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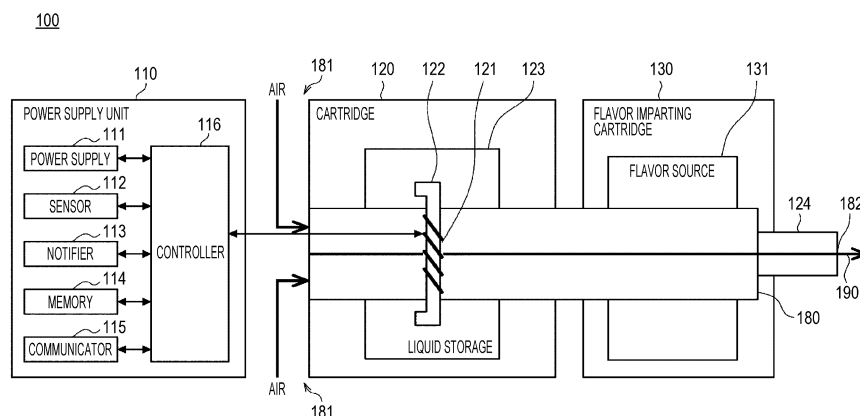
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(54) **INFORMATION PROCESSING DEVICE, INFORMATION PROCESSING METHOD, AND PROGRAM**

(57) [Problem] To provide a mechanism by which the quality of an aspiration experience of a user can be further improved. [Solution] An information processing device according to the present invention comprises a control unit that: generates a display image displaying characteristics of an aerosol generated in a case in which an aspiration device that heats an aerosol source contained in a base material and generates an aerosol has heated the aerosol source on the basis of a heating setting in-

cluding a first parameter pertaining to the temperature at which the aerosol source is to be heated and a second parameter pertaining to the amount of time that the aerosol source is to be heated; and that, on the basis of a user operation that changes the characteristics of the aerosol displayed in the display image that was generated, changes the display of the characteristics of the aerosol in the display image and the first and second parameters included in the heating setting.

FIG. 1



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Description

Technical Field

[0001] The present invention relates to an information processing device, an information processing method, and a program.

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.

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

Citation List

Patent Literature

[0004] Patent Literature 1: WO 2019/104227 A1

Summary of Invention

Technical Problem

[0005] In the technique disclosed in Patent Literature 1, however, it is difficult for a user to understand how a temperature set thereby affects his/her inhalation experience.

[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 an information processing device including a controller that generates a display image for displaying a property of an aerosol generated when an inhaler device, which generates the aerosol by heating an aerosol source included in a substrate, heats the aerosol source on a basis of heating settings including a first parameter relating to a temperature to which the aerosol source is heated and a second parameter relating to time for which the aerosol source is heated and that changes, on a basis of a user operation for changing

the property of the aerosol displayed in the generated display image, the property of the aerosol displayed in the display image and the first parameter and the second parameter included in the heating settings.

[0008] The aerosol source may be a liquid. In a case where the inhaler device detects a puff by the user, the inhaler device may heat the aerosol source on a basis of the first parameter and the second parameter

[0009] The heating settings may include a plurality of the first parameters and a plurality of the second parameters associated with different third parameters. The inhaler device may heat the aerosol source on a basis of the first parameter and the second parameter associated with the third parameter at a time when the puff is detected.

[0010] The third parameters may relate to a number of puffs.

[0011] The third parameters may be a cumulative number of puffs since the substrate began to be used.

[0012] The third parameters may be a number of puffs in a past certain period of time.

[0013] The controller may generate the display image for displaying properties of the aerosol associated with the one or more third parameters. The controller may change, on a basis of a user operation for changing, among the properties of the aerosol associated with the one or more third parameters displayed in the generated display image, a property of the aerosol associated with a certain one of the third parameters, the property of the aerosol associated with the certain third parameter displayed in the display image and the first parameter and the second parameter associated with the certain third parameter.

[0014] The certain third parameter may be the third parameter at a time when the puff will be detected in future.

[0015] The certain third parameter may be the third parameter at a time when the puff will be detected next time.

[0016] The controller may generate the display image for displaying properties of the aerosol associated with the third parameters at one or more times of detection of the puff in past.

[0017] The controller may generate the display image for displaying a property of the aerosol generated when the inhaler device heats the aerosol source on a basis of the currently used heating settings.

[0018] The controller may change the heating settings also on a basis of a type of substrate.

[0019] The controller may change the heating settings also on a basis of an environment where the inhaler device operates.

[0020] The property of the aerosol may include an amount of the aerosol generated.

[0021] The property of the aerosol may include an amount of a flavor component contained in the generated aerosol.

[0022] The controller may control the inhaler device in

such a way as to use new heating settings.

[0023] In addition, in order to solve the above problem, another aspect of the present invention provides an information processing method including generating a display image for displaying a property of an aerosol generated when an inhaler device, which generates the aerosol by heating an aerosol source included in a substrate, heats the aerosol source on a basis of heating settings including a first parameter relating to a temperature to which the aerosol source is heated and a second parameter relating to time for which the aerosol source is heated and changing, on a basis of a user operation for changing the property of the aerosol displayed in the generated display image, the property of the aerosol displayed in the display image and the first parameter and the second parameter included in the heating settings.

[0024] In addition, in order to solve the above problem, another aspect of the present invention provides a program causing a computer to perform a process including generating a display image for displaying a property of an aerosol generated when an inhaler device, which generates the aerosol by heating an aerosol source included in a substrate, heats the aerosol source on a basis of heating settings including a first parameter relating to a temperature to which the aerosol source is heated and a second parameter relating to time for which the aerosol source is heated and changing, on a basis of a user operation for changing the property of the aerosol displayed in the generated display image, the property of the aerosol displayed in the display image and the first parameter and the second parameter included in the heating settings.

Advantageous Effects of Invention

[0025] 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

[0026]

[Fig. 1] Fig. 1 is a schematic diagram schematically illustrating an example of configuration of an inhaler device.

[Fig. 2] Fig. 2 is a diagram illustrating an example of configuration of a system according to an embodiment of the present invention.

[Fig. 3] Fig. 3 is a diagram illustrating an example of a display image generated by a terminal device according to the embodiment.

[Fig. 4] Fig. 4 is a sequence diagram illustrating an example of a process performed by the system according to the embodiment.

[Fig. 5] Fig. 5 is a diagram illustrating an example of another display image generated by the terminal device according to the embodiment.

[Fig. 6] Fig. 6 is a diagram illustrating an example of another display image generated by the terminal device according to the embodiment.

[Fig. 7] Fig. 7 is a diagram illustrating an example of another display image generated by the terminal device according to the embodiment.

Description of Embodiments

[0027] 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>

[0028] 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.

[0029] Fig. 1 is a schematic diagram schematically illustrating an example of configuration of the inhaler device. As illustrated in Fig. 1, an inhaler device 100 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 111, a sensor 112, a notifier 113, a memory 114, a communicator 115, and a controller 116. The cartridge 120 includes a heater 121, 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.

[0030] The power supply 111 stores electric power. The power supply 111 supplies electric power to the structural elements of the inhaler device 100A under the control of the controller 116. The power supply 111 may be a rechargeable battery such as a lithium ion secondary battery.

[0031] The sensor 112 acquires various items of information regarding the inhaler device 100. In an example, the sensor 112 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 112 may be an input device that receives information input by the user, such as a button or a switch.

[0032] The notifier 113 provides information to the user. The notifier 113 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.

[0033] The memory 114 stores various items of infor-

mation for operation of the inhaler device 100. The memory 114 may be a non-volatile storage medium such as flash memory.

[0034] The communicator 115 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).

