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(71) Applicant: **Japan Tobacco Inc.**

Tokyo 105-6927 (JP)

(72) Inventor: **CHIKAOKA, Tomomi**

Tokyo 130-8603 (JP)

(74) Representative: **Hoffmann Eitle**

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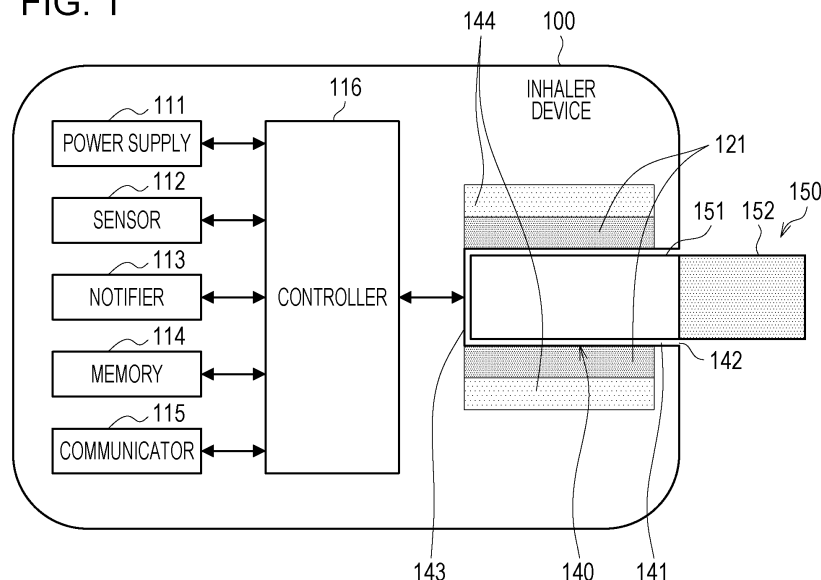
81925 München (DE)

(54) **SYSTEM AND METHOD**

(57) Provided is a mechanism with which it is possible to optimize a generated aerosol. This system comprises: an aerosol generation device that heats an aerosol source-containing base material on the basis of a heat setting; and a terminal device that transmits information indicating the heat setting on the basis of the type of the base material heated by the aerosol generation

device and a prescribed condition relating to a component amount of the aerosol generated when the aerosol generation device heats the base material. The aerosol generation device heats the base material on the basis of the heat setting indicated by the information received from the terminal device.

FIG. 1



Description

Technical Field

5 **[0001]** The present invention relates to a system and a method.

Background Art

10 **[0002]** Inhaler devices that generate material to be inhaled by users, such as electronic cigarettes and nebulizers, are widespread. For example, an inhaler device uses a substrate containing an aerosol source for generating an aerosol, a flavor source for imparting a flavor component to the generated aerosol, and the like, to generate the aerosol having the flavor component imparted. The user can taste a flavor by inhaling the aerosol generated by the inhaler device and having the flavor component imparted. Hereinafter, an action of the user inhaling the aerosol is also referred to as a puff or a puff action.

15 **[0003]** Various techniques have been considered for improving the quality of user experience with inhaler devices. For example, Patent Literature 1 below discloses a technique of determining the type of a substrate, selecting a heating profile associated with the determined type of the substrate in advance, and heating the substrate using the selected heating profile.

20 Citation List

Patent Literature

25 **[0004]** Patent Literature 1: JP 2020-526208 A

Summary of Invention

Technical Problem

30 **[0005]** However, in the technique described in Patent Literature 1, no consideration is given to what kind of aerosol is generated when the substrate is heated using the selected heating profile.

[0006] Thus, the present invention is made in view of the above problem, and an object of the present invention is to provide a mechanism with which it is possible to optimize a generated aerosol for a user.

35 Solution to Problem

[0007] To address the above problem, an aspect of the present invention provides a system including an aerosol generation device that heats a substrate containing an aerosol source based on a heating setting; and a terminal device that transmits information indicating the heating setting based on a type of the substrate to be heated by the aerosol generation device and a predetermined condition relating to an amount of a component of an aerosol to be generated when the aerosol generation device heats the substrate. The aerosol generation device heats the substrate based on the heating setting indicated by the information received from the terminal device.

[0008] The predetermined condition may relate to the amount of the component of the aerosol.

40 **[0009]** The terminal device may transmit information indicating the heating setting satisfying the predetermined condition further based on a combination of one or more of the heating setting, the type of the substrate, and the amount of the component of the aerosol when the substrate of the type is heated based on the heating setting.

[0010] The predetermined condition may relate to an amount of the component of the aerosol to be taken in by a user per the one substrate.

