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(71) Applicant: **Japan Tobacco Inc.**
Tokyo 105-6927 (JP)

(72) Inventors:
- **SHIMADA, Yurina**
  Tokyo 130-8603 (JP)
- **KATO, Masato**
  Tokyo 130-8603 (JP)

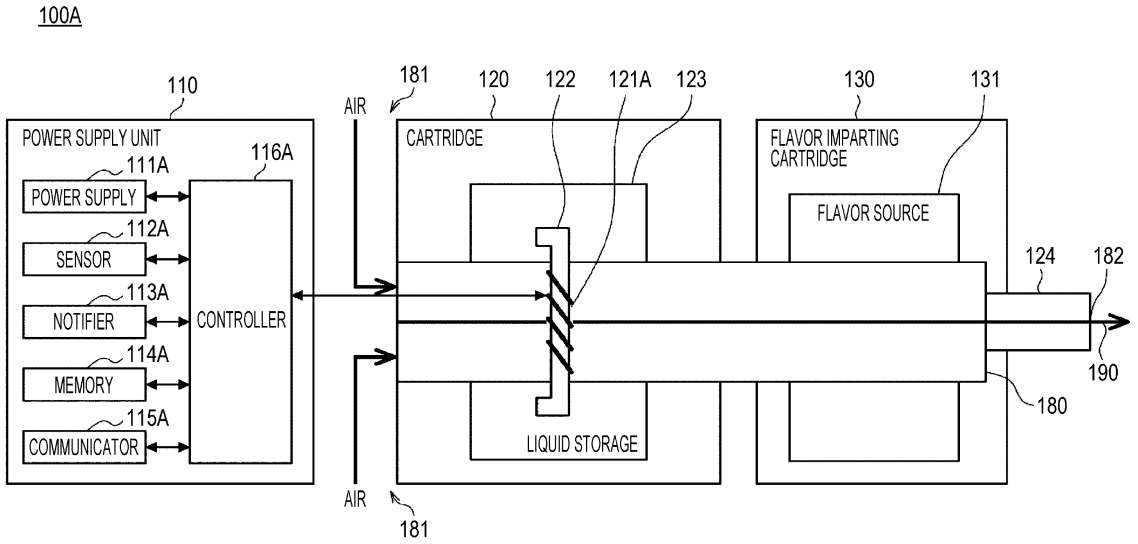
(74) Representative: **Hoffmann Eitle**
Patent- und Rechtsanwälte PartmbB
Arabellastraße 30
81925 München (DE)

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

(57) [Problem] To provide a mechanism capable of further improving the quality of a user's inhalation experience.

[Solution] This control device is equipped with a control part that selects a heating setting to be used by an inhalation device for generating an aerosol to be inhaled by a user by heating an aerosol source according to said heating setting, on the basis of inhalation-related information which is information pertaining the state of the user and/or the environment in which the user inhales the aerosol.

FIG. 1



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Description

Technical Field

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

Background Art

[0002] Inhaler devices that generate a substance to be inhaled by users, such as electronic cigarettes and nebulizers, are widely used. An inhaler device generates an aerosol with a flavor component, for example, using a substrate including an aerosol source for generating an aerosol and a flavor source for imparting a flavor component to the generated aerosol. A user can taste a flavor by inhaling the aerosol with the flavor component generated by the inhaler device. Inhalation, by the user, of an aerosol will be referred to as a "puff" or a "puff action" hereinafter.

[0003] In recent years, various techniques relating to inhaler devices have been developed in order to enrich users' inhalation experience. In Patent Literature 1, for example, a technique for enabling a user to select a temperature to which an inhaler device heats a substrate is disclosed.

Citation List

Patent Literature

[0004] Patent Literature 1: WO 2019/061906 A1

Summary of Invention

Technical Problem

[0005] In the technique disclosed in Patent Literature 1, however, a user is required to select a temperature to which an inhaler device heats a substrate.

[0006] The present invention, therefore, has been conceived in view of the above problem and aims to provide a mechanism capable of further improving a user's inhalation experience.

Solution to Problem

[0007] In order to solve the above problem, an aspect of the present invention provides a control device including a controller that selects a set of heating settings to be used by an inhaler device, which generates an aerosol to be inhaled by a user by heating an aerosol source on a basis of the set of heating settings, on a basis of inhalation-related information, which is information relating to at least a state of the user or an environment where the user inhales the aerosol.

[0008] The controller may select the set of heating settings associated with predetermined conditions satisfied by the inhalation-related information.

[0009] The controller may select the set of heating settings on a basis of a number of predetermined conditions satisfied by the inhalation-related information among a plurality of predetermined conditions.

[0010] The controller may select the set of heating settings on a basis of a sum of scores set for predetermined conditions satisfied by the inhalation-related information among a plurality of predetermined conditions.

[0011] The controller may selects, on a basis of an instruction from the user, predetermined conditions used to select the set of heating settings from the plurality of predetermined conditions.

[0012] The controller may select, on a basis of the inhalation-related information, predetermined conditions used to select the set of heating settings from the plurality of predetermined conditions.

[0013] The controller may select the set of heating settings on a basis of the periodically obtained inhalation-related information.

[0014] The controller may select the set of heating settings on a basis of the inhalation-related information obtained when the inhaler device performs the heating based on the heating settings.

[0015] The controller may switch the set of heating settings used by the inhaler device while the inhaler device is not performing the heating based on the heating settings.

[0016] The controller may switch the set of heating settings used by the inhaler device while the inhaler device is performing the heating based on the heating settings.

[0017] The inhalation-related information regarding the state of the user may include at least biological information regarding the user, information indicating an action taken by the user, information indicating an action that is being taken

by the user, or information indicating an action that the user plans to take.

[0018] The inhalation-related information regarding the environment where the user inhales the aerosol may include at least information regarding time, information regarding a place, information regarding weather, information regarding a use state of the inhaler device, or information regarding another inhaler device around the user.

[0019] The inhaler device may generate the aerosol using a substrate containing the aerosol source. The controller may select the set of heating settings on a basis of a type of substrate used by the inhaler device.

[0020] The controller may select the set of heating settings from a plurality of sets of heating settings that are different from one another in terms of at least a parameter relating to a temperature to which the aerosol source is heated or a parameter relating to a period of time for which the aerosol source is heated.

[0021] In addition, in order to solve the above problem, another aspect of the present invention provides an inhaler device that generates an aerosol to be inhaled by a user by heating an aerosol source on a basis of a set of heating settings. The inhaler device includes a controller that selects a set of heating settings on a basis of inhalation-related information, which is information relating to at least a state of the user or an environment where the user inhales the aerosol, and that performs control in such a way as to heat the aerosol source on a basis of the selected set of heating settings.

[0022] In addition, in order to solve the above problem, another aspect of the present invention provides a control method including selecting a set of heating settings to be used by an inhaler device, which generates an aerosol to be inhaled by a user by heating an aerosol source on a basis of the set of heating settings, on a basis of inhalation-related information, which is information relating to at least a state of the user or an environment where the user inhales the aerosol.

Advantageous Effects of Invention

[0023] As described above, according to the present invention, a mechanism capable of further improving a user's inhalation experience is provided.

Brief Description of Drawings

[0024]

[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 diagram illustrating an example of configuration of a system according to an embodiment of the present invention.
[Fig. 4] Fig. 4 is a diagram illustrating an example of a display screen displayed on a terminal device according to the embodiment.
[Fig. 5] Fig. 5 is a sequence diagram illustrating an example of a process performed by the system according to the embodiment.

Description of Embodiments

[0025] A preferred embodiment of the present invention will be described in detail hereinafter with reference to the accompanying drawings. Structural elements having substantially the same functional configuration will be given the same reference numerals herein and in the drawings, and redundant description thereof is omitted.

<1. Configuration example>

<1.1. Configuration example of inhaler device>

[0026] 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

[0027] Fig. 1 is a schematic diagram of an inhaler device according to a 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.

[0028] 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.

[0029] 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 condenser microphone, 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.

[0030] 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.

[0031] 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.

[0032] 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), Bluetooth (registered trademark), near-field communication (NFC), or a standard using a low-power wide-area network (LPWAN).

