that changes as appropriate.

[0099] The terminal device 200 executes various processes under control of the controller 250. Processing of information detected by the sensor 210, notification of information by the notifier 220, transmission and reception of information by the communicator 230, and storing and reading of information in the memory 240 are examples of processes controlled by the controller 250. Other processes executed by the terminal device 200, such as input of information into individual structural elements and a process based on information output from the individual structural elements, are also controlled by the controller 250. The functions of the controller 250 may be implemented by using an application. The application may be preinstalled or downloaded. The functions of the controller 250 may be implemented by Progressive Web Apps (PWA).

2.2. Technical features

(1) Detection of predetermined action

[0100] The inhaler device 100 detects a predetermined action regarding the inhaler device 100. The predetermined action herein is an action performed to use the inhaler device 100. The predetermined action can be detected by the sensor 112. The predetermined action will be hereinafter also referred to as a usage action. The usage action may include at least any of the actions exemplified below.

[0101] The usage action may be an action performed on the inhaler device 100 by the user. Alternatively, the usage action may be an action performed on the inhaler device 100 by a third person other than the user.

[0102] The usage action may include an action of charging the inhaler device 100. The power supply 111 may be charged by being connected to an external power supply by a USB cable or the like. The power supply 111 may be charged using a wireless power transmission technology without being connected to a power-transmission-side device. In addition, only the power supply 111 may be detachable from the inhaler device 100 and may be replaced with a new power supply 111. The sensor 112 is capable of detecting these actions by detecting the state of the power supply 111. For example, the sensor 112 regularly detects the amount of electric power remaining in the power supply 111, thereby being capable of detecting, in response to the remaining amount of electric power being increased, that a charging action has been performed.

[0103] The usage action may include an inhalation action. In response to detection of a negative pressure caused by inhalation by the user, the sensor 112 detects that an inhalation action has been performed.

[0104] The usage action may include an action of causing the inhaler device 100 to generate an aerosol to be inhaled by the user.

[0105] The action of causing the inhaler device 100 to generate an aerosol to be inhaled by the user may include an action of bringing the inhaler device 100 into an aerosol generation state. For example, the action of bringing the inhaler device 100 of the first type into an aerosol generation state is an inhalation action in a standby state. The action of bringing the inhaler device 100 of the second type into an aerosol generation state is an inhalation action in a standby state. The action of bringing the inhaler device 100 of the third type into an aerosol generation state is an action of pressing the power supply button in a sleep state.

[0106] The action of causing the inhaler device 100 to generate an aerosol to be inhaled by the user may include an action of bringing the inhaler device 100 into a standby state. The action of bringing the inhaler device 100 of the second type into a standby state is an action of pressing the power supply button in a sleep state.

[0107] The usage action may include an action of op-

erating the operation unit that is provided in the inhaler device 100 and that accepts a user operation.

[0108] The usage action may include an action of changing the position or attitude of the inhaler device 100. In an example, the sensor 112 detects an action of changing the position of the inhaler device 100 on the basis of at least any of the speed, acceleration, or position information of the inhaler device 100. In another example, the sensor 112 detects an action of changing the attitude of the inhaler device 100 on the basis of the angular speed of the inhaler device 100.

[0109] In addition, the predetermined action may include an action executed by the inhaler device 100. More specifically, the predetermined action may include an action executed by the inhaler device 100 on the basis of an action performed on the inhaler device 100 by the user. The predetermined action may include an action of generating, by the inhaler device 100, material to be inhaled by the user on the basis of inhalation by the user. In addition, the predetermined action may include a heating action by the heater 121 included in the inhaler device 100. Furthermore, the predetermined action may include an action of detecting, by the inhaler device 100, the speed or position of the inhaler device 100.

(2) Transmission of state information

[0110] The inhaler device 100 transmits information indicating the state of the inhaler device 100 to the terminal device 200 in response to a period during which a usage action is not detected exceeding a predetermined threshold. The usage action may include a plurality of types of actions as described above. The inhaler device 100 transmits information indicating the state of the inhaler device 100 to the terminal device 200 in response to a period during which none of the plurality of types of usage actions are detected exceeding the predetermined threshold. Thus, information on the inhaler device 100 can be collected even when the inhaler device 100 is left unused.

[0111] The starting point of the period during which a usage action is not detected is typically the timing at which a usage action is detected previously (last). Alternatively, the starting point of the period during which a usage action is not detected may be the timing at which a sleep state or a low-voltage state occurs last.

[0112] The predetermined threshold may take various values, such as several minutes, several hours, several days, or several weeks. The inhaler device 100 may set the predetermined threshold for each of usage actions. For example, the inhaler device 100 may set, as the predetermined threshold, a value corresponding to the type of the usage action detected last. The predetermined threshold will be hereinafter also referred to as a transmission trigger threshold.