50 **[0011]** The predetermined condition may relate to an amount of the component of the aerosol to be taken in by a user per one inhalation.

[0012] The predetermined condition may relate to an amount of the component of the aerosol to be taken in by a user per unit time.

[0013] The terminal device may transmit the information indicating the heating setting further based on a cumulative value of an amount of the component of the aerosol already taken in by the user in the unit time.

55 **[0014]** The predetermined condition may relate to an amount of the component of the aerosol to be discharged to a surrounding area per the one substrate, one inhalation, or unit time.

[0015] The predetermined condition may be set by a user

[0016] The predetermined condition may be set in accordance with a place where the aerosol generation device is used.

[0017] The terminal device may display one or more of the heating settings satisfying the predetermined condition, and transmit information indicating the heating setting selected by a user from among the displayed one or more of the heating settings.

[0018] The terminal device may transmit information instructing heating prohibition when the heating setting satisfying the predetermined condition is not present.

[0019] The aerosol generation device may transmit information indicating the type of the substrate to be heated, and the terminal device may transmit the information indicating the heating setting based on the type of the substrate to be heated by the aerosol generation device indicated by the information received from the aerosol generation device.

[0020] The system may further include the substrate.

[0021] Also, to address the above-described problem, another aspect of the present invention provides a method including transmitting, by a terminal device, information indicating a heating setting based on a type of a substrate to be heated by an aerosol generation device that heats the substrate containing an aerosol source based on the heating setting, and a predetermined condition relating to an amount of a component of an aerosol to be generated when the aerosol generation device heats the substrate; and heating, by the aerosol generation device, the substrate based on the heating setting indicated by the information received from the terminal device.

Advantageous Effects of Invention

[0022] As described above, according to the present invention, the mechanism with which it is possible to optimize the generated aerosol for the user is provided.

Brief Description of Drawings

[0023]

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

[Fig. 2] Fig. 2 is a diagram illustrating an example of a configuration of a system.

[Fig. 3] Fig. 3 is a graph presenting an example of a transition of the temperature of a heater when temperature control is performed based on a heating profile presented in Table 1.

[Fig. 4] Fig. 4 is a sequence diagram presenting an example of a flow of processing executed in the system.

[Fig. 5] Fig. 5 is a diagram illustrating an example of a screen displayed by a terminal device.

[Fig. 6] Fig. 6 is a sequence diagram presenting an example of a flow of processing executed in the system.

Description of Embodiments

[0024] Hereinafter, preferred embodiments of the present invention will be described in detail with reference to the accompanying drawings. In this description and the drawings, structural elements having substantially the same functional configuration are denoted by the same reference sign, and redundant description thereof will be omitted.

1. Configuration example of inhaler device

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

[0026] Fig. 1 is a schematic diagram of the inhaler device according to the configuration example. As illustrated in Fig. 1, an inhaler device 100 according to the present configuration example includes a power supply 111, a sensor 112, a notifier 113, a memory 114, a communicator 115, a controller 116, a heater 121, a holder 140, and a heat insulator 144.

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

[0028] 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.

[0029] 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.

[0030] The memory 114 stores various items of information for operation of the inhaler device 100. The memory 114 may be a non-volatile storage medium such as flash memory.

[0031] 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), or a standard using a low power wide area (LPWA).

[0032] 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) and a microprocessor, for example.

[0033] The holder 140 has an internal space 141, and holds a stick substrate 150 in a manner partially accommodated in the internal space 141. The holder 140 has an opening 142 that allows the internal space 141 to communicate with outside. The holder 140 holds the stick substrate 150 that is inserted into the internal space 141 through the opening 142. For example, the holder 140 may be a tubular body having the opening 142 and a bottom 143 on its ends, and may define the pillar-shaped internal space 141. The holder 140 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.

[0034] The stick substrate 150 includes a substrate 151 and an inhalation port 152. The substrate 151 includes an aerosol source. The aerosol source is a liquid such as polyhydric alcohol and 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. In this configuration example, the aerosol source is not limited to a liquid, but may be a solid. The stick substrate 150 held by the holder 140 includes the substrate 151 at least partially accommodated in the internal space 141 and the inhalation port 152 at least partially protruding from the opening 142. When the user inhales with the inhalation port 152 protruding from the opening 142 in his/her mouth, air flows into the internal space 141 through the airflow path (not illustrated), and the air and an aerosol generated from the substrate 151 reach inside the mouth of the user.

[0035] 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 has a film-like shape and surrounds the outer circumference of the holder 140. Subsequently, heat produced from the heater 121 heats the substrate 151 of the stick substrate 150 from the outer circumference, generating 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.