[0033] 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.

[0034] 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.

[0035] 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.

[0036] 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.

[0037] 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.

[0038] 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.

[0039] 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.

[0040] 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.

[0041] 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.

[0042] 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.

[0043] 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.

(2) Second configuration example

[0044] 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.

[0045] 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.

[0046] 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 accommodates 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 connects with an airflow path that supplies air to the internal space 141. For example, a side surface of the inhaler device 100 has an air inlet hole that is an inlet of air into the airflow path. For example, the bottom 143 has an air outlet hole that is an outlet of the air from the airflow path to the internal space 141.

[0047] The stick substrate 150 includes a substrate 151 and an inhalation port 152. The substrate 151 includes an aerosol source. In this configuration example, the aerosol source is not limited to a liquid, and may be a solid, instead. 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 airflow path (not illustrated), and the air and an aerosol generated from the substrate 151 reach inside the mouth of the user.

[0048] 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.

[0049] 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.

[0050] 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.

[0051] 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.

[0052] 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 accommodate the stick substrate 150 while sandwiching 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.

[0053] 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. In this case, the inhaler device 100B includes at least an electromagnetic induction source such as a coil that generates a magnetic field instead of the heater 121B. The inhaler device 100B may be provided with a susceptor that produces heat by the induction heating, or the stick substrate 150 may include the susceptor.

[0054] 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 airflow path 180 may supply air to the internal space 141. In this case, a mixture fluid of the 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

(3) Supplementary information

[0055] In the first configuration example, the power supply unit 110, the cartridge 120, and the flavor imparting cartridge 130 operate together to generate the aerosol to be inhaled by the user. The combination of the power supply unit 110, the cartridge 120, and the flavor imparting cartridge 130 may be regarded as an aerosol generation system. Similarly, the inhaler device 100B according to the second configuration example operates together with the stick substrate 150

to generate the aerosol to be inhaled by the user. The combination of the inhaler device 100B and the stick substrate 150, therefore, may be regarded as an aerosol generation system.

[0056] When the inhaler device 100A and the inhaler device 100B need not particularly be distinguished from each other, these will be generically referred to as the inhaler devices 100 while omitting the alphabets at ends of the reference numerals thereof. Similarly, when the structural elements of the inhaler device 100A and the inhaler device 100B need not particularly be distinguished from each other, the alphabets at ends of the reference numerals are omitted. In addition, when the cartridge 120, the flavor imparting cartridge 130, and the stick substrate 150 need not particularly be distinguished from one another, these will be generically referred to as substrates.

<1.2. Configuration example of system>

[0057] Fig. 3 is a diagram illustrating an example of configuration of a system 1 according to the embodiment of the present invention. As illustrated in Fig. 3, the system 1 includes an inhaler device 100 and a terminal device 200. The configuration of the inhaler device 100 is as described above.

[0058] The terminal device 200 is a device used by a user of the inhaler device 100. For example, the terminal device 200 is any information processing device such as a smartphone, a tablet terminal, or a wearable device. Alternatively, the terminal device 200 may be a charger that accommodates the inhaler device 100 and that charges the accommodated inhaler device 100. As illustrated in Fig. 3, the terminal device 200 includes an inputter 210, an outputter 220, a detector 230, a communicator 240, a memory 250, and a controller 260.

[0059] The inputter 210 has a function of receiving inputs of various pieces of information. The inputter 210 may include an input device that receives inputs of information from the user. The input device may be, for example, a button, a keyboard, a touch panel, a microphone, or the like. The inputter 210 may also include various sensors including an image sensor.

[0060] The outputter 220 has a function of outputting information. The outputter 220 may include an output device that outputs information for the user. The output device is, for example, a display device that displays information, a light-emitting device that emits light, a vibration device that vibrates, a sound output device that outputs sound, or the like. An example of the display 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 outputter 220 notifies the user of information by outputting information input from the controller 260.

[0061] The detector 230 has a function of detecting information regarding the terminal device 200. The detector 230 may detect positional information regarding the terminal device 200. For example, the detector 230 receives a global navigation satellite system (GNSS) signal from a GNSS satellite (e.g., a global positioning system (GPS) signal from a GPS satellite) and detects positional information including latitude, longitude, and altitude of the device. The detector 230 may detect movement of the terminal device 200. For example, the detector 230 includes a gyro sensor and an acceleration sensor and detects angular velocity and acceleration.

[0062] The communicator 240 is a communication interface for communicating information with the terminal device 200 and other devices. The communicator 240 performs communication in conformity with any wired or wireless communication standard. Such a communication standard may be, for example, universal serial bus (USB), Wi-Fi (registered trademark), Bluetooth (registered trademark), near-field communication (NFC), or a standard using a low-power wide-area network (LPWAN). For example, the communicator 240 communicates with the inhaler device 100.

[0063] The memory 250 stores various pieces of information. The memory 250 is, for example, a nonvolatile storage medium such as a flash memory.

[0064] The controller 260 functions as an arithmetic processing device or a control device and controls overall operations of the terminal device 200 in accordance with various programs. The controller 260 is achieved by, for example, an electronic circuit such as a central processing unit (CPU) or a microprocessor. The controller 260 may also include a read-only memory (ROM) that stores programs and arithmetic parameters to be used and the like and a random-access memory (RAM) that temporarily stores parameters that change as appropriate and the like. The terminal device 200 performs various types of processing under the control of the controller 260. Processing of information input from the inputter 210, outputting of information by the outputter 220, detection of information by the detector 230, communication of information by the communicator 240, and storing and reading of information by the memory 250 are examples of processing controlled by the controller 260. The controller 260 also controls other types of processing performed by the terminal device 200 including inputting of information to each structural element and processing based on information output from each structural element.

[0065] The functions of the controller 260 may be achieved using an application, instead. The application may be preinstalled or downloaded. Alternatively, the functions of the controller 260 may be achieved by progressive web apps (PWAs).

<2. Technical features>

(1) Heating settings

[0066] The inhaler device 100 generates an aerosol to be inhaled by the user by heating the aerosol source on the basis of heating settings. The heating settings are information that specifies a control sequence of the heater 121. The heating settings may include a parameter relating to a temperature to which the aerosol source is heated. The heating settings may also include a parameter relating to a period of time for which the aerosol source is heated. An example of the parameter relating to a temperature to which the aerosol source is heated is a target value of temperature of the heater 121 (hereinafter also referred to as a target temperature). The heating settings are typically designed such that a flavor tasted by the user when the user inhales an aerosol generated from a substrate becomes optimal. The flavor tasted by the user, therefore, can be optimized by generating an aerosol on the basis of the heating settings.

[0067] Heating settings used by the inhaler device 100A can include information that specifies a target temperature and a period of time for which the target temperature is maintained. In this case, when a user operation for requesting a start of heating is detected, the inhaler device 100A can maintain temperature of the heater 121A at the target temperature for the period of time specified in the heating settings.

[0068] Heating settings used by the inhaler device 100B, on the other hand, can include information that specifies temporal changes in target temperature. In this case, when a user operation for requesting a start of heating is detected, the inhaler device 100B can start the heating and change temperature of the heater 121B in accordance with the temporal changes in the target temperature specified in the heating settings.

[0069] An example of the user operation for requesting a start of heating is an operation performed on the inhaler device 100, such as use of a switch provided for the inhaler device 100 or the like. Another example of the user operation for requesting a start of heating is a puff. Another example of the user operation for requesting a start of heating is insertion of the stick substrate 150 into the inhaler device 100B. The insertion of the stick substrate 150 into the inhaler device 100B can be detected by a capacitive proximity sensor that detects capacitance in space close to the opening 142, a pressure sensor that detects pressure in the internal space 141, or the like.