[0035] The controller 116 functions as an arithmetic processing unit and a control circuit, and controls the overall operations of the inhaler device 100 in accordance with various programs. The controller 116 includes an electronic circuit such as a central processing unit (CPU) or a microprocessor, for example.

[0036] 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 100 that is a medical inhaler such as a nebulizer, the aerosol source may include a medicine.

[0037] 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.

[0038] The heater 121 heats the aerosol source to atomize the aerosol source and generate the aerosol. In the example illustrated in Fig. 1, the heater 121 includes a coil wound around the liquid guide 122. When the heater 121 produces heat, the aerosol source held by the liquid guide 122 is heated and atomized to generate the aerosol. The heater 121 produces heat when receiving electric power from the power supply 111. In an example, the electric power may be supplied in response to the sensor 112 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 112 detecting an end of the user's inhalation and/or an input of predetermined information.

[0039] 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.

[0040] 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 121. 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.

[0041] 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.

[0042] The configuration example of the inhaler device 100 has been described above. The inhaler device 100 is not limited to the above configuration, and may be configured in various ways as exemplified below.

[0043] In an example, the inhaler device 100 does not have to include the flavor imparting cartridge 130. In this case, the cartridge 120 includes the mouthpiece 124.

[0044] In another example, the inhaler device 100 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.

[0045] In addition, means for atomizing the aerosol source is not limited to heating by the heater 121. For example, the means for atomizing the aerosol source may be vibration atomization or induction heating.

<1.2. Configuration example of system>

[0046] Fig. 2 is a diagram illustrating an example of configuration of a system 1 according to the embodiment of the present invention. As illustrated in Fig. 2, the system 1 includes an inhaler device 100 and a terminal device 200. The configuration of the inhaler device 100 is as described above.

[0047] The terminal device 200 is a device used by the user of the inhaler device 100. For example, the terminal device 200 is achieved by 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. 2, the terminal device 200 includes an inputter 210, an outputter 220, a detector 230, a communicator 240, a memory 250, and a controller 260.

[0048] 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 micro-

phone, or the like. The inputter 210 may also include various sensors including an image sensor or the like.

[0049] 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.

[0050] 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.

[0051] The communicator 240 is a communication interface for communicating information between 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 (LP-WAN). For example, the communicator 240 communicates with the inhaler device 100.

[0052] The memory 250 stores various pieces of information. The memory 250 is, for example, a nonvolatile storage medium such as a flash memory.

[0053] 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 the 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.

[0054] 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

[0055] The inhaler device 100 generates an aerosol to be inhaled by the user by heating the aerosol source included in the cartridge 120 on the basis of heating settings. The heating settings are information that specifies a control sequence of the heater 121. 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.

[0056] The heating settings include a first parameter relating to a temperature to which an aerosol source is heated and a second parameter relating to time for which the aerosol source is heated. An example of the first parameter is a target value of temperature (hereinafter also referred to as a target temperature) of the heater 121. An example of the second parameter is length of time for which temperature of the heater 121 is maintained at the target temperature (hereinafter also referred to as a heating period). When the inhaler device 100 detects a user operation for requesting a start of heating, the inhaler device 100 can maintain the temperature of the heater 121 at the target temperature for the heating period. It is assumed in the following description that the first parameter is the target temperature and the second parameter is the heating period.

[0057] An example of the user operation for requesting a start of heating is a puff. When the inhaler device 100 detects a puff by the user, the inhaler device 100 can heat the aerosol source on the basis of the heating settings (i.e., the target temperature and the heating period). Alternatively, the user operation for requesting a start of heating may be an operation performed on the inhaler device 100 such as pressing of a button provided for the inhaler device 100. It is assumed in the following description that the user operation for requesting a start of heating is a puff.

[0058] 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 the 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.

[0059] 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.

(2) Customization of heating settings

[0060] The terminal device 200 generates and displays a display image for displaying properties of the aerosol generated when the inhaler device 100 heats the aerosol source on the basis of the heating settings. The terminal device 200 then changes the properties of the aerosol displayed in the generated display image and the heating settings on the basis of a user operation for changing the properties of the aerosol displayed in the display image. That is, the terminal device 200 generates new heating settings while updating the display image in such a way as to display new properties of the aerosol. With this configuration, the user can change the heating settings while visually recognizing how the properties of the aerosol change. In particular, the terminal device 200 changes the target temperature and the heating period included in the heating settings. More specifically, the terminal device 200 calculates a target temperature and a heating period for achieving the new properties of the aerosol set by the user and determines the target temperature and the heating period as the new heating settings. The user can thus indirectly change the target temperature and

the heating period by changing the properties of the aerosol. The user can easily achieve inhalation experience that the he/she prefers since the user can intuitively change the properties of the aerosol that directly affects his/her inhalation experience.

[0061] The properties of the aerosol include, for example, the amount of aerosol generated (hereinafter also referred to as the amount of atomization). The amount of atomization tends to increase as the target temperature increases. A relationship between the target temperature and the amount of atomization, however, is not linear, and an increase in the amount of atomization according to an increase in the target temperature, for example, can be saturated. The same holds for the heating period. That is, when the user changes the amount of atomization, inhalation experience that the user prefers can be achieved more easily than when the user changes the target temperature and the heating period.

[0062] An example of the display image generated by the terminal device 200 will be described with reference to Fig. 3.

[0063] Fig. 3 is a diagram illustrating an example of the display image generated by the terminal device 200 according to the present embodiment. A display image 10A illustrated in Fig. 3 includes a slider bar 20 as a double-ended arrow and a slider 21 slidable along the slider bar 20. The amount of atomization is set in accordance with a position of the slider 21 on the slider bar 20. The slider bar 20 indicates a range within which the amount of atomization can be set. The slider 21 is an object that the user can use to set the amount of atomization in accordance with the position of the slider 21 on the slider bar 20. The amount of atomization increases as the position of the slider 21 becomes higher and decreases as the position of the slider 21 becomes lower. The user can set the amount of atomization that he/she prefers by moving the slider 21 vertically. The terminal device 200 calculates a target temperature and a heating period for achieving the amount of atomization set on the basis of the slider 21 and determines the target temperature and the heating period as new heating settings.

[0064] The terminal device 200 generates a display image for displaying properties of an aerosol generated when the aerosol source is heated on the basis of heating settings currently used by the inhaler device 100. The terminal device 200 calculates the amount of atomization achieved by the heating settings currently used by the inhaler device 100 on the basis of the heating settings and generates a display image indicating a result of the calculation. An initial position of the slider 21 in the display image 10A illustrated in Fig. 3 may be, for example, a position corresponding to the amount of atomization achieved by the heating settings currently used by the inhaler device 100. In this case, the user can intuitively understand, from the position of the slider 21 before and after a change, a difference between the amount of atomization achieved by the currently used heating settings and the amount of atomization achieved by heating set-

tings after customization.

[0065] The terminal device 200 controls the inhaler device 100 in such a way as to use new heating settings. For example, the terminal device 200 receives, from the inhaler device 100, information indicating the heating settings currently used by the inhaler device 100 and generates and displays the display image 10A illustrated in Fig. 3. The terminal device 200 then calculates a target temperature and a heating period for achieving the amount of atomization set by the user and transmits information indicating new heating settings including the calculated target temperature and heating period to the inhaler device 100. At this time, the terminal device 200 may transmit the new heating settings or differences before and after the change. The inhaler device 100 stores the new heating settings indicated by the received information and operates in accordance with the new heating settings when generating an aerosol next time. With this configuration, the user can freely customize the operation of the inhaler device 100. As a result, the user can find a heating profile that achieves an inhalation feel that he/she prefers, for example, through repeated customization.