[0036] The heat insulator 144 prevents heat from transferring from the heater 121 to the other structural elements. For example, the heat insulator 144 may be a vacuum heat insulator or an aerogel heat insulator.

[0037] 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.

[0038] In an example, the heater 121 may have a blade-like shape, and may be disposed so that the heater 121 protrudes from the bottom 143 of the holder 140 toward the internal space 141. In this case, the heater 121 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 121 may be disposed so that the heater 121 covers the bottom 143 of the holder 140. In still another example, the heater 121 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.

[0039] In another example, the holder 140 may include an opening/closing mechanism that at least partially opens and closes an outer shell defining the internal space 141. Examples of the opening/closing mechanism include a hinge. In addition, the holder 140 may sandwich the stick substrate 150 inserted into the internal space 141 by opening and closing the outer shell. In this case, the heater 121 may be at the sandwiching position of the holder 140 and may produce heat while pressing the stick substrate 150.

[0040] 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 induction heating. In this case, the inhaler device 100 includes at least an electromagnetic induction source such as a coil that generates a magnetic field instead of the heater 121. The inhaler device 100 may be provided with a susceptor that produces heat by the induction heating, or the stick substrate 150 may include the susceptor.

[0041] The stick substrate 150 is an example of a substrate that contains an aerosol source and contributes to generation of an aerosol. The inhaler device 100 is an example of an aerosol generation device that heats the stick substrate 150 to generate an aerosol. A combination of the inhaler device 100 and the stick substrate 150 generates an aerosol. Thus, the combination of the inhaler device 100 and the stick substrate 150 may be considered as an aerosol generation system.

2. System configuration

[0042] Fig. 2 is a diagram illustrating an example of a configuration of a system 1 according to an embodiment of the present invention. As illustrated in Fig. 2, the system 1 includes the inhaler device 100 and a terminal device 200. The configuration of the inhaler device 100 is as described above.

[0043] The terminal device 200 is used by the user of the inhaler device 100. For example, the terminal device 200 may be any information processing device such as a personal computer, 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 charges the accommodated inhaler device 100. As illustrated in Fig. 2, the terminal device 200 includes an inputter 210, an outputter 220, a communicator 230, a memory 240, and a controller 250.

[0044] The inputter 210 has a function of receiving an input of various items of information. The inputter 210 may include an input device that receives an input of information from the user. Examples of the input device include a button, a keyboard, a touch panel, and a microphone. In addition, the inputter 210 may include various sensors such as an image sensor and an inertial sensor, and may receive a user's action as an input.

[0045] The outputter 220 has a function of outputting information. The outputter 220 may include an output device that outputs information to the user. Examples of the output device include a display device that displays information, a light-emitting device that emits light, a vibration device that vibrates, and a sound output device that outputs sound. 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 outputs information input from the controller 250 to notify the user of the information.

[0046] The communicator 230 is a communication interface for transmitting and receiving information between the terminal device 200 and another device. The communicator 230 performs communication in conformity with any wired or wireless communication standard. Such a communication standard may be, for example, wireless local area network (LAN), wired LAN, Wi-Fi (registered trademark), or Bluetooth (registered trademark).

[0047] The memory 240 stores various items of information for the operation of the terminal device 200. The memory 240 may be a non-volatile storage medium such as flash memory.

[0048] The controller 250 functions as an arithmetic processing unit or a control circuit, and controls the overall operations of the terminal device 200 in accordance with various programs. The controller 250 includes an electronic circuit, such as a central processing unit (CPU) or a microprocessor, for example. In addition, the controller 250 may include a read only memory (ROM) that stores a program to be used, calculation parameters, and the like, and a random access memory (RAM) that temporarily stores parameters that change as appropriate. The terminal device 200 executes various processing under the control of the controller 250. Examples of the processing controlled by the controller 250 include processing of information input by the inputter 210, an output of information by the outputter 220, transmission and reception of information by the communicator 230, and storage and reading of information by the memory 240. The controller 250 also controls other processing executed by the terminal device 200, such as an input of information to each structural element and processing based on information output from each structural element.

[0049] The function of the controller 250 may be implemented using an application. The application may be preinstalled or may be downloaded. The function of the controller 250 may be implemented by progressive web apps (PWA).

3. First embodiment

3.1. Technical features

(1) Heating profile

[0050] The controller 116 controls the operation of the heater 121 based on a heating profile. The control on the operation of the heater 121 is implemented by controlling supply of electric power from the power supply 111 to the heater 121. The heater 121 heats the stick substrate 150 using the electric power supplied from the power supply 111. The heating profile is a control sequence including target temperature control on the heater 121, and includes information that defines a time-series transition of a target value for the temperature. The heating profile is an example of a heating setting according to the present embodiment.