[0113] Information indicating the state of the inhaler device 100 will be hereinafter also referred to as state information. In response to receipt of state information,

the terminal device 200 provides the state information to the user. For example, the terminal device 200 displays the state information or outputs sound corresponding to the state information. This enables the user to recognize the state of the inhaler device 100. Here, the state information is transmitted in response to a period during which a usage action is not detected exceeding the transmission trigger threshold. Thus, the user is able to easily recognize the state of the inhaler device 100 that has been left unused for a period exceeding the transmission trigger threshold.

[0114] It may be difficult for the inhaler device 100 in a sleep state to determine whether the period during which a usage action is not detected exceeds the transmission trigger threshold and to transmit state information. In this case, when being in a sleep state, the inhaler device 100 may regularly recover to a standby state, determine whether the period during which a usage action is not detected exceeds the transmission trigger threshold, and transmit state information in accordance with a determination result. In this case, the inhaler device 100 shifts again to a sleep state after the determination or after the transmission of the state information.

[0115] The inhaler device 100 may recover from a sleep state to a standby state, with a usage action by the user serving as a trigger. In a case where whether a period during which a usage action is not detected exceeds the transmission trigger threshold is not determined in the sleep state, the inhaler device 100 may determine, at a recovery timing, whether a period during which a usage action is not detected exceeds the transmission trigger threshold. For example, the inhaler device 100 determines whether a time interval between a usage action serving as a trigger for recovery and a usage action detected last before recovery exceeds the transmission trigger threshold. The inhaler device 100 may then transmit state information in accordance with a determination result.

[0116] The state information may include at least any of items of information described below.

Information indicating state of cartridge 120

[0117] The inhaler device 100 may generate material to be inhaled by the user, by consuming the contents stored in a first substrate. Regarding the inhaler device 100A according to the first configuration example, the cartridge 120 corresponds to the first substrate, the aerosol source corresponds to the contents stored in the first substrate, and the aerosol corresponds to the material to be inhaled by the user. The state information may include information indicating the state of the first substrate, that is, information indicating the state of the cartridge 120. The user recognizes the information indicating the state of the cartridge 120 via the terminal device 200, thereby being able to, for example, easily determine whether the cartridge 120 of the inhaler device 100 left for a long time is to be replaced. The state information

may include at least any of items of information exemplified below as the information indicating the state of the cartridge 120.

[0118] The information indicating the state of the cartridge 120 may include information indicating the remaining amount of the aerosol source stored in the cartridge 120. In an example, the remaining amount of the aerosol source stored in the cartridge 120 may be detected by detecting the weight of the aerosol source stored in the liquid storage 123. In another example, the remaining amount of the aerosol source stored in the cartridge 120 may be estimated on the basis of the number of times of inhalation.

[0119] The information indicating the state of the cartridge 120 may include information indicating an elapsed time from last generation of an aerosol using the cartridge 120. The elapsed time from last generation of an aerosol using the cartridge 120 is also referred to as an elapsed time from last detection of an inhalation action in a state in which the cartridge 120 is attached.

[0120] The information indicating the state of the cartridge 120 may include information indicating an elapsed time from the start of a state in which generating of an aerosol using the cartridge 120 is possible. The state in which generating of an aerosol using the cartridge 120 is possible is, for example, a state in which the cartridge 120 is attached to the power supply unit 110. That is, the information indicating the state of the cartridge 120 may include information indicating a period during which the cartridge 120 is in an attached state.

[0121] The information indicating the state of the cartridge 120 may include information indicating the state of the heater 121. The information indicating the state of the heater 121 may include information indicating the temperature of the heater 121 and a change in the temperature per unit time.

Information indicating state of flavor imparting cartridge 130

[0122] The inhaler device 100 may generate material that has a predetermined component imparted thereto and that is to be inhaled by the user, by imparting the predetermined component added to a second substrate to material generated by consuming the contents stored in the first substrate. The predetermined component added to the second substrate includes, for example, a flavor component. Regarding the inhaler device 100A according to the first configuration example, the cartridge 120 corresponds to the first substrate, the aerosol source corresponds to the contents stored in the first substrate, the flavor imparting cartridge 130 corresponds to the second substrate, and the aerosol corresponds to the material to be inhaled by the user. The state information may include information indicating the state of the second substrate, that is, information indicating the state of the flavor imparting cartridge 130. The flavor imparting cartridge may have another component in addition to the flavor

component added thereto. The user recognizes the information indicating the state of the flavor imparting cartridge 130 via the terminal device 200, thereby being able to, for example, easily determine whether the flavor imparting cartridge 130 of the inhaler device 100 left for a long time is to be replaced. The state information may include at least any of items of information exemplified below as the information indicating the state of the flavor imparting cartridge 130.