(3) Process

[0066] Fig. 4 is a sequence diagram illustrating an example of a process performed by the system 1 according to the present embodiment. This sequence involves the inhaler device 100 and the terminal device 200.

[0067] As illustrated in Fig. 4, first, the inhaler device 100 transmits, to the terminal device 200, information indicating heating settings currently used by the inhaler device 100 (step S102). For example, the inhaler device 100 transmits identification information assigned to the heating settings currently used by the inhaler device 100.

[0068] Next, the terminal device 200 displays a customization screen for heating settings (step S104). For example, the terminal device 200 generates and displays the display image 10A illustrated in Fig. 3, which has been received in step S102 and where the amount of atomization achieved by the heating settings currently used by the inhaler device 100 is the initial position of the slider 21.

[0069] Next, the terminal device 200 changes the heating settings on the basis of a user operation performed on the customization screen (step S106). For example, the terminal device 200 calculates a target temperature and a heating period for achieving the amount of atomization corresponding to a new position of the slider 21 in the display image 10A displayed in step S104 and determines the target temperature and the heating period as new heating settings.

[0070] Next, the terminal device 200 transmits information indicating the new heating settings to the inhaler device 100 (step S108). For example, the terminal device 200 transmits, to the inhaler device 100, new heating settings including the target temperature and the heating

period calculated in step S106.

[0071] The inhaler device 100 then heats the aerosol source on the basis of the new heating settings indicated by the received information (step S110). For example, when a puff by the user is detected, the inhaler device 100 maintains the temperature of the heater 121 at the target temperature indicated by the new heating settings for the heating period indicated by the new heating settings.

<3. Modifications>

(1) First modification

[0072] The heating settings may include a plurality of target temperatures and heating periods associated with different third parameters. That is, the heating settings may include combinations of a target temperature and a heating period associated with a plurality of parameters for the plurality of parameters. The inhaler device 100 may then heat the aerosol source on the basis of a target temperature and a heating period corresponding to a third parameter at a time when a puff is detected. That is, the inhaler device 100 may heat the aerosol source while changing the target temperature and the heating period in accordance with a third parameter at a time when a puff is detected. With this configuration, more appropriate inhalation experience can be achieved.

[0073] The third parameters may relate to the number of puffs. Because a cumulative intake of the flavor component increases as the number of puffs increases, for example, the user can be impressed differently even with the same amount of atomization. By changing the target temperature and the heating period in accordance with the number of puffs, therefore, appropriate inhalation experience that suits the user's sensation, which changes in accordance with the number of puffs, can be achieved.

[0074] In particular, the third parameters may be the cumulative number of puffs since the cartridge 120 began to be used. That is, the heating settings may specify target temperatures and heating periods in a series of puffs from a start to an end of use of the cartridge 120. With this configuration, appropriate inhalation experience can be achieved in a series of puffs from a start to an end of use of the cartridge 120. It is assumed in the following description that the third parameters are the cumulative number of puffs since the cartridge 120 began to be used.

[0075] The terminal device 200 generates a display image for displaying the amount of atomization corresponding to one or more values of the cumulative number of puffs. The terminal device 200 then changes the amount of atomization corresponding to, among the one or more values of the cumulative number of puffs displayed in the display image, a certain value of the cumulative number of puffs displayed in the display image and a target temperature and a heating period associated with the certain value of the cumulative number of puffs on the basis of a user operation for changing the amount

of atomization corresponding to the certain value of the cumulative number of puffs. More specifically, the terminal device 200 calculates a target temperature and a heating period for achieving, among values of the amount of atomization corresponding to the one or more values of the cumulative number of puffs, a value of the amount of atomization corresponding to the certain value of the cumulative number of puffs changed by the user. The terminal device 200 then changes, in the heating settings, a target temperature and a heating temperature corresponding to the certain value of the cumulative number of puffs to the calculated target temperature and heating period. With this configuration, the user can change a target temperature and a heating period corresponding to a certain value of the cumulative number of puffs in the heating settings while visually recognizing how, among values of the amount of atomization corresponding to one or more values of the cumulative number of puffs displayed in a display image, a value of the amount of atomization corresponding to the certain value of the cumulative number of puffs is changed.

[0076] A certain value of the cumulative number of puffs is the cumulative number of puffs at a time when a puff will be detected in the future. That is, the terminal device 200 may change a target temperature and a heating period at a time of a future puff on the basis of a user operation for changing the amount of atomization at the time of the future puff.

[0077] In particular, a certain value of the cumulative number of puffs may be the cumulative number of puffs at a time when a puff will be detected next time. That is, the terminal device 200 may change a target temperature and a heating period at a time of a next puff on the basis of a user operation for changing the amount of atomization at the time of the next puff.

[0078] The terminal device 200 may generate a display image for displaying values of the amount of atomization corresponding to values of the cumulative number of puffs at one or more times when a puff was detected in the past as a display image for displaying values of the amount of atomization corresponding to one or more values of the cumulative number of puffs. That is, the terminal device 200 may generate a display image for displaying the amount of atomization at past puffs. With this configuration, the user can change the amount of atomization at next and later puffs while visually recognizing the amount of atomization at past puffs. As a result, the user can design the amount of atomization at next and later puffs while visually recognizing the amount of atomization at past puffs and remembering inhalation feels of the past puffs.

[0079] Examples of another display image generated by the terminal device 200 will be described with reference to Figs. 5 to 7.

[0080] Fig. 5 is a diagram illustrating an example of the display image generated by the terminal device 200 according to the present embodiment. A display image 10B illustrated in Fig. 5 shows a graph 30B indicating the

amount of atomization at each of values of the cumulative number of puffs. A horizontal axis of this graph represents the cumulative number of puffs. A vertical axis of this graph represents the amount of atomization. In the display image 10B, a total of three puffs have been performed, and a next puff is displayed at a time of a fourth puff. The display image 10B shows marks 31A to 31C indicating the amount of atomization of the aerosol caused by the total of three puffs performed in the past. As indicated by the marks 31A to 31C, the amount of atomization caused by a first puff is the largest, and then the amount of atomization gradually decreases until a third puff. The display image 10B also shows a slider 21 indicating the amount of atomization at the next fourth puff and a slider bar 20 indicating a range within which the slider 21 can be slid. The slider bar 20 and the slider 21 are as described above with reference to Fig. 3. The user can set the amount of atomization that he/she prefers for the next fourth puff by vertically moving the slider 21.

[0081] Fig. 6 is a diagram illustrating an example of another display image generated by the terminal device 200 according to the present embodiment. A display image 10C illustrated in Fig. 6 shows a graph 30C indicating the amount of atomization at each of values of the cumulative number of puffs. A horizontal axis of this graph represents the cumulative number of puffs. A vertical axis of this graph represents the amount of atomization. In the display image 10C, a total of three puffs have been performed, and a next puff is displayed at a time of a fourth puff. The display image 10C shows marks 31A to 31C indicating the amount of atomization of the aerosol caused by the total of three puffs performed in the past. The display image 10B also shows sliders 21A to 21H indicating the amount of atomization at fourth to eleventh puffs performed in the future and slider bars 20A to 20H indicating ranges within which the sliders 21A to 21H can be slid. The user can set the amount of atomization that he/she prefers for the fourth to eleventh puffs by vertically moving the sliders 21A to 21H.