[0070] The controller 116 can control the temperature of the heater 121 on the basis of a difference between a current temperature (hereinafter also referred to as an actual temperature) of the heater 121 and a target temperature. The temperature control for the heater 121 can be achieved through, for example, known feedback control. The feedback control may be, for example, a proportional-integral-differential (PID) controller. The controller 116 can supply power from the power supply 111 to the heater 121 in a form of pulses based on pulse-width modulation (PWM) or pulse-frequency modulation (PFM). In this case, the controller 116 can control the temperature of the heater 121 by adjusting a duty ratio or frequency of the power pulses in feedback control. Alternatively, the controller 116 may perform simple on/off control in the feedback control. For example, the controller 116 may cause the heater 121 to produce heat until the actual temperature reaches the target temperature, cause the heater 121 to stop producing heat when the actual temperature reaches the target temperature, and cause the heater 121 to produce heat again when the actual temperature falls below the target temperature. The controller 116 may also adjust voltage in the feedback control.

[0071] The temperature of the heater 121 can be quantified, for example, by measuring or estimating an electrical resistance of the heater 121 (more accurately, a heating resistor included in the heater 121). This is because the electrical resistance of the heating resistor varies depending on the temperature. The electrical resistance of the heating resistor can be estimated, for example, by measuring the amount of decrease in voltage of the heating resistor. The amount of decrease in the voltage of the heating resistor can be measured by a voltage sensor that measures a potential difference applied to the heating resistor. In another example, the temperature of the heater 121 can be measured by a temperature sensor, such as a thermistor, provided near the heater 121.

[0072] The parameter that is included in the heating settings and that specifies the temperature to which the aerosol source is heated may be a target value of the electrical resistance of the heater 121, instead of the target temperature.

(2) Selection of heating settings

[0073] The terminal device 200 selects, on the basis of inhalation-related information, a set of heating settings to be used by the inhaler device 100. The inhalation-related information is information relating to at least a state of the user or an environment where the user inhales an aerosol (hereinafter also referred to as an inhalation environment). In particular, the terminal device 200 selects a set of heating settings to be used by the inhaler device 100 automatically, that is, without selection by the user, on the basis of the inhalation-related information. With this configuration, a set of heating settings that suits the state of the user or the inhalation environment of the user is automatically selected. A comfortable inhalation experience where the user can taste an appropriate aerosol without needing to select a set of heating settings, therefore, can be provided for the user

[0074] An example of the inhalation-related information will be described hereinafter.

[0075] The inhalation-related information regarding the state of the user may include biological information regarding the user. The biological information may include information detected by so-called biosensors, such as pulse, blood pressure, body temperature, blood oxygen saturation, and a respiratory rate. Such information may be detected by biosensors provided for the inhaler device 100, the terminal device 200, or a wearable device worn by the user, such as a smartwatch, instead. The biological information may also include information obtained by processing information detected by biosensors, such as a stress level and a relax level estimated from pulse, a respiratory rate, and the like.

[0076] The inhalation-related information regarding the state of the user may include information indicating an action taken by the user, an action that is being taken by the user, or an action that the user plans to take. The user's action may be moving, stationary, doing exercise, falling asleep, waking up, or the like. The user's action can be estimated on the basis of positional information, acceleration, and angular velocity of the terminal device 200, the biological information regarding the user, or the like.

[0077] The inhalation-related information regarding the inhalation environment of the user may include information regarding time. The information regarding time may include information indicating attributes of time, such as weekday/holiday, day, hours of the day, or morning/afternoon/evening. The information regarding time may also include information regarding the user's schedule, such as at work/private, during/before/after an event such as a meeting, or the like. The information regarding the user's schedule can be obtained by referring to information registered in a schedule application installed on the terminal device 200.

[0078] The inhalation-related information regarding the inhalation environment of the user may include information regarding a place. The information regarding a place may include positional information regarding the user. The terminal device 200 can detect the positional information regarding the user. The information regarding a place may include information indicating a type of location of the user, such as indoor/outdoor, inside/outside a vehicle, or home/office/shop. The information indicating the type of location of the user may be obtained by combining the positional information regarding the user with another type of information such as map information or traveling speed of the user.

[0079] The inhalation-related information regarding the inhalation environment of the user may include information regarding weather. The information regarding weather may include atmospheric temperature, a weather condition such as sunny/rainy/cloudy, humidity, wind speed, or the like. A sensor provided for the inhaler device 100 or the terminal device 200 may detect the information regarding weather. Alternatively, the information regarding weather may be obtained from a server on the Internet or the like.

[0080] The inhalation-related information regarding the inhalation environment of the user may include information regarding a use condition of the inhaler device 100. The information regarding a use condition of the inhaler device 100 includes a battery level and use frequency of the inhaler device 100, puff intervals, and the amount of inhalation. The use frequency of the inhaler device 100 may be the number of stick substrates 150 used or the number of puffs in a past predetermined period of time (e.g., 10 minutes or from a time when the inhaler device 100 was turned on to present time). The amount of inhalation may be the amount of inhalation per puff or a total amount of inhalation in a past predetermined period of time. The information regarding the use condition of the inhaler device 100 can be stored in the memory 114 each time the inhaler device 100 is used and transmitted to the terminal device 200 as appropriate.

[0081] The inhalation-related information regarding the inhalation environment of the user may include information regarding other inhaler devices 100 around the user. The information regarding other inhaler devices 100 around the user may include the number of other inhaler devices 100 around the user, distances to the other inhaler devices 100, or density of the other inhaler devices 100. The information regarding other inhaler devices 100 around the user may be obtained through short-distance wireless communication between the inhaler devices 100 or from a server that manages positional information regarding the inhaler devices 100.

[0082] Examples of the inhalation-related information have been described.

[0083] The terminal device 200 selects a heating setting from among a plurality of sets of heating settings that are different from one another in terms of at least the parameter relating to the temperature to which the aerosol source is heated or the parameter relating to the period of time for which the aerosol source is heated. As the target temperature increases, the amount of the aerosol and the flavor component conveyed to the user in each inhalation action increases. In addition, as the period of time for which the target temperature is maintained at the target temperature increases, a period of time for which the user tastes the flavor increases. With this configuration, therefore, an inhalation experience that suits the state of the user or the inhalation environment of the user can be provided. As sets of heating settings, for example, there are three sets of heating settings including a high heating mode, where a heating temperature (i.e., target temperature) is high, a normal mode, where the heating temperature is moderate, and a low heating mode, where the heating temperature is low.

[0084] The terminal device 200 selects a set of heating settings on the basis of the inhalation-related information and predetermined conditions (hereinafter also referred to as selection conditions).

[0085] In an example, the terminal device 200 may select a set of heating settings associated with a selection condition satisfied by the inhalation-related information. In this case, each selection condition is associated with a set of heating settings to be selected when the selection condition is satisfied. In an example, the high heating mode can be associated

with a first selection condition, the normal mode can be associated with a second selection condition, and the low heating mode can be associated with a third selection condition. In this case, the terminal device 200 selects the high heating mode if the first selection condition, the normal mode if the second selection condition is satisfied, and the low heating mode if the third selection condition is satisfied.

[0086] The terminal device 200 may select selection conditions to be used to select a set of heating settings from a plurality of selection conditions on the basis of an instruction from the user. For example, the user enables or disables each of the plurality of selection conditions. Enabled selection conditions are then used to select a set of heating settings. A user instruction can be obtained through a display screen displayed on the terminal device 200. An example of the display screen will be described with reference to Fig. 4.

[0087] Fig. 4 is a diagram illustrating an example of the display screen displayed on the terminal device 200 according to the present embodiment. A display screen 10 illustrated in Fig. 4 shows selection conditions 11A to 11C associated with the high heating mode and switches 12A to 12C for enabling (on) or disabling (off) the selection conditions 11A to 11C, respectively. The user can enable or disable the selection conditions 11A to 11C by selecting the switches 12A to 12C on the display screen 10. In the example illustrated in Fig. 4, the selection conditions 11A and 11B are enabled, and the selection condition 11C is disabled.