[0051] The controller 116 controls the operation of the heater 121 so that the temperature (hereinafter, also referred to as an actual temperature) of the heater 121 transitions in a manner similar to a target temperature defined in the heating profile. The heating profile is typically designed to optimize the flavor that the user tastes when the user inhales the aerosol generated from the stick substrate 150. Thus, by controlling the operation of the heater 121 based on the heating profile, it is possible to optimize the flavor that the user tastes.

[0052] The heating profile includes one or more combinations each including a target temperature and information indicating a timing at which the target temperature is to be reached. Then, the controller 116 controls the temperature

of the heater 121 while switching the target temperature in accordance with an elapsed time since the start of heating based on the heating profile. Specifically, the controller 116 controls the temperature of the heater 121 based on the difference between the current actual temperature and the target temperature corresponding to the elapsed time since the start of heating based on the heating profile. The temperature control on the heater 121 can be implemented by, for example, known feedback control. The feedback control may be, for example, a proportional-integral-differential controller (PID controller). The controller 116 may cause the electric power from the power supply 111 to be supplied to the heater 121 in the form of a pulse by pulse width modulation (PWM) or pulse frequency modulation (PFM). In this case, the controller 116 can perform the temperature control on the heater 121 by adjusting the duty ratio or the frequency of the electric power pulse in the feedback control. Alternatively, the controller 116 may perform simple on/off control in the feedback control. For example, the controller 116 may execute heating by the heater 121 until the actual temperature reaches the target temperature, stop heating by the heater 121 when the actual temperature has reached the target temperature, and execute heating again by the heater 121 when the actual temperature becomes lower than the target temperature. Still alternatively, the controller 116 may adjust the voltage in the feedback control.

[0053] The temperature of the heater 121 can be quantified by, for example, measuring or estimating the electrical resistance value of the heater 121 (more accurately, the electrical resistance value of a heating resistor constituting the heater 121). This is because the electrical resistance value of the heating resistor changes with the temperature. The electrical resistance value of the heating resistor can be estimated, for example, by measuring the amount of voltage decrease in the heating resistor. The amount of voltage decrease in the heating resistor can be measured by a voltage sensor that measures the 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 installed near the heater 121.

[0054] The period from the start to the end of the processing of generating an aerosol using the stick substrate 150 is hereinafter also referred to as a heating session. In other words, the heating session is a period in which the supply of electric power to the heater 121 is controlled based on the heating profile. The start of the heating session is a timing at which heating based on the heating profile is started. The end of the heating session is a timing at which a sufficient amount of aerosol is no longer generated. The heating session includes a preheating period in the former half and a puffable period in the latter half. The puffable period is a period during which a sufficient amount of aerosol is expected to be generated. The preheating period is a period from the start of heating to the start of the puffable period. Heating performed during the preheating period is also referred to as preheating.

[0055] The heating profile may include a plurality of periods in which different target temperatures are set. The temperature may be controlled so as to reach a target temperature set in a certain period at a desired timing in the period, or the temperature may be controlled so as to reach the target temperature at the end of the period. In any case, the temperature of the heater 121 can be transitioned in a manner similar to the transition of the target temperature defined in the heating profile.

[0056] An example of the heating profile is presented in Table 1 below.

[Table 1]

Table 1. Example of heating profile			
Period			Target temperature [°C]
Section	Subsection	Duration [sec]	
Early stage	STEP 0	20	295
	STEP 1	20	295
	STEP 2	20	295
Middle stage	STEP 3	20	230
	STEP 4	60	230
Final stage	STEP 5	60	260
	STEP 6	60	260
	STEP 7	20	-

[0057] The heating profile presented in Table 1 includes three periods roughly divided into an early stage, a middle stage, and a final stage. The early stage, the middle stage, and the final stage may be subdivided into STEP 0 to STEP 7. A STEP is the minimum unit period constituting the heating profile. In each STEP, the temperature may be controlled to reach the target temperature at the end of the duration. In this case, the rate of temperature change in a certain STEP

is determined by the duration of the STEP and the difference in target temperature between the STEP and a previous STEP.

[0058] The transition of the temperature of the heater 121 when the controller 116 performs the temperature control in accordance with the heating profile presented in Table 1 will be described with reference to Fig. 3. Fig. 3 is a graph presenting an example of the transition of the temperature of the heater 121 when the temperature control is performed based on the heating profile presented in Table 1. The horizontal axis of this graph indicates time (second). The vertical axis of this graph indicates the temperature of the heater 121. A line 21 in this graph indicates a transition of the temperature of the heater 121. As presented in Fig. 3, the temperature of the heater 121 transitions in a manner similar to the transition of the target temperature defined in the heating profile.