[0082] Fig. 7 is a diagram illustrating an example of another display image generated by the terminal device 200 according to the present embodiment. A display image 10D illustrated in Fig. 7 shows a graph 30D indicating the amount of atomization at each of values of the cumulative number of puffs. A horizontal axis of this graph represents the cumulative number of puffs. A vertical axis of this graph represents the amount of atomization. In the display image 10D, a total of three puffs have been performed, and a next puff is displayed at a time of a fourth puff. The display image 10D shows, as with the display image 10C illustrated in Fig. 6, marks 31A to 31C, sliders 21A to 21H, and slider bars 20A to 20H. The terminal device 200, however, adjusts initial positions of the sliders 21A to 21H in the display image 10D such that the amount of atomization becomes consistent over time. As a result, as illustrated in Fig. 7, positions of the marks 31A to 31C and the initial positions of the sliders 21A to

21H smoothly change as the cumulative number of puffs increases. The user can prevent inappropriate inhalation experience, such as a sharp change in the amount of atomization between a previous puff and a next puff, by performing customization with reference to the initial positions of the sliders 21A to 21H.

(2) Second modification

[0083] The terminal device 200 may change the heating settings also on the basis of a type of cartridge 120 used by the inhaler device 100. More specifically, the terminal device 200 may calculate a target temperature and a heating period for achieving, when the aerosol source included in the cartridge 120 is heated, the amount of atomization changed by the user and determine the target temperature and the heating period as new heating settings. For example, the terminal device 200 multiplies a target temperature calculated in accordance with the amount of atomization by 1.02 for a cartridge 120 whose aerosol source includes menthol and uses a target temperature calculated in accordance with the amount of atomization for other cartridges 120. An aerosol source included in a cartridge 120 can differ depending on the type of cartridge 120. Even when heat is produced on the basis of the same heating settings, therefore, the amount of atomization can vary depending on the type of cartridge 120. With this configuration, therefore, appropriate heating settings that suit the type of cartridge 120 used by the inhaler device 100 can be generated.

[0084] Various methods may be used to identify the type of cartridge 120 used by the inhaler device 100. In an example, the type of cartridge 120 used by the inhaler device 100 may be identified by performing image recognition on a color, a twodimensional code, or the like given to the cartridge 120. In another example, the type of cartridge 120 used by the inhaler device 100 can be identified on the basis of a potential resistance value at a time when the power supply unit 110 applies voltage to the heater 121 of the cartridge 120 connected to the power supply unit 110.

[0085] For the same reason as above, the terminal device 200 may change the heating settings also on the basis of a type of flavor imparting cartridge 130 used by the inhaler device 100.

(3) Third modification

[0086] The terminal device 200 may change the heating settings also on the basis of an environment where the inhaler device 100 operates. More specifically, the terminal device 200 may calculate a target temperature and a heating period for achieving the amount of atomization changed by the user in an environment where the inhaler device 100 operates and determine the target temperature and the heating period as new heating settings. An example of the environment where the inhaler

device 100 operates is atmospheric temperature and humidity. For example, if atmospheric temperature is higher than or equal to a certain value, the terminal device 200 multiplies a target temperature calculated in accordance with the amount of atomization by 0.98, and if atmospheric temperature is lower than the certain value, the terminal device 200 uses a target temperature calculated in accordance with the amount of atomization as is. Even when heat is produced on the basis of the same heating settings, the amount of atomization can vary depending on the environment where the inhaler device 100 operates. With this configuration, therefore, appropriate heating settings that suit the environment where the inhaler device 100 operates can be generated.

[0087] Information indicating the environment where the inhaler device 100 operates may be obtained by the inhaler device 100 or the terminal device 200. In an example, a temperature sensor or a humidity sensor provided for the inhaler device 100 or the terminal device 200 can detect atmospheric temperature or humidity. In another example, the information indicating the environment where the inhaler device 100 operates may be provided from an external apparatus such as a server on the Internet.

[0088] <4. Supplementary information>

[0089] 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 alterations 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.

[0090] Although an example where the terminal device 200 generates and displays a display image, receives a user operation, and generates new heating settings has been described in the above embodiment, the present invention is not limited to this example. An apparatus that generates a display image, an apparatus for display, an apparatus that receives a user operation, and an apparatus that generates new heating settings are not limited to the terminal device 200 and may be achieved by different apparatuses, instead. In an example, the inhaler device 100 may generate and display a display image, receive a user operation, and generate new heating settings. In another example, a server on the Internet may generate a display image, the terminal device 200 may display the display image and receive a user operation, and the server on the Internet may generate new heating settings.

[0091] Although an example where a property of the aerosol to be displayed in a display image and changed is the amount of atomization has been described in the above embodiment, the present invention is not limited to this example. The properties of the aerosol may include the amount of the flavor component contained in the gen-

erated aerosol in addition to, or instead of, the amount of atomization. The amount of the flavor component contained in the aerosol is at least the amount, density, or volume of the flavor component contained in a certain volume of aerosol. For example, the user performs a user operation for intensifying or diluting the flavor instead of a user operation for increasing or decreasing the amount of atomization. The terminal device 200 then changes the heating settings on the basis of the user operation. With this configuration, the user can easily achieve a flavor that he/she prefers.

[0092] Although an example where the first parameter included in the heating profile is the target temperature and the second parameter is the length of time for which the temperature of the heater 121 is maintained at the target temperature has been described in the above embodiment, the present invention is not limited to this. In an example, the first parameter may be a target value of the electrical resistance of the heater 121. In another example, the second parameter may be length of time for which voltage is applied to the heater 121. In this case, the length of time for which the temperature or the resistance value of the heater 121 is maintained at the target value specified by the first parameter is smaller than the length of time specified by the second parameter.

[0093] Although an example where the third parameter is the cumulative number of puffs since the cartridge 120 began to be used has been described in the above embodiment, the present invention is not limited to this example.

[0094] In an example, the third parameter may be the number of puffs performed in a past certain period of time (e.g., 3 minutes). The user can successively perform puffs in a short period of time like when the user uses a cigarette. In view of this, the heating settings may specify a target temperature and a heating period in a series of puffs successively performed in a short period of time. With this configuration, an inhalation feel of the inhaler device 100 can be changed in a series of successively performed puffs like when an inhalation feel of a cigarette changes from a time when the user lights the cigarette until the user finishes smoking the cigarette.

[0095] In another example, the third parameter may be, for example, time. More specifically, the third parameter may be time elapsed since the cartridge 120 began to be used. The aerosol source included in the cartridge 120 can volatilize naturally over time in addition to the heating by the heater 121. With this configuration, therefore, appropriate inhalation experience that takes into account the volatilization of the aerosol source can be achieved. The third parameter may be a combination of a plurality of parameters and, for example, may be a combination of the number of puffs and time.

[0096] 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. In addition, the process by each device described herein may be performed by a plurality of computers in a distributed manner.

[0097] 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, or some processing steps may be omitted.

[0098] The following configurations also belong to the technical scope of the present invention.

(1) An information processing device including:
a controller that generates a display image for displaying a property of an aerosol generated when an inhaler device, which generates the aerosol by heating an aerosol source included in a substrate, heats the aerosol source on a basis of heating settings including a first parameter relating to a temperature to which the aerosol source is heated and a second parameter relating to time for which the aerosol source is heated and that changes, on a basis of a user operation for changing the property of the aerosol displayed in the generated display image, the property of the aerosol displayed in the display image and the first parameter and the second parameter included in the heating settings.

(2) The information processing device according to (1),

in which the aerosol source is a liquid, and
in which, in a case where the inhaler device detects a puff by the user, the inhaler device heats the aerosol source on a basis of the first parameter and the second parameter.

(3) The information processing device according to (2),

in which the heating settings include a plurality of the first parameters and a plurality of the second parameters associated with different third parameters, and
in which the inhaler device heats the aerosol

source on a basis of the first parameter and the second parameter associated with the third parameter at a time when the puff is detected.