[0088] "Smoke upon waking" indicated by the selection condition 11A is satisfied when the inhalation-related information indicates that the user has just woken up. That is, when the selection condition 11A is enabled, the high heating mode is selected if the user has just woken up. "Smoke for stressful time" indicated by the selection condition 11B is satisfied when the inhalation-related information indicates that the user's stress level is high. That is, when the selection condition 11B is enabled, the high heating mode is selected if the user's stress level is higher than or equal to a predetermined value. "First smoke after returning home" indicated by the selection condition 11C is satisfied when the inhalation-related information indicates that the user uses the inhaler device 100 for a first time after returning home. That is, when the selection condition 11C is enabled, the high heating mode is selected if the user uses the inhaler device 100 for the first time after returning home. The selection conditions 11A to 11C may be OR condition for selecting the high heating mode. In this case, if at least one of enabled selection conditions is satisfied, the high heating mode is selected, and if none of the enabled selection conditions is satisfied, the normal mode is selected. The user can enjoy a comfortable inhalation experience by enabling or disabling these selection conditions 11A to 11C in accordance with his/her preference.

[0089] Association between the selection conditions and the heating settings is not limited to the above example. The following table 1 shows another example.

[Table 1]

Table 1. Example of selection conditions associated with high heating mode and normal mode

Classifications of selection conditions	Selection conditions associated with high heating mode	Selection conditions associated with normal mode
Hours of day	Morning, afternoon	Evening, night
Atmospheric temperature	Cold (lower than 25°C)	Hot (25°C or higher)
Weather condition	Snowy, rainy	Sunny, cloudy
Weekday/holiday	Weekday	Holiday
Indoor/outdoor	Outdoor	Indoor
Inside/outside a vehicle	Outside a vehicle	Inside a vehicle
Home/office/shop	Office	Home, shop
Immediately after waking	Immediately after waking	Any time other than immediately after waking
State of stress	High stress	Low stress
Body temperature and pulse	High	Low
Moving/stationary	Moving	Stationary
Use frequency of inhaler device	Low	High
At work/private	At work	Private
Before/after an event (meeting etc.)	Before an event	After an event

(continued)

Immediately after waking	Immediately after waking	Any time other than immediately after waking
Number of other inhaler devices around the user	Many (five or more)	Few (less than four)

[0090] The above table 1 shows an example of the selection conditions associated with the high heating mode and the normal mode. In the example shown in table 1, the high heating mode can be selected in the morning or the afternoon, and the normal mode can be selected in the evening or the night. In addition, when the number of other inhaler devices 100 around the inhaler device 100 is large, the high heating mode can be selected, and when the number is small, the normal mode can be selected. Although table 1 shows an example where one selection condition is associated with one set of heating settings, a plurality of selection conditions may be associated with one set of heating settings, instead. For example, a selection condition relating to hours of the day and a selection condition relating to atmospheric temperature may be combined together, and when atmospheric temperature is lower than 25°C in the morning, the high heating mode may be selected. When atmospheric temperature is 20°C or higher in the evening or the night, on the other hand, the low heating mode may be selected.

[0091] The terminal device 200 may select a set of heating settings on the basis of periodically obtained inhalation-related information. For example, the inhalation-related information may be obtained at predetermined time intervals. With this configuration, the terminal device 200 can select a set of heating settings while constantly tracking the state of the user or the inhalation environment of the user. That is, the terminal device 200 may select a set of heating settings on the basis of temporal changes in the inhalation-related information. As a result, a set of heating settings that suits the state of the user or the inhalation environment of the user can be selected.

[0092] Obtaining surroundings may differ depending on information included in the inhalation-related information, that is, for example, pulse and blood pressure may be obtained at different intervals. Obtaining intervals may be different between information obtained by the inhaler device 100, information obtained by the terminal device 200, and information obtained from the outside, such as a server on the Internet.

[0093] The terminal device 200 causes the inhaler device 100 to use a selected set of heating settings. For example, the terminal device 200 transmits information indicating a selected heating settings to the inhaler device 100. The inhaler device 100 stores the set of heating settings indicated by the received information and will heat the aerosol source on the basis of the stored set of heating settings thereafter.

[0094] The terminal device 200 may switch a set of heating settings used by the inhaler device 100 in a period when the inhaler device 100 is not performing heating based on the heating settings. For example, the terminal device 200 may transmit the information indicating the selected set of heating settings to the inhaler device 100 in a period when the inhaler device 100 is not performing heating based on the heating settings. The inhaler device 100 may then store the set of heating settings indicated by the received information and heat the aerosol source on the basis of a new set of heating settings from next time. With this configuration, a processing load of the inhaler device 100 can be reduced compared to when a set of heating settings used by the inhaler device 100 is switched while the inhaler device 100 is performing heating based on the heating settings.

(3) Process

[0095] Fig. 5 is a sequence diagram illustrating an example of a process performed by the system 1 according to the embodiment. This sequence involves the inhaler device 100 and the terminal device 200.

[0096] As illustrated in Fig. 5, first, the inhaler device 100 obtains inhalation-related information (step S102). For example, the inhaler device 100 detects biological information from the user's fingers holding the inhaler device 100 and reads information regarding a use history of the inhaler device 100 from the memory 114.

[0097] Next, the inhaler device 100 transmits the inhalation-related information obtained in step S102 to the terminal device 200 (step S104).

[0098] Next, the terminal device 200 obtains inhalation-related information (step S106). For example, the terminal device 200 obtains information regarding time by referring to information registered in a schedule application, obtains information regarding a place on the basis of positional information, and obtains information regarding weather from a server on the Internet.

[0099] Next, the terminal device 200 selects a set of heating settings on the basis of a selection condition satisfied by the inhalation-related information obtained in step S104 or S106 (step S108). If a selection condition associated with the high heating mode is satisfied, for example, the terminal device 200 selects the high heating mode. If not, the terminal device 200 selects the normal mode.

[0100] Next, the terminal device 200 transmits information indicating the selected set of heating settings (step S110).

[0101] The inhaler device 100 then heats the aerosol source on the basis of the received set of heating settings (step S112). For example, the inhaler device 100 stores the set of heating settings indicated by the information received in step S110. The inhaler device 100 then heats the aerosol source on the basis of the stored set of heating settings when a user operation for requesting a start of heating is performed.

<3. Modifications>

(1) First modification

[0102] The terminal device 200 may select a set of heating settings on the basis of the number of selection conditions satisfied by the inhalation-related information among a plurality of selection conditions. For example, the terminal device 200 selects a set of heating settings in accordance with the number of selection conditions satisfied by the inhalation-related information among selection conditions associated with the high heating mode shown in the above table 1. The following table 2 shows an example of association between the number of selection conditions satisfied by the inhalation-related information and a set of heating settings.

[Table 2]

Table 2. Example of association between number of selection conditions satisfied by inhalation-related information and set of heating settings

	High heating mode	Normal mode	Low heating mode
Number of selection conditions satisfied by inhalation-related information	6 or more	2 to 5	1 or less

[0103] In the example shown in table 2, the terminal device 200 selects the high heating mode if the number of selection conditions satisfied by the inhalation-related information among the selection conditions associated with the high heating mode shown in the above table 1 is six or more, the normal mode if the number is two or five, and the low heating mode if the number is one or less. Relationships between the number of selection conditions satisfied by the inhalation-related information and a set of heating settings, an example of which is shown in table 2, may be set by the user, instead.

(2) Second modification

[0104] The terminal device 200 may select a set of heating settings on the basis of the sum of scores set for selection conditions satisfied by the inhalation-related information among a plurality of selection conditions. The following table 3 shows an example of scores set for the selection conditions. Table 4 shows an example of sets of heating settings corresponding to the sum of scores.