[0123] The information indicating the state of the flavor imparting cartridge 130 may include information indicating the remaining amount of the flavor component stored in the flavor imparting cartridge 130. In an example, the remaining amount of the flavor component stored in the flavor imparting cartridge 130 may be detected by detecting the weight of the flavor source 131. In another example, the remaining amount of the flavor component stored in the flavor imparting cartridge 130 may be estimated on the basis of the number of times of inhalation.

[0124] The information indicating the state of the flavor imparting cartridge 130 may include information indicating an elapsed time from last generation of an aerosol using the flavor imparting cartridge 130. The elapsed time from last generation of an aerosol using the flavor imparting cartridge 130 is also referred to as an elapsed time from last detection of an inhalation action in a state in which the flavor imparting cartridge 130 is attached.

[0125] The information indicating the state of the flavor imparting cartridge 130 may include information indicating an elapsed time from the start of a state in which imparting of a flavor component to an aerosol using the flavor imparting cartridge 130 is possible. The state in which imparting of a flavor component to an aerosol using the flavor imparting cartridge 130 is possible is, for example, a state in which the flavor imparting cartridge 130 is attached to the cartridge 120 attached to the power supply unit 110. That is, the information indicating the state of the cartridge 120 may include information indicating a period during which the flavor imparting cartridge 130 is in an attached state.

Information regarding inhalation previously performed using inhaler device 100

[0126] The state information may include information regarding inhalation previously performed using the inhaler device 100. The user recognizes the information regarding inhalation previously performed using the inhaler device 100 via the terminal device 200, thereby being able to, for example, easily determine whether the inhaler device 100 left for a long time can be used as is. The state information may include at least any of items of information exemplified below as the information regarding inhalation previously performed using the inhaler device 100.

[0127] The information regarding inhalation previously performed using the inhaler device 100 may include information indicating the total number of times of inhala-

tion performed using the inhaler device 100. The total number of times may be reset at various timings, for example, when the inhaler device 100 is manufactured, when the inhaler device 100 is charged last, the cartridge 120 is replaced last, or when the flavor imparting cartridge 130 is replaced last.

[0128] The information regarding inhalation previously performed using the inhaler device 100 may include information indicating an elapsed time from last inhalation performed using the inhaler device 100. That is, the information regarding inhalation previously performed using the inhaler device 100 may include information indicating an elapsed time from last detection of an inhalation action.

[0129] The information regarding inhalation previously performed using the inhaler device 100 may include information indicating the time of last inhalation performed using the inhaler device 100. That is, the information regarding inhalation previously performed using the inhaler device 100 may include information indicating the time of last detection of an inhalation action.

Other information

[0130] The state information may include other various items of information. For example, the state information may include at least any of items of information exemplified below.

[0131] The state information may include information indicating the remaining amount of the electric power stored in the inhaler device 100. The user recognizes the information indicating the remaining amount of the electric power stored in the inhaler device 100 via the terminal device 200, thereby being able to, for example, easily determine whether the inhaler device 100 left for a long time can be used without charging the inhaler device 100.

[0132] The state information may include information indicating the position of the inhaler device 100. The user recognizes the information indicating the position of the inhaler device 100, thereby being able to, for example, easily find the missing inhaler device 100 left for a long time.

(3) Flow of process

[0133] Fig. 5 is a flowchart illustrating an example of a flow of a state management process executed by the inhaler device 100 according to the present embodiment. As illustrated in Fig. 5, first, the inhaler device 100 starts detection of a usage action (step S102). Subsequently, the inhaler device 100 starts counting by a time counter (step S104). The time counter is a counter in which a count value is incremented in accordance with elapse of time (that is, count-up is performed). Subsequently, the inhaler device 100 determines whether a usage action has been detected (step S106).

[0134] If it is determined that a usage action has been detected (YES in step S106), the inhaler device 100 re-

sets the time counter (step S114). Thereafter, the process returns to step S104.

[0135] On the other hand, if it is determined that a usage action has not been detected (NO in step S106), the inhaler device 100 counts up the time counter (step S108). Subsequently, the inhaler device 100 determines whether a period during which a usage action is not detected indicated by the count value of the time counter exceeds a transmission trigger threshold (step S110).

[0136] If it is determined that the period during which a usage action is not detected exceeds the transmission trigger threshold (YES in step S110), the inhaler device 100 transmits state information to the terminal device 200 (step S112). Subsequently, the inhaler device 100 resets the time counter (step S114). Thereafter, the process returns to step S104.

[0137] On the other hand, if it is determined that the period during which a usage action is not detected does not exceed the transmission trigger threshold (NO in step S110), the process returns to step S106.