- (4) The information processing device according to (3),
in which the third parameters relate to a number of puffs. 5
- (5) The information processing device according to (4),
in which the third parameters are a cumulative number of puffs since the substrate began to be used. 10
- (6) The information processing device according to (4),
in which the third parameters are a number of puffs in a past certain period of time. 15
- (7) The information processing device according to any of (3) to (6),
in which the controller generates the display image for displaying properties of the aerosol associated with the one or more third parameters, and
in which the controller changes, on a basis of a user operation for changing, among the properties of the aerosol associated with the one or more third parameters displayed in the generated display image, a property of the aerosol associated with a certain one of the third parameters, the property of the aerosol associated with the certain third parameter displayed in the display image and the first parameter and the second parameter associated with the certain third parameter. 20 25 30 35
- (8) The information processing device according to (7),
in which the certain third parameter is the third parameter at a time when the puff will be detected in future. 40
- (9) The information processing device according to (8),
in which the certain third parameter is the third parameter at a time when the puff will be detected next time. 45
- (10) The information processing device according to any of (3) to (9),
in which the controller generates the display image for displaying properties of the aerosol associated with the third parameters at one or more times of detection of the puff in past. 50
- (11) The information processing device according to any of (1) to (10),
in which the controller generates the display image for displaying a property of the aerosol generated when the inhaler device heats the aerosol source on a basis of the currently used heating settings. 55

- (12) The information processing device according to any of (1) to (11),
in which the controller changes the heating settings also on a basis of a type of substrate.
- (13) The information processing device according to any of (1) to (12),
in which the controller changes the heating settings also on a basis of an environment where the inhaler device operates.
- (14) The information processing device according to any of (1) to (13),
in which the property of the aerosol includes an amount of the aerosol generated.
- (15) The information processing device according to any of (1) to (13),
in which the property of the aerosol includes an amount of a flavor component contained in the generated aerosol.
- (16) The information processing device according to any of (1) to (15),
in which the controller controls the inhaler device in such a way as to use new heating settings.
- (17) An information processing method including:

generating a display image for displaying a property of an aerosol generated when an inhaler device, which generates the aerosol by heating an aerosol source included in a substrate, heats the aerosol source on a basis of heating settings including a first parameter relating to a temperature to which the aerosol source is heated and a second parameter relating to time for which the aerosol source is heated; and
changing, on a basis of a user operation for changing the property of the aerosol displayed in the generated display image, the property of the aerosol displayed in the display image and the first parameter and the second parameter included in the heating settings.

- (18) A program causing a computer to perform a process including:

generating a display image for displaying a property of an aerosol generated when an inhaler device, which generates the aerosol by heating an aerosol source included in a substrate, heats the aerosol source on a basis of heating settings including a first parameter relating to a temperature to which the aerosol source is heated and a second parameter relating to time for which the aerosol source is heated; and
changing, on a basis of a user operation for changing the property of the aerosol displayed in the generated display image, the property of the aerosol displayed in the display image and the first parameter and the second parameter included in the heating settings.

Reference Signs List

[0099]

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
 200 terminal device
 210 inputter
 220 outputter
 230 detector
 240 communicator
 250 memory
 260 controller

Claims

1. An information processing device comprising:
 a controller that generates a display image for displaying a property of an aerosol generated when an inhaler device, which generates the aerosol by heating an aerosol source included in a substrate, heats the aerosol source on a basis of heating settings including a first parameter relating to a temperature to which the aerosol source is heated and a second parameter relating to time for which the aerosol source is heated and that changes, on a basis of a user operation for changing the property of the aerosol displayed in the generated display image, the property of the aerosol displayed in the display image and the first parameter and the second parameter included in the heating settings.
2. The information processing device according to claim 1,
 wherein the aerosol source is a liquid, and
 wherein, in a case where the inhaler device detects a puff by the user, the inhaler device heats the aerosol source on a basis of the first parameter and the second parameter.
3. The information processing device according to claim 2,

wherein the heating settings include a plurality of the first parameters and a plurality of the second parameters associated with different third parameters, and

wherein the inhaler device heats the aerosol source on a basis of the first parameter and the second parameter associated with the third parameter at a time when the puff was detected.

4. The information processing device according to claim 3,
 wherein the third parameters relate to a number of puffs.

5. The information processing device according to claim 4,
 wherein the third parameters are a cumulative number of puffs since the substrate began to be used.

6. The information processing device according to claim 4,
 wherein the third parameters are a number of puffs in a past certain period of time.

7. The information processing device according to any of claims 3 to 6,

wherein the controller generates the display image for displaying properties of the aerosol associated with the one or more third parameters, and

wherein the controller changes, on a basis of a user operation for changing, among the properties of the aerosol associated with the one or more third parameters displayed in the generated display image, a property of the aerosol associated with a certain one of the third parameters, the property of the aerosol associated with the certain third parameter displayed in the display image and the first parameter and the second parameter associated with the certain third parameter.

8. The information processing device according to claim 7,
 wherein the certain third parameter is the third parameter at a time when the puff will be detected in future.

9. The information processing device according to claim 8,
 wherein the certain third parameter is the third parameter at a time when the puff will be detected next time.

10. The information processing device according to any of claims 3 to 9,

wherein the controller generates the display image for displaying properties of the aerosol associated with the third parameters at one or more times of detection of the puff in past.

11. The information processing device according to any of claims 1 to 10,
wherein the controller generates the display image for displaying a property of the aerosol generated when the inhaler device heats the aerosol source on a basis of the currently used heating settings. 5
12. The information processing device according to any of claims 1 to 11,
wherein the controller changes the heating settings also on a basis of a type of substrate. 10
13. The information processing device according to any of claims 1 to 12,
wherein the controller changes the heating settings also on a basis of an environment where the inhaler device operates. 20
14. The information processing device according to any of claims 1 to 13,
wherein the property of the aerosol includes an amount of the aerosol generated. 25
15. The information processing device according to any of claims 1 to 13,
wherein the property of the aerosol includes an amount of a flavor component contained in the generated aerosol. 30
16. The information processing device according to any of claims 1 to 15,
wherein the controller controls the inhaler device in such a way as to use new heating settings. 35
17. An information processing method comprising: 40

generating a display image for displaying a property of an aerosol generated when an inhaler device, which generates the aerosol by heating an aerosol source included in a substrate, heats the aerosol source on a basis of heating settings including a first parameter relating to a temperature to which the aerosol source is heated and a second parameter relating to time for which the aerosol source is heated; and 45

changing, on a basis of a user operation for changing the property of the aerosol displayed in the generated display image, the property of the aerosol displayed in the display image and the first parameter and the second parameter included in the heating settings. 50

18. A program causing a computer to perform a process

comprising:

generating a display image for displaying a property of an aerosol generated when an inhaler device, which generates the aerosol by heating an aerosol source included in a substrate, heats the aerosol source on a basis of heating settings including a first parameter relating to a temperature to which the aerosol source is heated and a second parameter relating to time for which the aerosol source is heated; and changing, on a basis of a user operation for changing the property of the aerosol displayed in the generated display image, the property of the aerosol displayed in the display image and the first parameter and the second parameter included in the heating settings.