[Table 3]

Table 3. Example of scores set for selection conditions

Classifications of selection conditions	Selection conditions	Scores	Selection conditions	Scores
Hours of day	Morning, afternoon	5	Evening, night	0
Atmospheric temperature	Cold (lower than 25°C)	5	Hot (25°C or higher)	0
Weather condition	Snowy, rainy	10	Sunny, cloudy	0
Weekday/holiday	Weekday	5	Holiday	-5
Indoor/outdoor	Outdoor	5	Indoor	0
Inside/outside a vehicle	Outside a vehicle	5	Inside a vehicle	0
Home/office/shop	Office	10	Home, shop	-10

(continued)

Table 3. Example of scores set for selection conditions				
Classifications of selection conditions	Selection conditions	Scores	Selection conditions	Scores
Immediately after waking	Immediately after waking	15	Any time other than immediately after waking	0
State of stress	High stress	15	Low stress	-15
Body temperature and pulse	High	5	Low	0
Moving/stationary	Moving	5	Stationary	0
Use frequency of inhaler device	Low	15	High	-10
At work/private	At work	10	Private	-5
Before/after an event (meeting etc.)	Before an event	10	After an event	0
Number of other inhaler devices around	Many (five or more)	10	Few (less than four)	0
the user				

[Table 4]

Table 4. Example of sets of heating settings corresponding to sum of scores			
	High heating mode	Normal mode	Low heating mode
Sum of scores	30 or more	10 to 29	9 or less

[0105] In the example shown in tables 3 and 4, the terminal device 200 selects the high heating mode if the sum of scores set for selection conditions satisfied by the inhalation-related information is 30 or more, the normal mode if the number is 10 to 29, or the low heating mode if the number is nine or less. The scores set for the selection conditions, an example of which is shown in table 3, may be set by the user, instead. Sets of heating settings corresponding to the sum of scores, an example of which is shown in table 4, may be set by the user, instead.

(3) Third modification

[0106] The terminal device 200 may select a set of heating settings on the basis of inhalation-related information obtained when the inhaler device 100 performs heating based on the heating settings. For example, the inhalation-related information may be obtained when a user operation for requesting a start of heating is performed. Here, the inhalation-related information may be obtained between the user operation for requesting a start of heating and an actual start of the heating. The inhaler device 100 may then start the heating using a set of heating settings selected on the basis of the obtained inhalation-related information. With this configuration, a set of heating settings that suits the state of the user or the inhalation environment of the user immediately before a start of heating can be selected.

(4) Fourth modification

[0107] The terminal device 200 may switch a set of heating settings used by the inhaler device 100 while the inhaler device 100 is performing heating based on the heating settings. For example, the terminal device 200 may transmit information indicating a selected set of heating settings to the inhaler device 100 while the inhaler device 100 is performing heating based on the heating settings. The inhaler device 100 may then store the set of heating settings indicated by the received information and switch to the new set of heating settings during the heating. With this configuration, a set of heating settings that suits the user can be immediately applied.

(5) Fifth modification

[0108] The terminal device 200 may select a set of heating settings further on the basis of a type of substrate used by the inhaler device 100. A type of substrate used by the inhaler device 100A in the first configuration example is a brand of the cartridge 120 and the flavor imparting cartridge 130 attached to the power supply unit 110. A type of substrate used by the inhaler device 100B in the second configuration example is a brand of the stick substrate 150 inserted into the inhaler device 100B. The type of substrate can be identified by performing image recognition on appearance of the substrate, such as a color of the substrate or a two-dimensional code, which may be a barcode, given to the substrate. In an example, the terminal device 200 may switch selection conditions used to select a set of heating settings on the basis of the type of substrate used by the inhaler device 100. In another example, when the high heating mode is selected, the terminal device 200 may select a set of heating settings according to the type of substrate used by the inhaler device 100 from a plurality of sets of heating settings belonging to the high heating mode. Since an appropriate set of heating settings can differ depending on the type of substrate, the user's inhalation experience can be further improved with this configuration.

(6) Sixth modification

[0109] The terminal device 200 may select, on the basis of the inhalation-related information, a selection condition used to select a set of heating settings from a plurality of sets of selection conditions. In an example, a selection condition used to select a set of heating settings in the morning or the afternoon and a selection condition used to select a set of heating settings in the evening or the night may be different from each other. With this configuration, the user's effort can be reduced compared to when the user selects a selection condition used to select a set of heating settings from among a plurality of selection conditions.

<4. Supplementary information>

[0110] Although a preferred embodiment of the present invention has been described in detail with reference to the accompanying drawings, the present invention is not limited to this example. It is clear that those who have ordinary knowledge in a technical field to which the present invention pertains can conceive various examples of changes or modifications within the scope of the technical idea described in the claims, and it is understood that these also naturally belong to the technical scope of the present invention.

[0111] Although an example where the terminal device 200 functions as a control device that selects a set of heating settings has been described in the above embodiment, for example, the present invention is not limited to this example. In an example, the inhaler device 100 may function as a control device that selects a set of heating settings. In this case, the inhaler device 100 can select a set of heating settings on the basis of inhalation-related information obtained thereby. It is needless to say that the inhaler device 100 may select a set of heating settings on the basis of inhalation-related information received from the terminal device 200 in addition to, or instead of, inhalation-related information obtained thereby. In addition, the inhaler device 100 may receive, directly from a server on the Internet or indirectly through the terminal device 200, inhalation-related information obtained by the server. In another example, an external device such as a server on the Internet may function as a control device that selects a set of heating settings.

[0112] It is to be noted that the process by each device described herein may be achieved by software, hardware, or a combination of software and hardware. A program constituting software is stored in advance, for example, in a storage medium (more specifically, a non-transitory computer-readable storage medium) provided inside or outside each device. When executed by a computer that controls each device described herein, for example, each program is loaded into a RAM and executed by a processing circuit such as CPU. The storage medium is, for example, a magnetic disk, an optical disc, a magneto-optical disk, a flash memory, or the like. For example, the computer program may be distributed over a network, instead, without using a storage medium. In addition, the computer may be an integrated circuit for a specific application such as an ASIC, a general-purpose processor that executes a function by reading a software program, a computer on a server used for cloud computing, or the like. The process by each device described herein may be performed by a plurality of computers in a distributed manner.

[0113] In addition, the process described herein with reference to the flowchart and the sequence diagram need not necessarily be performed in the illustrated order. Some processing steps may be performed in parallel with each other, instead. Additional processing steps may also be employed, and some processing steps may be omitted.

[0114] The following configurations also belong to the technical scope of the present invention.

(1) A control device including:
a controller that selects a set of heating settings to be used by an inhaler device, which generates an aerosol to be inhaled by a user by heating an aerosol source on a basis of the set of heating settings, on a basis of inhalation-

related information, which is information relating to at least a state of the user or an environment where the user inhales the aerosol.

(2) The control device according to (1),

in which the controller selects the set of heating settings associated with a predetermined condition satisfied by the inhalation-related information.

(3) The control device according to (1),

in which the controller selects the set of heating settings on a basis of a number of predetermined conditions satisfied by the inhalation-related information among a plurality of predetermined conditions.

(4) The control device according to (1),

in which the controller selects the set of heating settings on a basis of a sum of scores set for predetermined conditions satisfied by the inhalation-related information among a plurality of predetermined conditions.

(5) The control device according to any of (2) to (4),

in which the controller selects, on a basis of an instruction from the user, predetermined conditions used to select the set of heating settings from the plurality of predetermined conditions.

(6) The control device according to any of (2) to (4),

in which the controller selects, on a basis of the inhalation-related information, predetermined conditions used to select the set of heating settings from the plurality of predetermined conditions.

(7) The control device according to any of (1) to (6),

in which the controller selects the set of heating settings on a basis of the periodically obtained inhalation-related information.

(8) The control device according to any of (1) to (6),

in which the controller selects the set of heating settings on a basis of the inhalation-related information obtained when the inhaler device performs the heating based on the heating settings.

(9) The control device according to any of (1) to (8),

in which the controller switches the set of heating settings used by the inhaler device while the inhaler device is not performing the heating based on the heating settings.

(10) The control device according to any of (1) to (8),

in which the controller switches the set of heating settings used by the inhaler device while the inhaler device is performing the heating based on the heating settings.

(11) The control device according to any of (1) to (10),

in which the inhalation-related information regarding the state of the user includes at least biological information regarding the user, information indicating an action taken by the user, information indicating an action that is being taken by the user, or information indicating an action that the user plans to take.

(12) The control device according to any of (1) to (11),

in which the inhalation-related information regarding the environment where the user inhales the aerosol includes at least information regarding time, information regarding a place, information regarding weather, information regarding a use state of the inhaler device, or information regarding another inhaler device around the user

(13) The control device according to any of (1) to (12),

in which the inhaler device generates the aerosol using a substrate containing the aerosol source, and

in which the controller selects the set of heating settings on a basis of a type of substrate used by the inhaler device.