3. Supplemental description

[0138] While the preferred embodiment of the present invention has been described in detail with reference to the accompanying drawings, the present invention is not limited to the foregoing examples. It is apparent that a person having ordinary knowledge in the technical field of the present invention could conceive of various changes or modifications within the scope of the technical spirit described in the claims, and it is to be understood that the changes or modifications are also included in the technical scope of the present invention as a matter of course.

[0139] For example, in the above embodiment, a description has been given that the power supply unit 110 functions as a control device, but the present invention is not limited to this example. For example, any of the cartridge 120, the flavor imparting cartridge 130, or the terminal device 200 may function as a control device. Furthermore, a device other than the inhaler device 100 or the terminal device 200 may function as a control device. Alternatively, the functions of the control device may be shared among a plurality of devices, such as the power supply unit 110 and the terminal device 200.

[0140] For example, in the above embodiment, a description has been given that the sensor 112 is disposed in the power supply unit 110, but the present invention is not limited to this example. For example, at least part of the sensor 112 may be disposed in the cartridge 120 or the flavor imparting cartridge 130. Specifically, the sensor 112 that detects the state of the cartridge 120 may be disposed in the cartridge 120, and information detected by the sensor 112 may be transmitted to the controller 116. The same applies to the sensor 112 that detects the state of the flavor imparting cartridge 130.

[0141] The series of steps performed by the individual devices described in this specification may be imple-

mented by using any of software, hardware, and a combination of software and hardware. Programs constituting software are, for example, stored in advance in recording media (non-transitory media) provided inside or outside the individual devices. Each program is, for example, at the time of being executed by a computer, loaded into a RAM and executed by a processor such as a CPU. The recording media are, for example, a magnetic disk, an optical disc, a magneto-optical disk, a flash memory, and the like. The computer programs may be distributed, for example, via a network without using recording media.

[0142] The steps described using a flowchart or sequence diagram in this specification need not necessarily be executed in the order illustrated. Some of the process steps may be executed in parallel. An additional process step may be adopted, or one or some of the process steps may be omitted.

Reference Signs List

[0143]

1 system
100 inhaler device
110 power supply unit
111 power supply
112 sensor
113 notifier
114 memory
115 communicator
116 controller
120 cartridge
121 heater
122 liquid guide
123 liquid storage
124 mouthpiece
130 flavor imparting cartridge
131 flavor source
140 holder
141 internal space
142 opening
143 bottom
144 heat insulator
150 stick substrate
151 substrate
152 inhalation port
180 airflow path
181 air inlet hole
182 air outlet hole
200 terminal device
210 sensor
220 notifier
230 communicator
240 memory
250 controller
301 system controller
303 power supply controller

305 sensor controller
307 notification controller
309 storage controller
311 communication controller

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Claims

1. A control device that controls an inhaler device, the control device comprising:
a controller that, in response to a period during which a predetermined action regarding the inhaler device is not detected by a sensor capable of detecting the predetermined action exceeding a predetermined threshold, controls the inhaler device to transmit information indicating a state of the inhaler device to another device.
2. The control device according to claim 1, wherein the predetermined action includes an action performed on the inhaler device by a user.
3. The control device according to claim 1 or 2, wherein the predetermined action includes at least any of an action of charging the inhaler device, an action of inhaling using the inhaler device, an action of causing the inhaler device to generate material to be inhaled by a user, an action of operating an operation unit that is provided in the inhaler device and that accepts an operation by the user, and/or an action of changing a position or attitude of the inhaler device.
4. The control device according to any one of claims 1 to 3, wherein the predetermined action includes an action executed by the inhaler device.
5. The control device according to any one of claims 1 to 4, wherein the predetermined action includes at least any of an action of generating, by the inhaler device, material to be inhaled, a heating action by a heater included in the inhaler device, an action of detecting, by the inhaler device, a speed of the inhaler device, and/or an action of detecting, by the inhaler device, a position of the inhaler device.
6. The control device according to any one of claims 1 to 5, wherein
the inhaler device consumes contents stored in a first substrate to generate material to be inhaled by a user, and
the information indicating the state of the inhaler device includes information indicating a state of the first substrate.
7. The control device according to claim 6, wherein the information indicating the state of the first substrate

includes at least any of information indicating a remaining amount of the contents stored in the first substrate, information indicating an elapsed time from last generation of the material using the first substrate, information indicating an elapsed time from start of a state in which generating of the material using the first substrate is possible, and/or information indicating a state of a heater included in the inhaler device.

8. The control device according to any one of claims 1 to 6, wherein

the inhaler device imparts a component added to a second substrate to material generated by consuming contents stored in a first substrate, to generate material that has a flavor component imparted thereto and that is to be inhaled by a user, and

the information indicating the state of the inhaler device includes information indicating a state of the second substrate.