FIG. 1

100

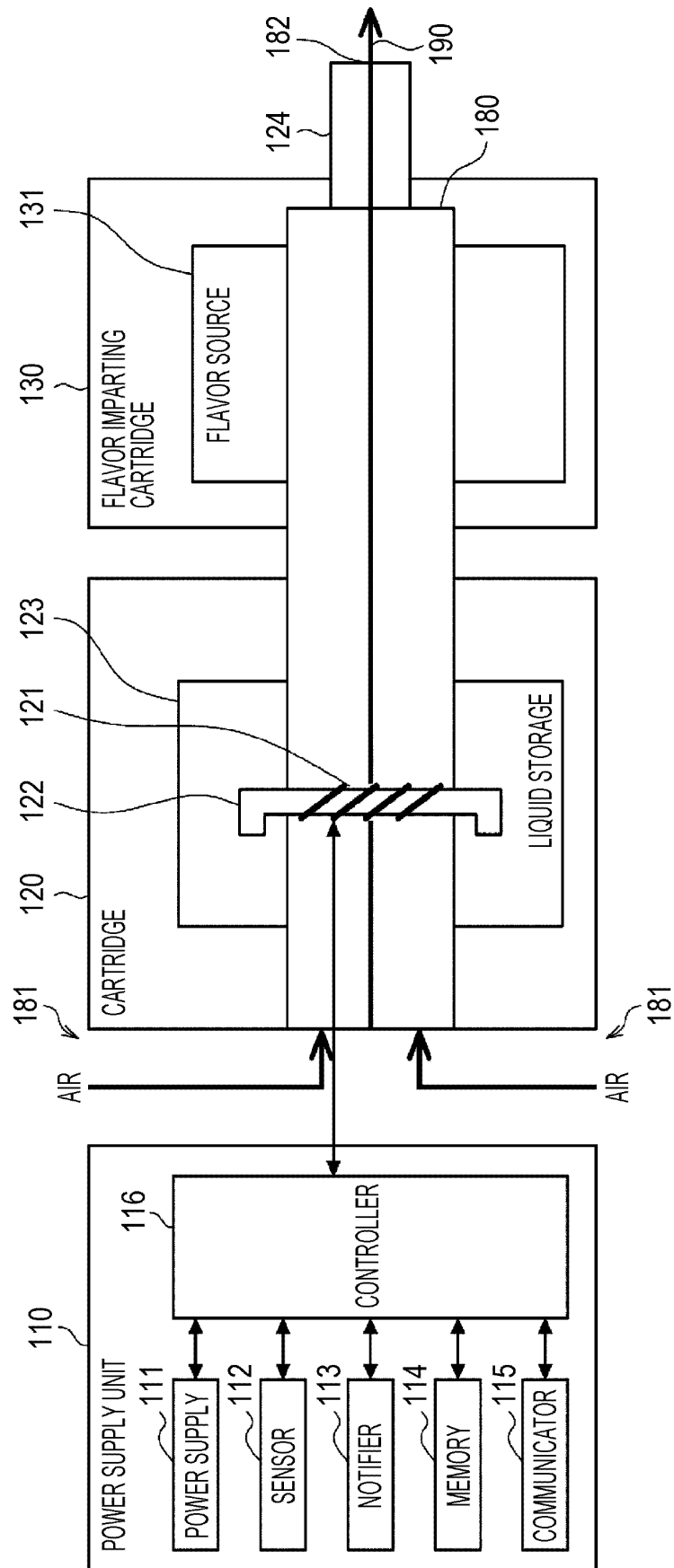


FIG. 2

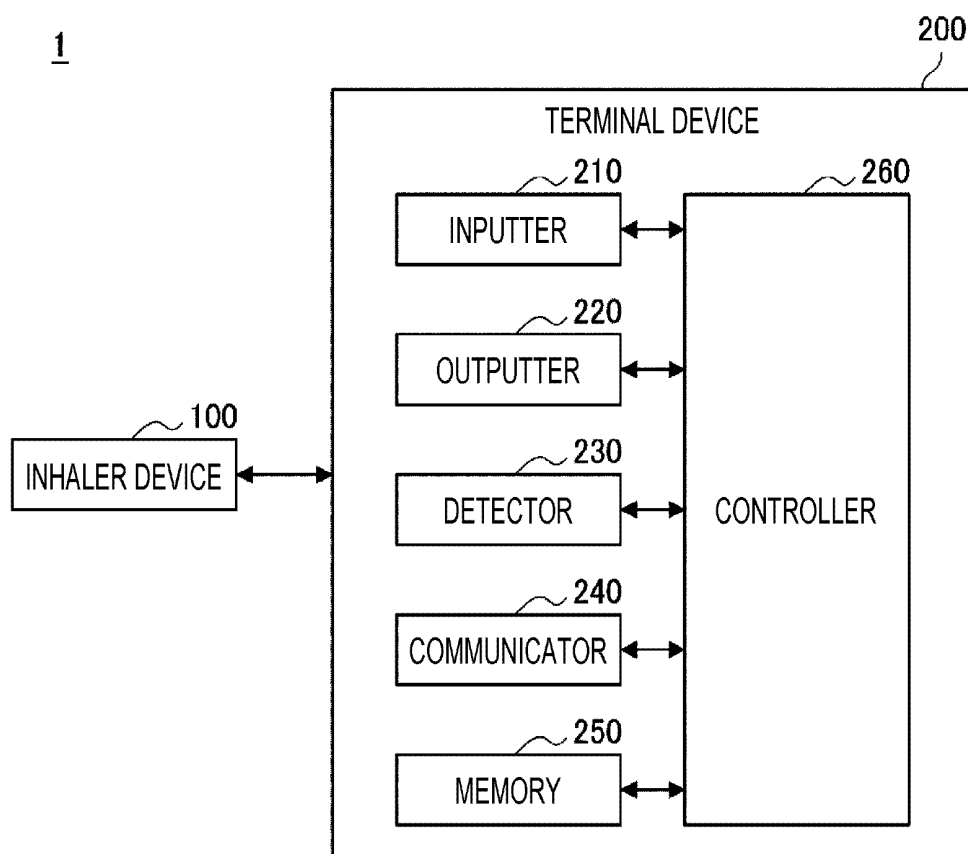


FIG. 3

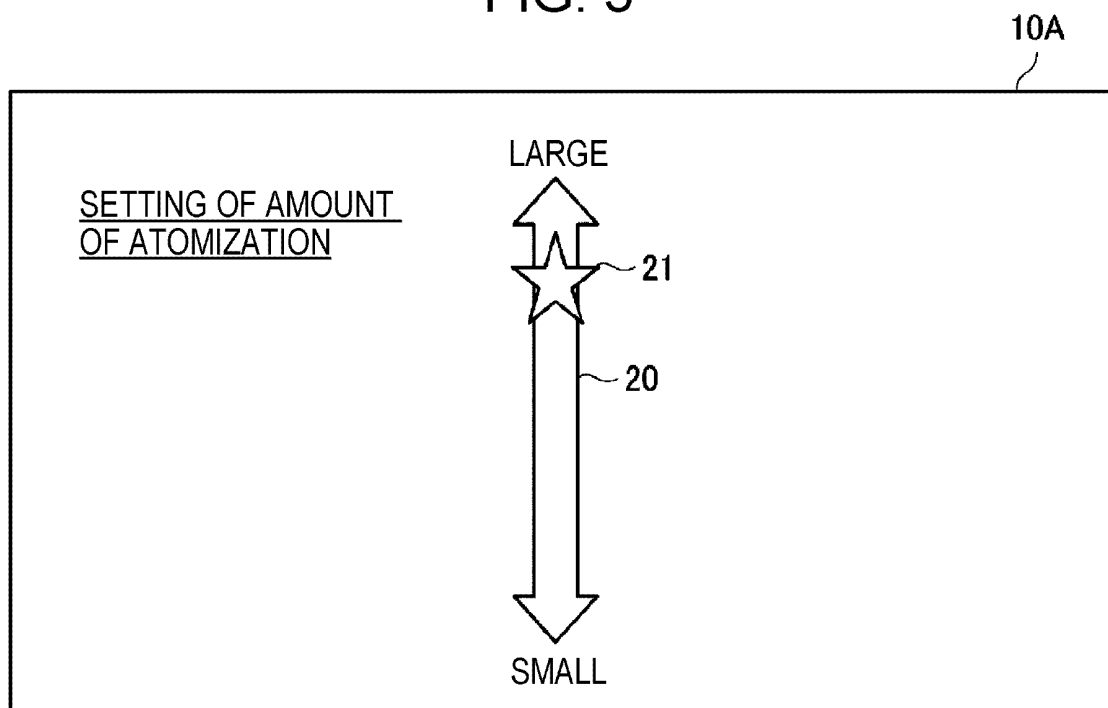


FIG. 4

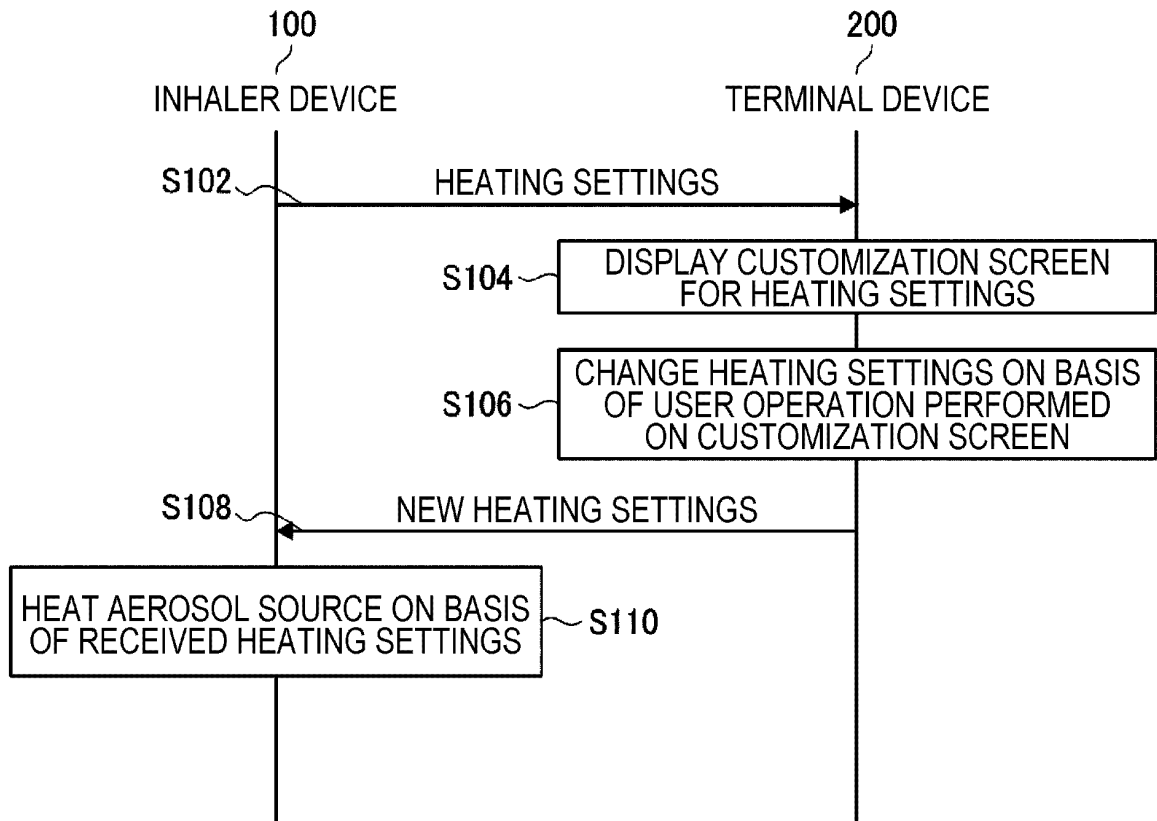


FIG. 5

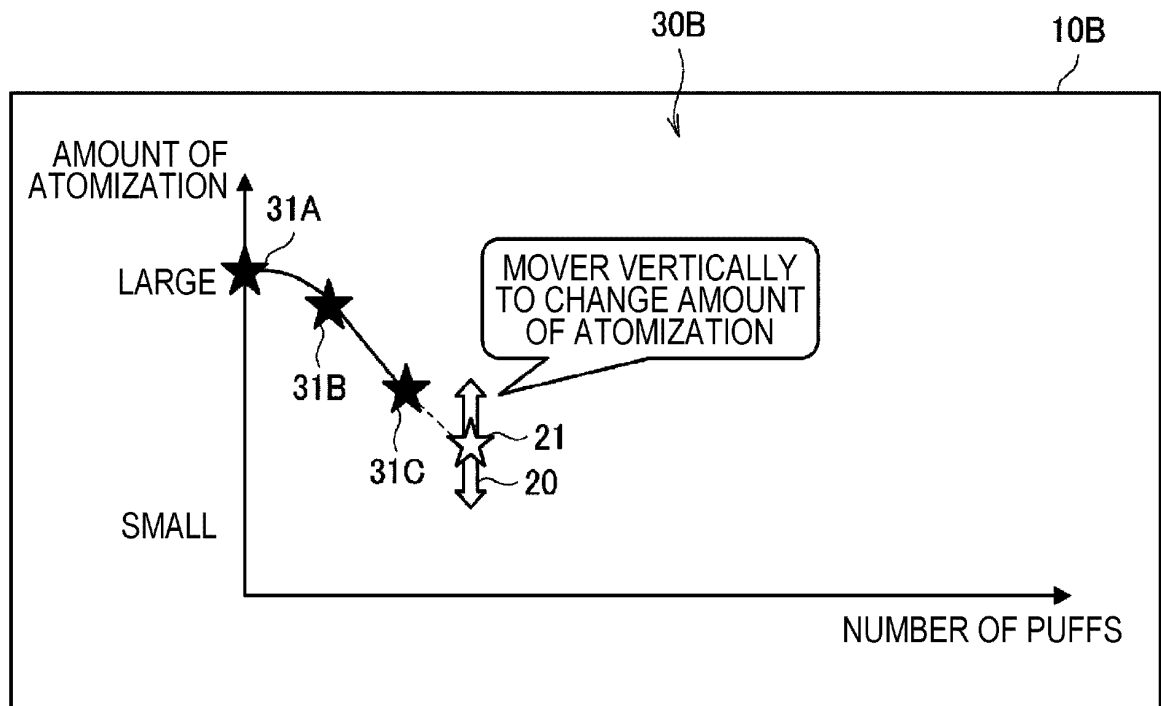


FIG. 6

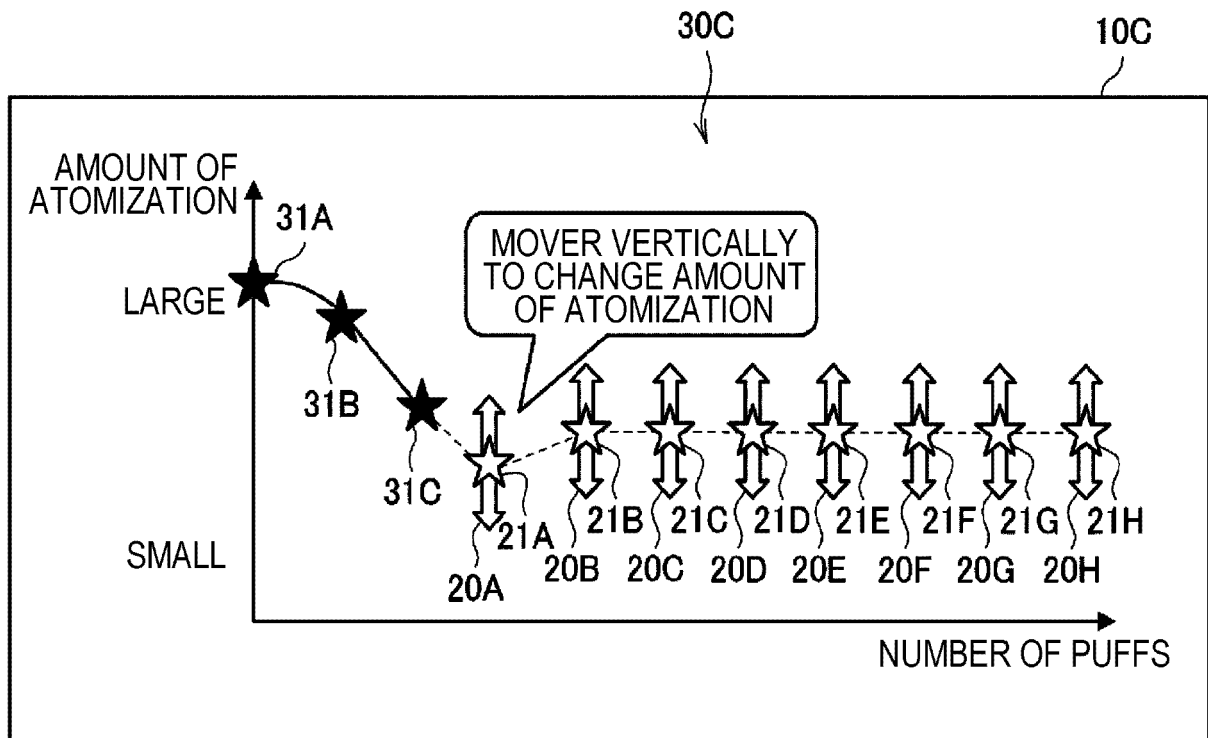
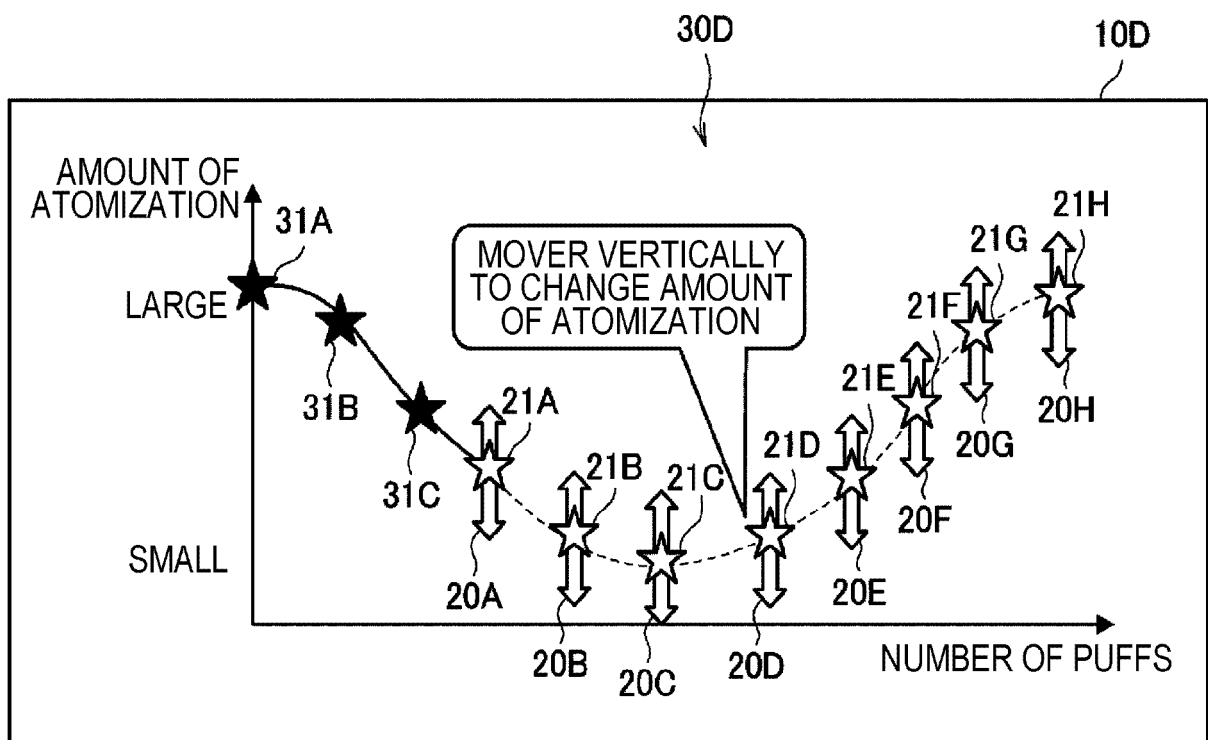


FIG. 7



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2021/046332

A. CLASSIFICATION OF SUBJECT MATTER A24F 40/65 (2020.01)i FI: A24F40/65 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) A24F40/65 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 <table border="1"> <thead> <tr> <th>Category*</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>Y</td> <td>WO 2019/104227 A1 (JUUL LABS, INC.) 31 May 2019 (2019-05-31) paragraphs [0001]-[0275], fig. 1-35</td> <td>1-6, 10-18</td> </tr> <tr> <td>A</td> <td></td> <td>7-9</td> </tr> <tr> <td>Y</td> <td>WO 2020/039589 A1 (JAPAN TOBACCO INC.) 27 February 2020 (2020-02-27) paragraphs [0036]-[0149]</td> <td>1-6, 10-18</td> </tr> <tr> <td>Y</td> <td>JP 2021-182914 