(14) The control device according to any of (1) to (13),

in which the controller selects the set of heating settings from a plurality of sets of heating settings that are different from one another in terms of at least a parameter relating to a temperature to which the aerosol source is heated or a parameter relating to a period of time for which the aerosol source is heated.

(15) An inhaler device that generates an aerosol to be inhaled by a user by heating an aerosol source on a basis of a set of heating settings, the inhaler device including:

a controller that selects the set of heating settings on a basis of inhalation-related information, which is information relating to at least a state of the user or an environment where the user inhales the aerosol, and that performs control in such a way as to heat the aerosol source on a basis of the selected set of heating settings.

(16) A control method including:

selecting a set of heating settings to be used by an inhaler device, which generates an aerosol to be inhaled by a user by heating an aerosol source on a basis of the set of heating settings, on a basis of inhalation-related information, which is information relating to at least a state of the user or an environment where the user inhales the aerosol.

Reference Signs List

[0115]

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 inputter
220 outputter
230 detector
240 communicator
250 memory
260 controller

Claims

1. A control device comprising:
a controller that selects a set of heating settings to be used by an inhaler device, which generates an aerosol to be inhaled by a user by heating an aerosol source on a basis of the set of heating settings, on a basis of inhalation-related information, which is information relating to at least a state of the user or an environment where the user inhales the aerosol.

2. The control device according to claim 1,
wherein the controller selects the set of heating settings associated with a predetermined condition satisfied by the inhalation-related information.

3. The control device according to claim 1,
wherein the controller selects the set of heating settings on a basis of a number of predetermined conditions satisfied by the inhalation-related information among a plurality of predetermined conditions.

4. The control device according to claim 1,
wherein the controller selects the set of heating settings on a basis of a sum of scores set for predetermined conditions

satisfied by the inhalation-related information among a plurality of predetermined conditions.

5. The control device according to any of claims 2 to 4,
wherein the controller selects, on a basis of an instruction from the user, predetermined conditions used to select the set of heating settings from the plurality of predetermined conditions.

6. The control device according to any of claims 2 to 4,
wherein the controller selects, on a basis of the inhalation-related information, predetermined conditions used to select the set of heating settings from the plurality of predetermined conditions.

7. The control device according to any of claims 1 to 6,
wherein the controller selects the set of heating settings on a basis of the periodically obtained inhalation-related information.

8. The control device according to any of claims 1 to 6,
wherein the controller selects the set of heating settings on a basis of the inhalation-related information obtained when the inhaler device performs the heating based on the heating settings.

9. The control device according to any of claims 1 to 8,
wherein the controller switches the set of heating settings used by the inhaler device while the inhaler device is not performing the heating based on the heating settings.

10. The control device according to any of claims 1 to 8,
wherein the controller switches the set of heating settings used by the inhaler device while the inhaler device is performing the heating based on the heating settings.

11. The control device according to any of claims 1 to 10,
wherein the inhalation-related information regarding the state of the user includes at least biological information regarding the user, information indicating an action taken by the user, information indicating an action that is being taken by the user, or information indicating an action that the user plans to take.

12. The control device according to any of claims 1 to 11,
wherein the inhalation-related information regarding the environment where the user inhales the aerosol includes at least information regarding time, information regarding a place, information regarding weather, information regarding a use state of the inhaler device, or information regarding another inhaler device around the user.

13. The control device according to any of claims 1 to 12,

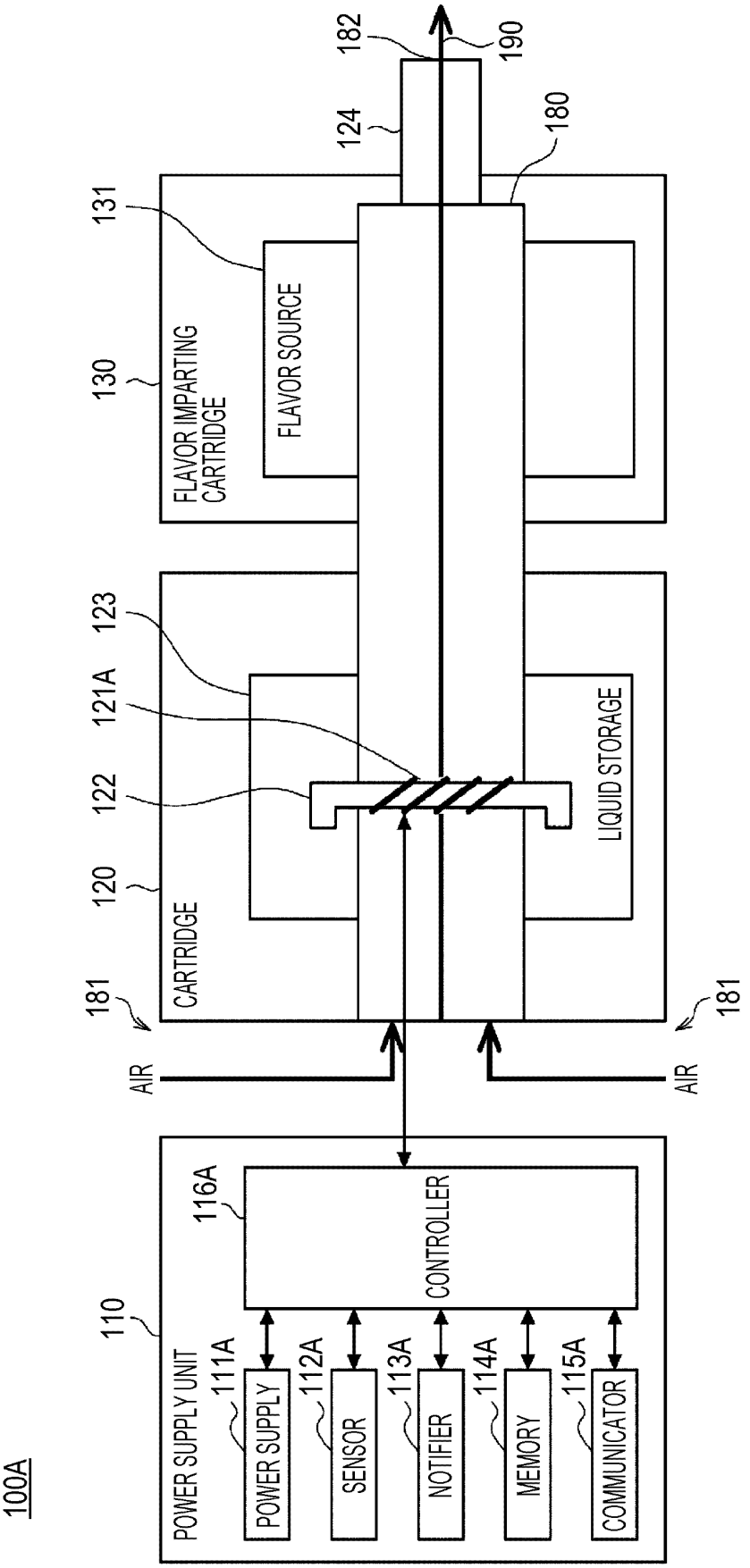
wherein the inhaler device generates the aerosol using a substrate containing the aerosol source, and
wherein the controller selects the set of heating settings on a basis of a type of substrate used by the inhaler device.

14. The control device according to any of claims 1 to 13,
wherein the controller selects the set of heating settings from a plurality of sets of heating settings that are different from one another in terms of at least a parameter relating to a temperature to which the aerosol source is heated or a parameter relating to a period of time for which the aerosol source is heated.

15. An inhaler device that generates an aerosol to be inhaled by a user by heating an aerosol source on a basis of a set of heating settings, the inhaler device comprising:
a controller that selects the set of heating settings on a basis of inhalation-related information, which is information relating to at least a state of the user or an environment where the user inhales the aerosol, and that performs control in such a way as to heat the aerosol source on a basis of the selected set of heating settings.

16. A control method comprising:
selecting a set of heating settings to be used by an inhaler device, which generates an aerosol to be inhaled by a user by heating an aerosol source on a basis of the set of heating settings, on a basis of inhalation-related information, which is information relating to at least a state of the user or an environment where the user inhales the aerosol.