9. The control device according to any one of claims 1 to 8, wherein the information indicating the state of the inhaler device includes information regarding inhalation previously performed using the inhaler device.

10. The control device according to claim 9, wherein the information regarding inhalation previously performed using the inhaler device includes at least any of information indicating a total number of times of inhalation performed using the inhaler device, information indicating an elapsed time from last inhalation performed using the inhaler device, and/or information indicating a time of last inhalation performed using the inhaler device.

11. The control device according to any one of claims 1 to 10, wherein the information indicating the state of the inhaler device includes information indicating a remaining amount of electric power stored in the inhaler device and/or information indicating a position of the inhaler device.

12. The control device according to any one of claims 1 to 11, wherein the controller sets the predetermined threshold for each of predetermined actions.

13. A control method executed by a control device that controls an inhaler device, the control method comprising:

in response to a period during which a predetermined action regarding the inhaler device is not detected by a sensor capable of detecting the predetermined action exceeding a predetermined threshold, controlling the inhaler device to transmit information in-

dicating a state of the inhaler device to another device.

14. A program for causing a computer that controls an inhaler device to function as:
a controller that, in response to a period during which a predetermined action regarding the inhaler device is not detected by a sensor capable of detecting the predetermined action exceeding a predetermined threshold, controls the inhaler device to transmit information indicating a state of the inhaler device to another device.