A (KT & G CORP.) 02 December 2021 (2021-12-02) paragraphs [0028]-[0249]</td> <td>1-6, 10-18</td> </tr> <tr> <td>Y</td> <td>WO 2018/066088 A1 (JAPAN TOBACCO INC.) 12 April 2018 (2018-04-12) paragraph [0061]</td> <td>2-6, 10-16</td> </tr> <tr> <td>Y</td> <td>JP 2021-136992 A (JAPAN TOBACCO INC.) 16 September 2021 (2021-09-16) paragraphs [0084]-[0085]</td> <td>3-6, 10-16</td> </tr> <tr> <td>Y</td> <td>JP 2021-503883 A (PHILIP MORRIS PRODUCTS S.A.) 15 February 2021 (2021-02-15) paragraph [0068]</td> <td>11-16</td> </tr> </tbody> </table>	Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	Y	WO 2019/104227 A1 (JUUL LABS, INC.) 31 May 2019 (2019-05-31) paragraphs [0001]-[0275], fig. 1-35	1-6, 10-18	A		7-9	Y	WO 2020/039589 A1 (JAPAN TOBACCO INC.) 27 February 2020 (2020-02-27) paragraphs [0036]-[0149]	1-6, 10-18	Y	JP 2021-182914 A (KT & G CORP.) 02 December 2021 (2021-12-02) paragraphs [0028]-[0249]	1-6, 10-18	Y	WO 2018/066088 A1 (JAPAN TOBACCO INC.) 12 April 2018 (2018-04-12) paragraph [0061]	2-6, 10-16	Y	JP 2021-136992 A (JAPAN TOBACCO INC.) 16 September 2021 (2021-09-16) paragraphs [0084]-[0085]	3-6, 10-16	Y	JP 2021-503883 A (PHILIP MORRIS PRODUCTS S.A.) 15 February 2021 (2021-02-15) paragraph [0068]	11-16
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A		7-9																						
Y	WO 2020/039589 A1 (JAPAN TOBACCO INC.) 27 February 2020 (2020-02-27) paragraphs [0036]-[0149]	1-6, 10-18																						
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☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex. * Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family																								
Date of the actual completion of the international search 06 January 2022	Date of mailing of the international search report 18 January 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.																							

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

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2021/046332

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/JP2021/046332

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		KR 10-2019-0059313 A	
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