FIG. 1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110
POWER SUPPLY UNIT
111A
POWER SUPPLY
112A
SENSOR
113A
NOTIFIER
114A
MEMORY
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COMMUNICATOR
116A
CONTROLLER
AIR
AIR
181
181
120
CARTRIDGE
122
121A
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FLAVOR IMPARTING CARTRIDGE
131
FLAVOR SOURCE
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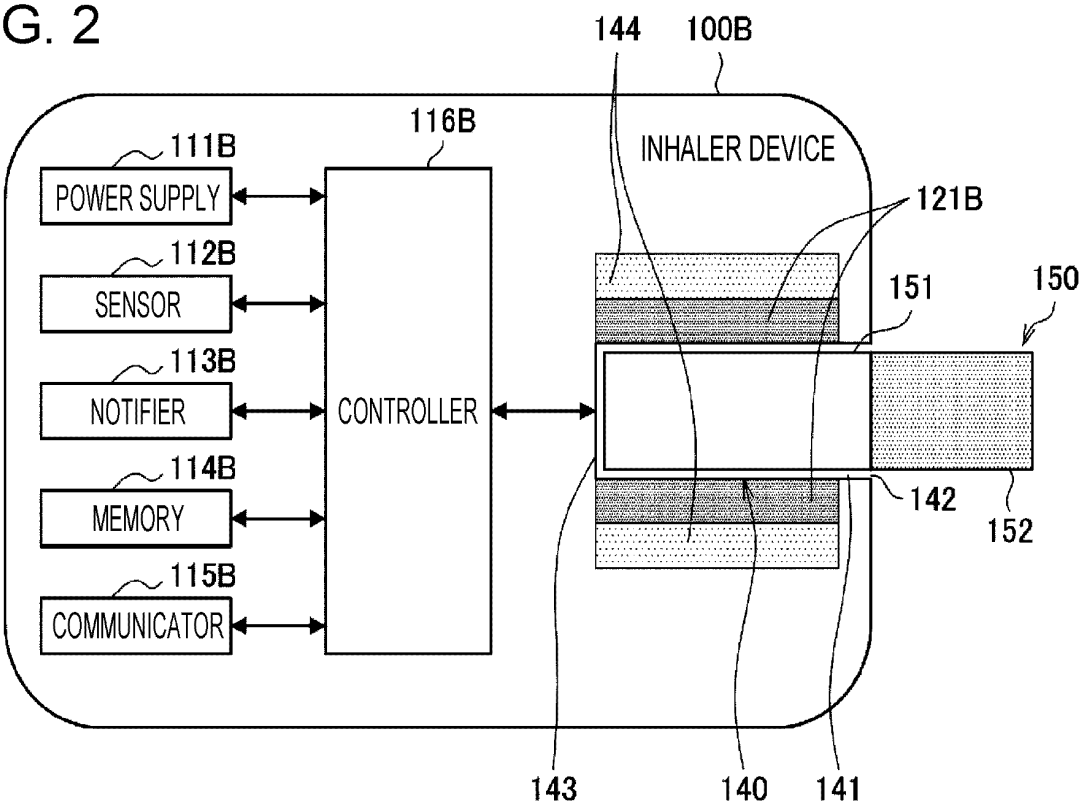
182
190

FIG. 2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100B
116B
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111B
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121B
112B
SENSOR
151
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114B
MEMORY
142
152
115B
COMMUNICATOR
143
140
141

FIG. 3

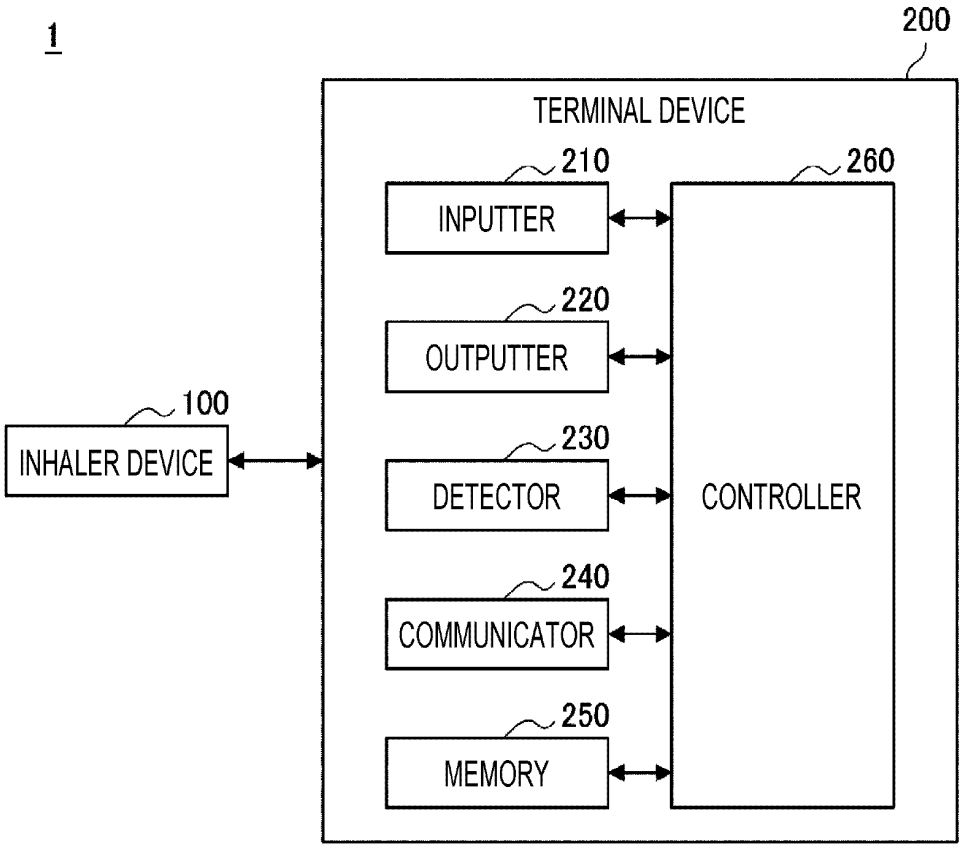

1
200
TERMINAL DEVICE
210
260
INPUTTER
220
OUTPUTTER
100
INHALER DEVICE
230
DETECTOR
CONTROLLER
240
COMMUNICATOR
250
MEMORY