FIG. 1

100A

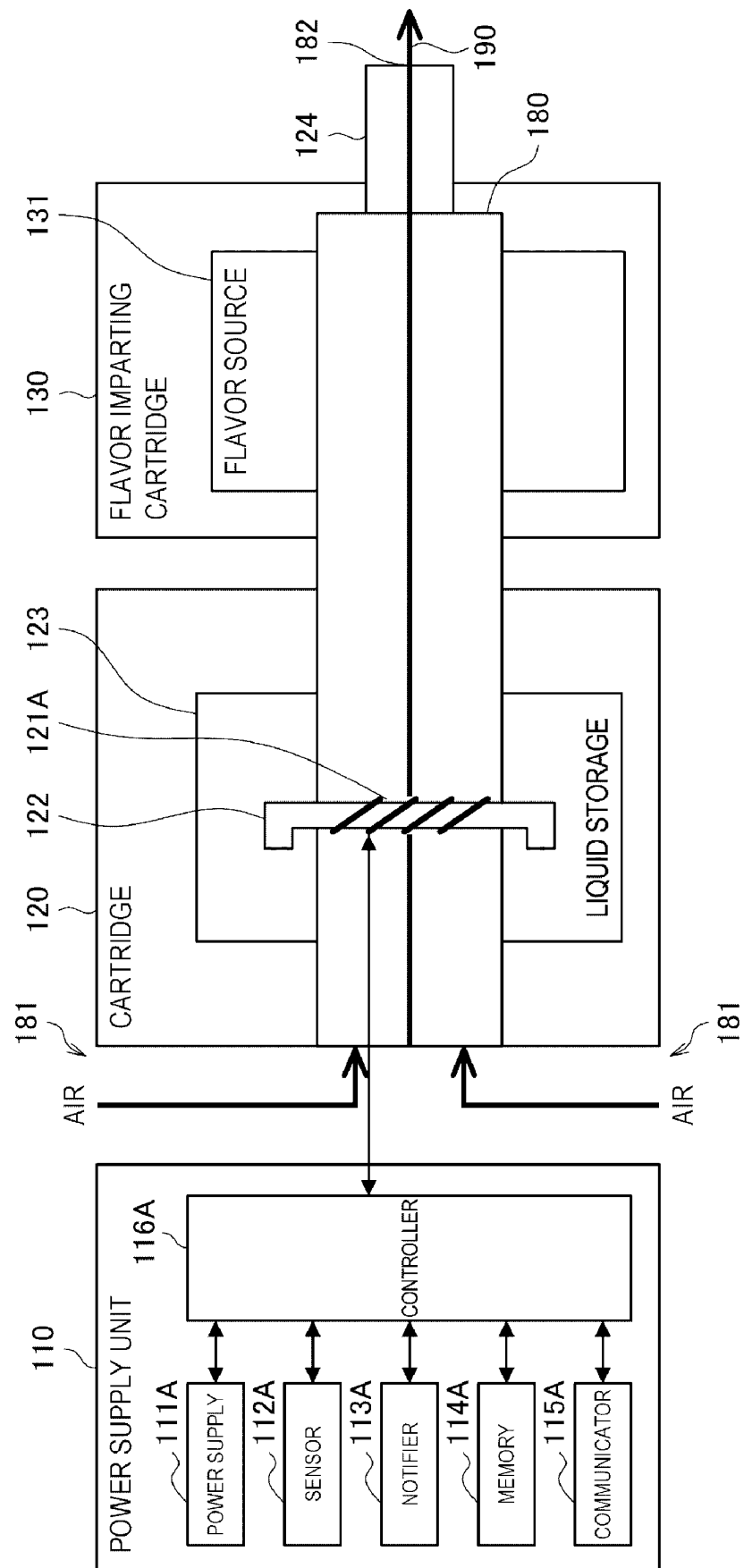


FIG. 2

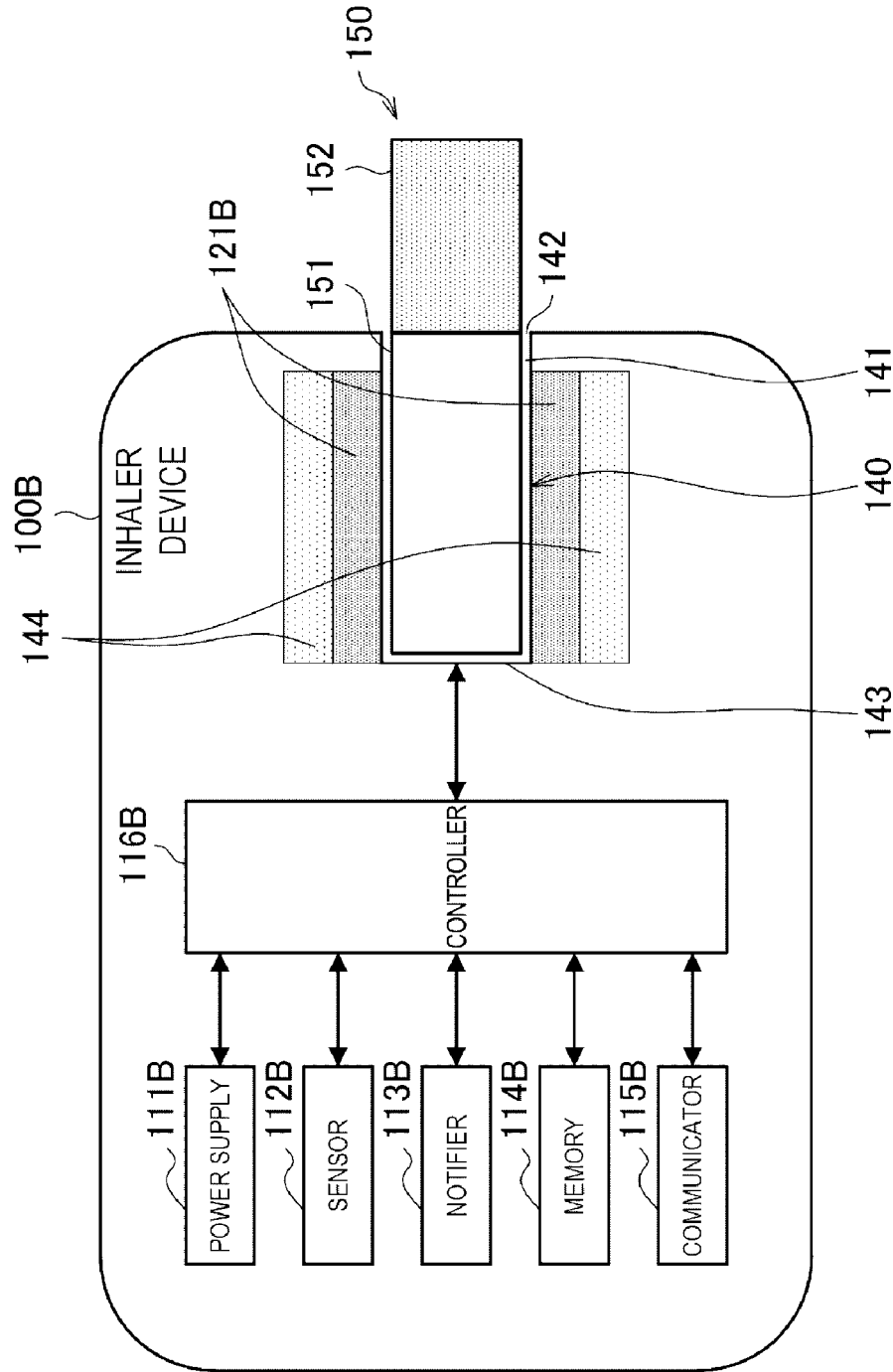


FIG. 3

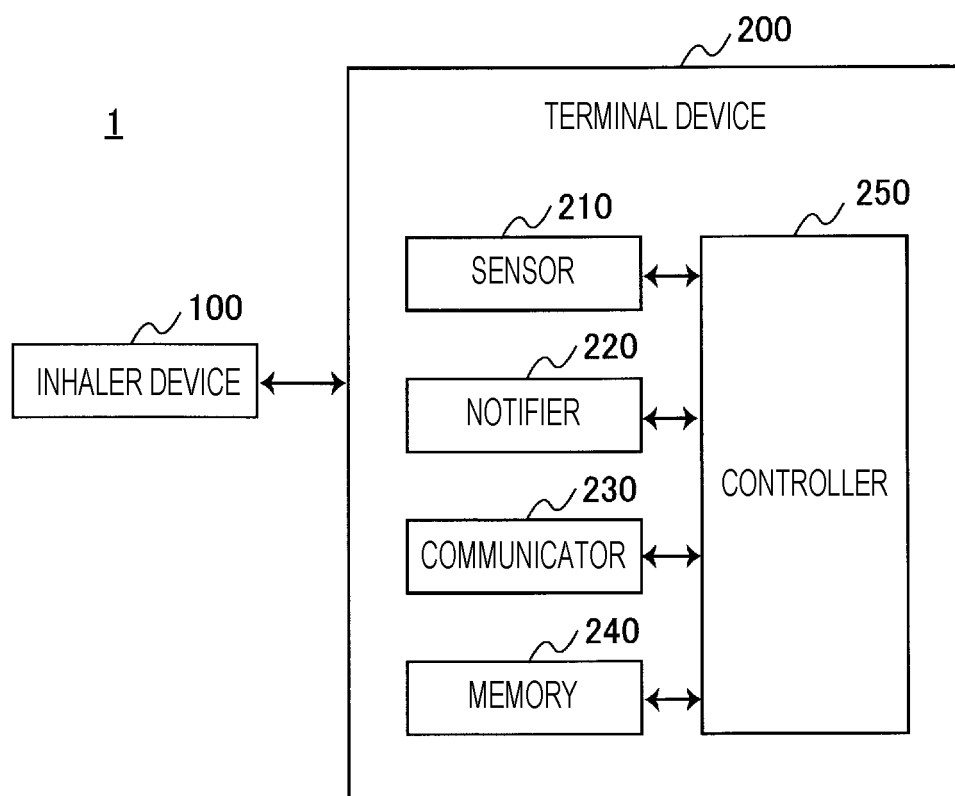


FIG. 4

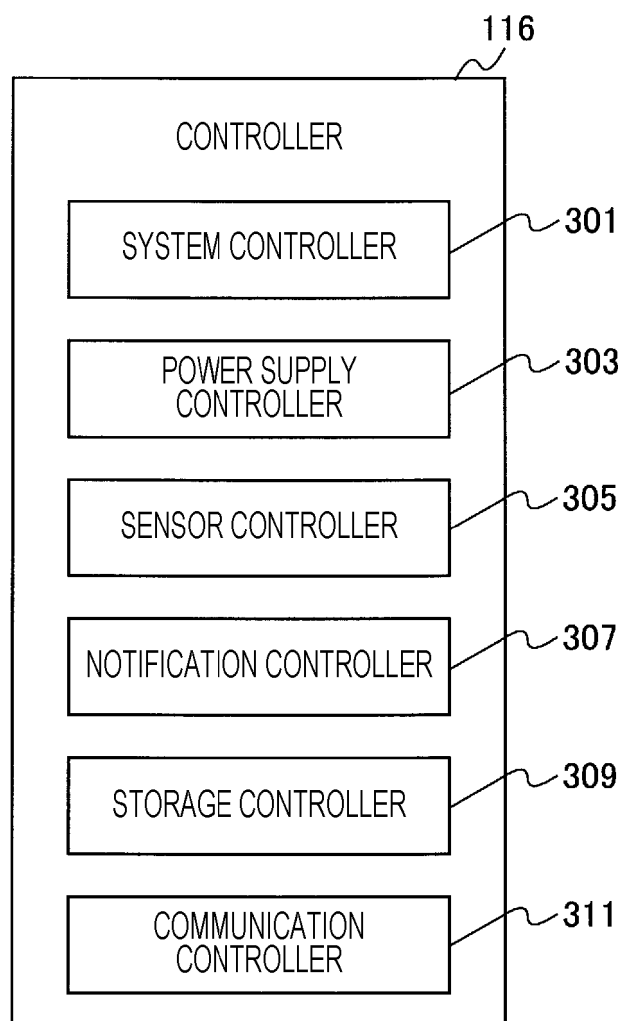
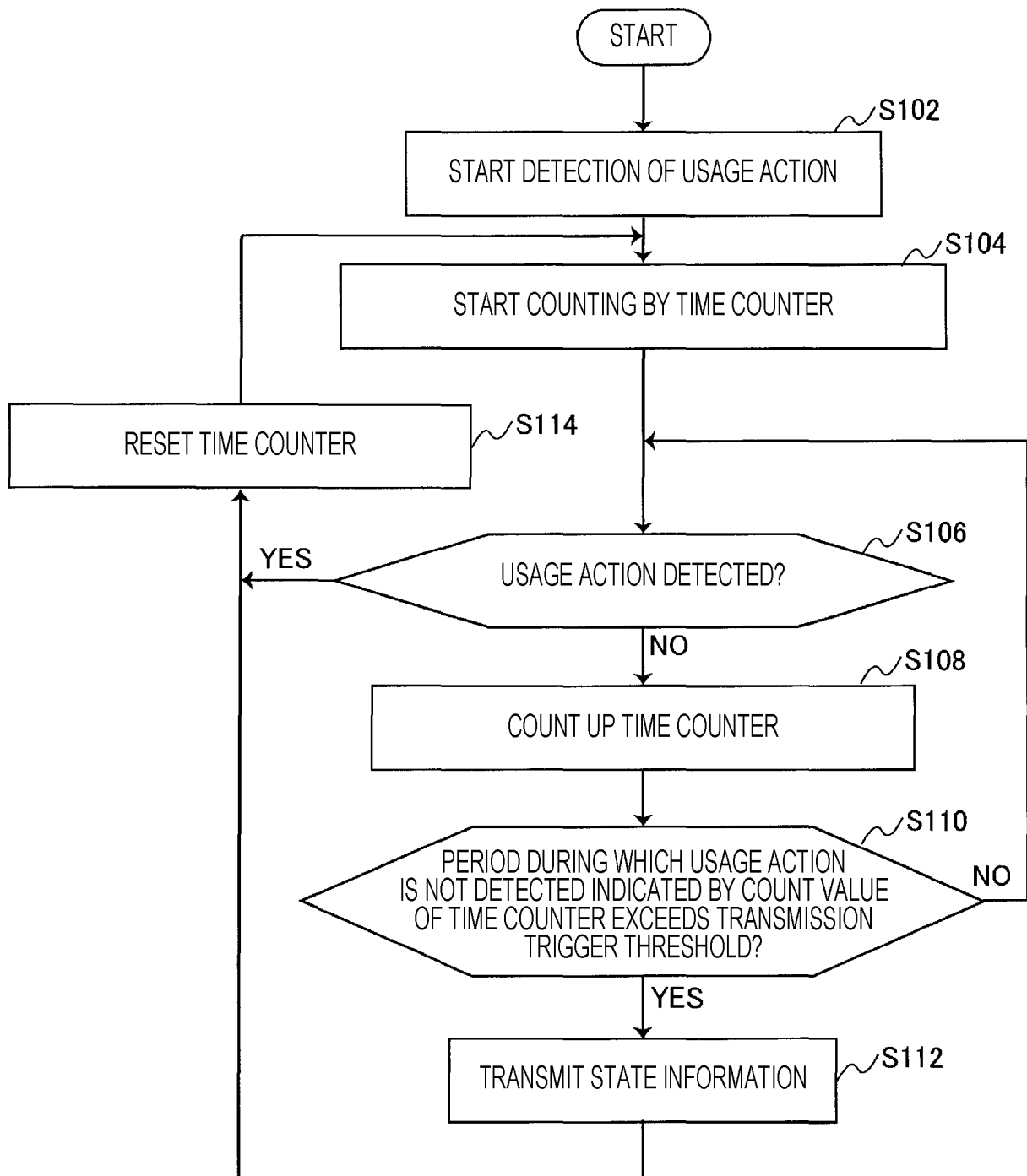


FIG. 5



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INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2020/014555

A. CLASSIFICATION OF SUBJECT MATTER

Int.Cl. A24F40/53 (2020.01) i, A24F40/65 (2020.01) i, A24F47/00 (2020.01) i
 FI: A24F40/65, A24F47/00, A24F40/53

10

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)

Int.Cl. A24F40/53, A24F40/65, A24F47/00

15

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

Published examined utility model applications of Japan	1922-1996
Published unexamined utility model applications of Japan	1971-2020
Registered utility model specifications of Japan	1996-2020
Published registered utility model applications of Japan	1994-2020

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

25

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2015-532112 A (NICOVENTURES HOLDINGS LTD.) 09 November 2015 (2015-11-09), paragraphs [0003], [0024]	1-14
A	JP 2019-50809 A (JAPAN TOBACCO INC.) 04 April 2019 (2019-04-04), entire text, all drawings	1-14

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

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* 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

50

Date of the actual completion of the international search
22 May 2020

Date of mailing of the international search report
09 June 2020

55

Name and mailing address of the ISA/
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