[0059] In the example presented in Table 1 and Fig. 3, the early stage is a period in which the temperature of the heater 121 increases from an initial temperature. The initial temperature is a temperature of the heater 121 at the start of heating. In the early stage, the temperature of the heater 121 may be maintained after being increased. As presented in Table 1 and Fig. 3, the temperature of the heater 121 reaches 295°C 20 seconds after the start of the early stage, and is maintained at 295°C for 40 seconds thereafter. Accordingly, it is expected that the temperature of the stick substrate 150 reaches a temperature at which a sufficient amount of aerosol is generated. By increasing the temperature to 295°C at a stroke immediately after the start of heating, it is possible to end preheating early and start the puffable period early. In Fig. 3, the preheating period ends 60 seconds after the start of heating.

[0060] In the example presented in Table 1 and Fig. 3, the middle stage is a period in which the temperature of the heater 121 decreases. In the middle stage, the temperature of the heater 121 may be maintained after being decreased. As presented in Table 1 and Fig. 3, the temperature of the heater 121 decreases to 230°C 20 seconds after the start of the middle stage, and is maintained at 230°C for 60 seconds thereafter. In a period from the start of the middle stage to a temperature decrease to 230°C, the supply of electric power to the heater 121 may be stopped, and heating may be stopped. Even in this case, a sufficient amount of aerosol is generated with the remaining heat of the heater 121 and the stick substrate 150. Here, if the heater 121 is maintained at a high temperature, the aerosol source contained in the stick substrate 150 is rapidly consumed, and there may be deterioration of the flavor, for example, the flavor that the user tastes is too strong. In this regard, by decreasing the temperature in the middle stage, it is possible to avoid such deterioration of the flavor and to improve the quality of puff experience of the user.

[0061] In the example presented in Table 1 and Fig. 3, the final stage is a period in which the temperature of the heater 121 increases again. In the final stage, the temperature of the heater 121 may be maintained after being increased again. As presented in Table 1 and Fig. 3, the temperature of the heater 121 increases to 260°C 60 seconds after the start of the final stage, and is maintained for 60 seconds thereafter. If the temperature of the heater 121 is continuously decreased, the temperature of the stick substrate 150 is also decreased. Thus, the generation amount of aerosol may be decreased, and the flavor that the user tastes may be deteriorated. As the heating profile progresses to the latter half, the remaining amount of the aerosol source contained in the stick substrate 150 decreases, and thus the generation amount of aerosol tends to decrease even when heating is continued at the same temperature. In this regard, by increasing the temperature again in the latter half of the heating profile to increase the generation amount of aerosol, it is possible to compensate for the decrease in the generation amount of aerosol due to the decrease in the remaining amount of the aerosol source. Thus, it is possible to prevent deterioration of the flavor that the user tastes even in the latter half of the heating profile.

[0062] As presented in Table 1, the final stage may include a period in which the target temperature is not set at the end. As presented in Fig. 3, during this period, the supply of electric power to the heater 121 is stopped, and heating is stopped. Even in this case, a sufficient amount of aerosol is generated with the remaining heat of the heater 121 and the stick substrate 150 for a while. In the example presented in Fig. 3, the puffable period, that is, the heating session ends with the end of the final stage.

[0063] The user may be notified of a timing at which the puffable period starts and a timing at which the puffable period ends. Further, the user may be notified of a timing a predetermined time before the end of the puffable period (for example, a timing at which the supply of electric power to the heater 121 ends). In this case, the user can puff in the puffable period with reference to the notification.

(2) Condition relating to component

[0064] The terminal device 200 selects a heating profile based on a type (hereinafter, also referred to as a brand) of a stick substrate 150 to be heated by the inhaler device 100 and a predetermined condition relating to an aerosol to be generated when the inhaler device 100 heats the stick substrate 150. Specifically, the terminal device 200 acquires information indicating the brand of the stick substrate 150 to be heated by the inhaler device 100, and selects a heating profile that satisfies the predetermined condition when the stick substrate 150 of the brand is heated. Then, the terminal device 200 transmits information indicating the selected heating profile. In order to reduce the amount of communication, it is desirable that identification information for uniquely identifying the heating profile is transmitted as the information

indicating the heating profile. The inhaler device 100 heats the stick substrate 150 based on the heating profile indicated by the information received from the terminal device 200. According to such a configuration, the inhaler device 100 can heat the stick substrate 150 based on the heating profile satisfying the predetermined condition relating to the aerosol.