FIG. 4

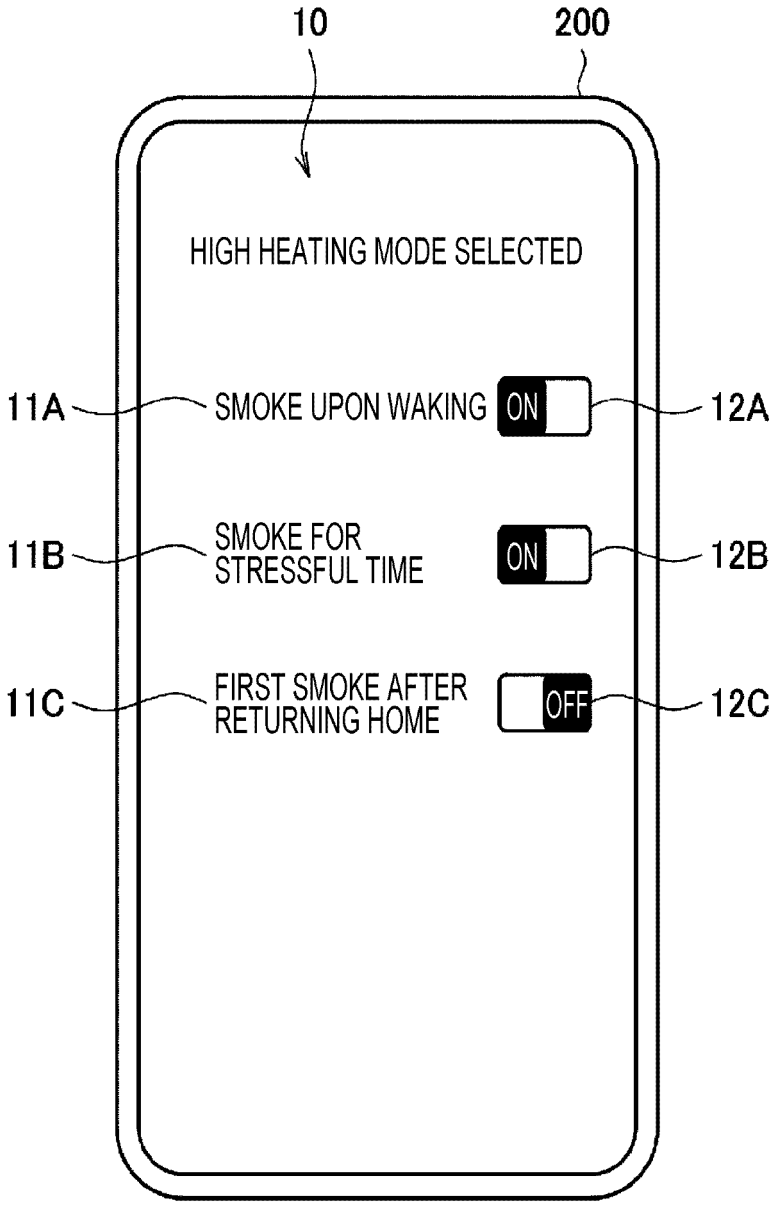
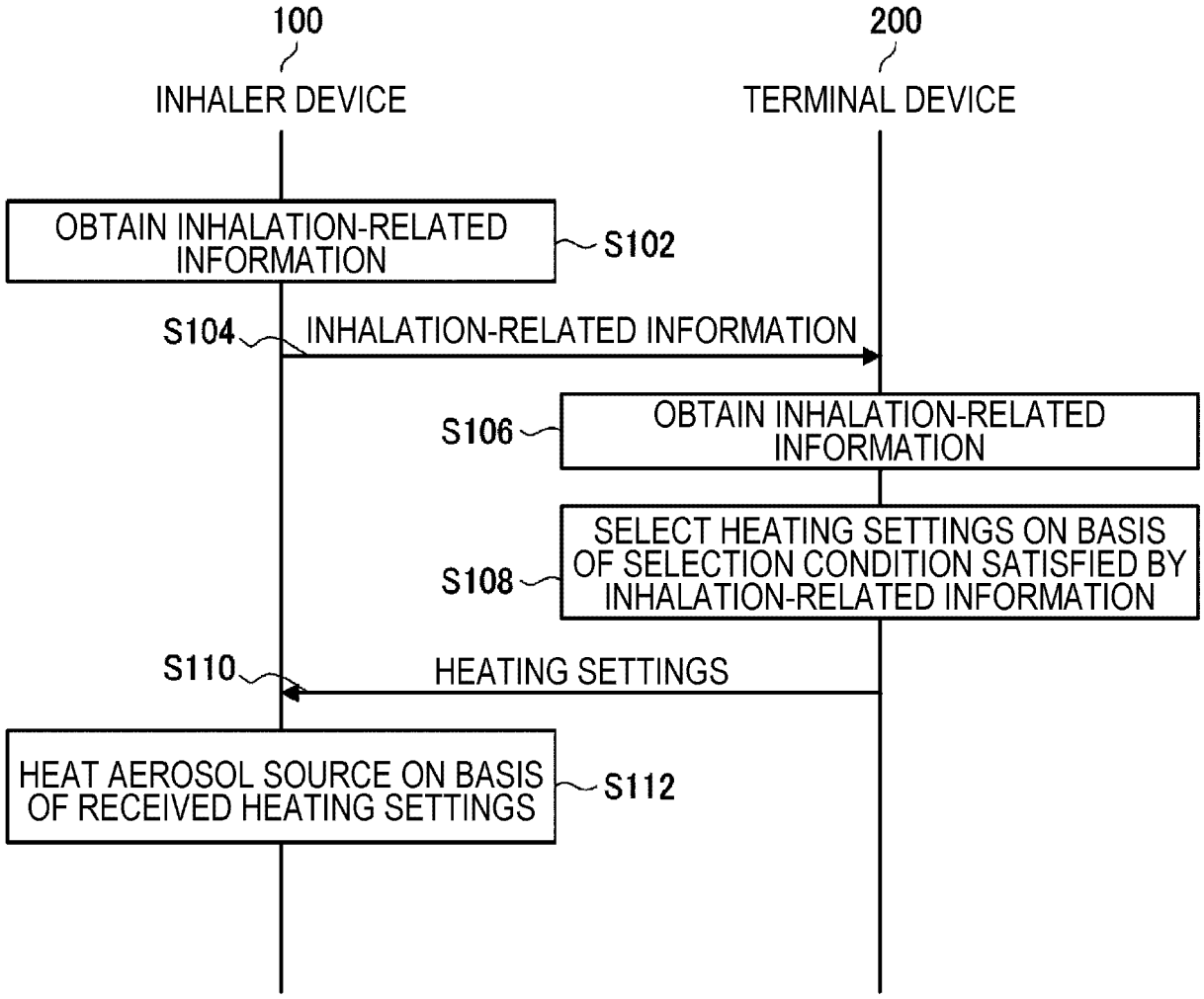

10
200
HIGH HEATING MODE SELECTED
11A
SMOKE UPON WAKING
ON
12A
11B
SMOKE FOR STRESSFUL TIME
ON
12B
11C
FIRST SMOKE AFTER RETURNING HOME
OFF
12C

FIG. 5


100
INHALER DEVICE
200
TERMINAL DEVICE
OBTAIN INHALATION-RELATED INFORMATION
S102
S104
INHALATION-RELATED INFORMATION
S106
OBTAIN INHALATION-RELATED INFORMATION
S108
SELECT HEATING SETTINGS ON BASIS OF SELECTION CONDITION SATISFIED BY INHALATION-RELATED INFORMATION
S110
HEATING SETTINGS
HEAT AEROSOL SOURCE ON BASIS OF RECEIVED HEATING SETTINGS
S112

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2021/046331

A. CLASSIFICATION OF SUBJECT MATTER

A24F 40/57(2020.01)i
FI: A24F40/57

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)

A24F40/00-47/00; A61M15/00-15/06

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 1971-2022
Registered utility model specifications of Japan 1996-2022
Published registered utility model applications of Japan 1994-2022

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 2021-532728 A (KT&G CORP.) 02 December 2021 (2021-12-02) paragraphs [0021]-[0022], [0078]-[0083], [0086]-[0100], [0116]-[0126], fig. 6, 8, 10	1-2, 5-10, 12-16
Y		11-13
A		3-4
X	JP 2021-182914 A (KT&G CORP.) 02 December 2021 (2021-12-02) paragraphs [0117]-[0191], [0227]-[0235], fig. 1-5, 9, 12-13	1-2, 5, 7-16
Y		11-13
A		3-4, 6
X	US 2021/0037889 A1 (PHILIP MORRIS PRODUCTS S.A.) 11 February 2021 (2021-02-11) paragraphs [0001]-[0091], fig. 1-4	1-2, 5, 7-11, 14-16
Y		11-13
A		3-4, 6

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

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
15 February 2022	**08 March 2022**
Name and mailing address of the ISA/JP **Japan Patent Office (ISA/JP)** **3-4-3 Kasumigaseki, Chiyoda-ku, Tokyo 100-8915** **Japan**	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2021/046331

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2021/240617 A1 (JAPAN TOBACCO INC.) 02 December 2021 (2021-12-02) paragraphs [0025]-[0106], fig. 1-5	1-2, 5, 7-11, 14-16
Y		11-13
A		3-4, 6

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/JP2021/046331

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
JP 2021-532728 A	02 December 2021	(Family: none)	
JP 2021-182914 A	02 December 2021	(Family: none)	
US 2021/0037889 A1	11 February 2021	WO 2019/175810 A1 EP 3765132 A1 CN 111757766 A KR 10-2020-0133212 A	
WO 2021/240617 A1	02 December 2021	(Family: none)	

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

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- WO 2019061906 A1 **[0004]**