[0065] The terminal device 200 selects a heating profile satisfying a predetermined condition from heating profiles usable by the inhaler device 100. However, the usable heating profiles may differ for each brand of a stick substrate 150. In this case, the terminal device 200 selects a heating profile satisfying the predetermined condition from heating profiles usable for the brand of the stick substrate 150 to be heated by the inhaler device 100. It is desirable that the heating profiles usable for the brand of the stick substrate 150 allow the aerosol source contained in the stick substrate 150 to be consumed without excess or deficiency.

[0066] The predetermined condition is a condition relating to the amount of a component of an aerosol. Examples of the component of the aerosol include various flavor components contained in an aerosol source. The predetermined condition may include an upper limit value for each component. The predetermined condition may be set to conform with, for example, laws such as the Pharmaceutical Affairs Law, various rules such as environmental standard values defined by various organizations, or reference values given by experts such as doctors. The predetermined condition may be updated in response to a revision of the rules to be conformed with. Different predetermined conditions may be imposed on stick substrates 150 of different brands, but in the present description, a common predetermined condition is assumed to be imposed.

[0067] The predetermined condition may be a condition relating to the amount of a component of an aerosol to be taken in by the user per one stick substrate 150. For example, the predetermined condition includes upper limit values of the amounts of various components of an aerosol to be taken in by the user per one stick substrate 150. According to such a configuration, the amounts of the components of the aerosol to be taken in by the user when one stick substrate 150 is used can fall within appropriate ranges in light of the various rules.

[0068] An example of predetermined conditions relating to the amounts of components of an aerosol to be taken in by the user per one stick substrate 150 is presented in Table 2 below.

[Table 2]

Table 2. Example of predetermined conditions relating to amounts of components of aerosol to be taken in by user per one stick substrate 150				
Predetermined condition	Upper limit value of amount of component [mg]			
	A _A	A _B	A _C	A _D
C _A	10	10	8	8
C _B	6	6	4	4
C _C	4	4	4	4

[0069] According to Table 2, the upper limit values of the amounts of the components to be taken in by the user per one stick substrate 150 under a predetermined condition C_A is 10 mg for a component A_A, 10 mg for a component A_B, 8 mg for a component A_C, and 8 mg for a component A_D. A condition C_A, a condition C_B, and a condition C_C may be predetermined conditions set in conformity with different rules. As presented in Table 2, a plurality of predetermined conditions may be set. The inhaler device 100 may select a heating profile satisfying all of the plurality of predetermined conditions, or may select a heating profile satisfying part of the plurality of predetermined conditions.

[0070] The terminal device 200 selects a heating profile satisfying a predetermined condition based on a combination of one or more of a heating profile, a brand of a stick substrate 150, and the amount of a component of an aerosol when the stick substrate 150 of the brand is heated based on the heating profile. As an example, Table 3 below presents an example of a combination of a heating profile, a brand of a stick substrate 150, and the amounts of components of an aerosol to be taken in by the user per one stick substrate 150 when the stick substrate 150 of the brand is heated based on the heating profile.

[Table 3]

Table 3 Example of amounts of components of aerosol to be taken in by user per one stick substrate 150					
Brand of substrate	Heating profile	Amount of component [mg]			
		A _A	A _B	A _C	A _D
S _A	P _A	6	6	4	6

(continued)

Table 3 Example of amounts of components of aerosol to be taken in by user per one stick substrate 150					
Brand of substrate	Heating profile	Amount of component [mg]			
		A _A	A _B	A _C	A _D
S _A	P _B	4	4	2	4
SB	P _A	0	10	8	10
SB	P _B	0	4	2	4

[0071] According to Table 3, when a stick substrate 150 of a brand S_A is heated based on a heating profile P_A, the component A_A of 6 mg, the component A_B of 6 mg, the component A_C of 4 mg, and the component A_D of 6 mg are taken in by the user per one stick substrate 150. The amounts of components of an aerosol to be taken in by the user per one stick substrate 150 may be measured or estimated by a test by the manufacturer of the inhaler device 100 or the stick substrate 150. The amounts of the components of the aerosol to be taken in by the user per one stick substrate 150 may vary depending on the number of puffs performed by the user and the timings of the puffs. Thus, the amounts of the components of the aerosol to be taken in by the user per one stick substrate 150 may be adjusted in accordance with the tendency of user's usual puffs, with reference to the amounts of the components measured or estimated by the manufacturer.

[0072] The terminal device 200 stores the tables presented in Table 2 and Table 3, and selects a heating profile satisfying a predetermined condition in accordance with the brand of the stick substrate 150 to be heated by the inhaler device 100. For example, when the condition C_B is applied and the inhaler device 100 heats a stick substrate 150 of the brand S_A, the terminal device 200 selects the heating profile P_B in which the amounts of the components of the aerosol to be taken in by the user are equal to or less than the amounts of the components defined in the condition C_B. Then, the terminal device 200 transmits information indicating the heating profile P_B to the inhaler device 100, and the inhaler device 100 heats the stick substrate 150 of the brand S_A based on the heating profile P_B.

[0073] The inhaler device 100 may transmit information indicating a brand of a stick substrate 150 to be heated. In this case, the terminal device 200 selects a heating profile based on the brand of the stick substrate 150 to be heated by the inhaler device 100, which is indicated by the information received from the inhaler device 100. For example, the inhaler device 100 identifies the brand of a stick substrate 150 held by the holder 140 and transmits information indicating the identified brand. The brand of the stick substrate 150 held by the holder 140 can be identified by, for example, image recognition on identification information such as a color or a two-dimensional code given to the stick substrate 150. An example of the two-dimensional code is a barcode. According to such a configuration, it is possible to reduce the time and effort for the user to input the brand of the stick substrate 150 to be heated by the inhaler device 100 to the terminal device 200. Of course, the terminal device 200 may receive an input of a brand from the user.

[0074] Hereinafter, an example of a flow of processing executed in the system 1 according to the present embodiment will be described with reference to Fig. 4.

[0075] Fig. 4 is a sequence diagram presenting an example of a flow of processing executed in the system 1 according to the present embodiment. The inhaler device 100 and the terminal device 200 are involved in this sequence.

[0076] As presented in Fig. 4, first, the inhaler device 100 identifies the brand of a stick substrate 150 to be heated by the inhaler device 100 (step S102). For example, when the stick substrate 150 is inserted into the holder 140, the inhaler device 100 identifies the brand of the stick substrate 150 by image recognition on the appearance of the stick substrate 150. Here, as an example, it is assumed that the brand S_A is identified.

[0077] Next, the inhaler device 100 transmits information indicating the identified brand of the stick substrate 150 (step S104). For example, the inhaler device 100 transmits information indicating the brand S_A of the stick substrate 150 to the terminal device 200 with which Bluetooth connection has been established.

[0078] Next, the terminal device 200 reads a predetermined condition to be applied (step S106). For example, the terminal device 200 reads the table presented in Table 2 from the memory 240.

[0079] Next, the terminal device 200 selects a heating profile that satisfies the predetermined condition when the stick substrate 150 of the brand indicated by the information received from the inhaler device 100 is heated (step S108). For example, when the condition C_B is applied and the inhaler device 100 heats the stick substrate 150 of the brand S_A, the terminal device 200 selects the heating profile P_B in which the amounts of the components of the aerosol to be taken in by the user satisfies the condition C_B.

[0080] Next, the terminal device 200 transmits information indicating the selected heating profile (step S110). For example, the terminal device 200 transmits information indicating the heating profile P_B to the inhaler device 100 with

which Bluetooth connection has been established.

[0081] Next, the inhaler device 100 sets the heating profile indicated by the received information as a heating profile to be used for heating (step S112).

[0082] Next, when a user's operation for instructing the start of heating has been performed, the inhaler device 100 heats the stick substrate 150 based on the set heating profile (step S114). For example, the inhaler device 100 heats the stick substrate 150 of the brand S_A based on the heating profile P_B . An example of the user's operation for instructing the start of heating is pressing of a button provided on the inhaler device 100.

[0083] The example of the flow of the processing executed in the system 1 has been described above.

[0084] The user's operation for instructing the start of heating is not limited to the example described above. For example, insertion of the stick substrate 150 into the holder 140 may also serve as the user's operation for instructing the start of heating. In this case, the insertion of the stick substrate 150 into the holder 140 triggers identification of the stick substrate 150 and selection of a heating profile, and heating based on the selected heating profile is started.

3.2. Modifications

(1) First modification

[0085] In the above description, as the heating profile, the example in which the target temperature increases in the early stage, the target temperature decreases in the middle stage, and the target temperature increases again in the final stage has been described, but the present invention is not limited to such an example.

[0086] As an example, the target temperature may be always constant in the early stage, the middle stage, and the final stage. As another example, the target temperature may be increased or decreased consistently in the early stage, the middle stage, and the final stage.

[0087] In the above description, the example in which the heating profile is roughly divided into the three periods of the early stage, the middle stage, and the final stage has been described, but the present invention is not limited to such an example. Similarly, in the above description, the example in which the early stage is subdivided into three STEPs, the middle stage is subdivided into two STEPs, and the final stage is subdivided into three STEPs has been described, but the present invention is not limited to such an example. The heating profile may be divided into any number of periods.

(2) Second modification

[0088] In the above description, the example in which the predetermined condition is set in conformity with the various rules, for example, laws such as the Pharmaceutical Affairs Law or environmental standard values defined by various organizations has been described, but the present invention is not limited to such an example.

[0089] As an example, a predetermined condition may be set by the user. For example, the user may autonomously set a condition for achieving a health goal.

[0090] As another example, a predetermined condition may be set in accordance with a place where the inhaler device 100 is used. For example, since the laws that restrict the components to be inhaled by the user, such as the Pharmaceutical Affairs Law, are enacted in each country, different predetermined conditions may be applied depending on the country in which the inhaler device 100 is used. Since the environmental standard values may be different for each building or room, different predetermined conditions may be applied depending on the building or room in which the inhaler device 100 is used. When the rule to be conformed with is a legal rule, a change of the setting is disabled for the user, thereby increasing the degree of conformance to the rule.

(3) Third modification

[0091] In the above description, the example in which the predetermined condition is the condition relating to the amount of the component of the aerosol to be taken in by the user per one stick substrate 150 has been described, but the present invention is not limited to such an example.

[0092] As an example, the predetermined condition may be a condition relating to the amount of a component of an aerosol to be taken in by the user per one inhalation. For example, the predetermined condition includes upper limit values of the amounts of various components of an aerosol to be taken in by the user when the user performs a puff once. According to such a configuration, the amounts of the components of the aerosol to be taken in by the user per one puff can fall within appropriate ranges in light of the various rules.

[0093] In this case, the terminal device 200 selects a heating profile based on a combination of a heating profile, a brand of a stick substrate 150, and the amounts of components of an aerosol to be taken in by the user per one inhalation when the stick substrate 150 of the brand is heated based on the heating profile. The amounts of components of an aerosol to be taken in by the user per one inhalation can be measured or estimated by a test by the manufacturer of the

inhaler device 100 or the stick substrate 150. The amounts of the components of the aerosol to be taken in by the user per one inhalation may vary depending on the timing of a puff performed by the user. Thus, the amounts of the components of the aerosol to be taken in by the user per one inhalation may be adjusted in accordance with the tendency of user's usual puffs, with reference to the amounts of the components measured or estimated by the manufacturer.

[0094] As another example, the predetermined condition may be a condition relating to the amount of a component of an aerosol to be taken in by the user per unit time. The unit time may be any time such as one hour, one day, or one week. For example, the predetermined condition includes upper limit values of the amounts of various components of an aerosol to be taken in by the user per one hour. According to such a configuration, the amounts of the components of the aerosol to be taken in by the user per unit time can fall within appropriate ranges in light of the various rules.

[0095] In this case, the terminal device 200 selects a heating profile based on a combination of a heating profile, a brand of a stick substrate 150, and the amounts of components of an aerosol to be taken in by the user per unit time when the stick substrate 150 of the brand is heated based on the heating profile. The amounts of components of an aerosol to be taken in by the user per unit time can be measured or estimated by a test by the manufacturer of the inhaler device 100 or the stick substrate 150. The amounts of the components of the aerosol to be taken in by the user per unit time may vary depending on the number of puffs performed by the user and the timings of the puffs. Thus, the amounts of the components of the aerosol to be taken in by the user per unit time per inhalation may be adjusted in accordance with the tendency of user's usual puffs, with reference to the amounts of the components measured or estimated by the manufacturer.

[0096] The terminal device 200 may select a heating profile further based on the cumulative value of the amount of a component of an aerosol already taken in by the user in a unit time. In this case, the cumulative value of the amount of the component of the aerosol to be taken in by the user in the unit time is stored in the memory 114. For example, the terminal device 200 sets the amount of a component obtained by subtracting the amount of the component already taken in from an upper limit value of the amount of the component allowable to be taken in per one day defined in a predetermined condition, as an upper limit value of the amount of the component allowable to be taken in a remaining time. Then, the terminal device 200 selects a heating profile in which the amount of the component to be taken in by the user falls within a range of the upper limit value of the amount of the component allowable to be taken in the remaining time until the end of one day. In this case, the terminal device 200 selects a heating profile with a smaller amount of the component to be taken in by the user as the cumulative number of stick substrates 150 consumed in one day increases. According to such a configuration, the amount of the component of the aerosol to be taken in by the user per unit time can more reliably fall within an appropriate range in light of the various rules.

[0097] In the above description, the example in which the predetermined condition is the condition relating to the amount of the component of the aerosol to be taken in by the user has been described, but the present invention is not limited to such an example. The predetermined condition may be a condition relating to the amount of a component of an aerosol to be discharged to a surrounding area per one stick substrate 150, per one inhalation, or per unit time. More simply, the predetermined condition may be a condition relating to the amount of a component contained in a mainstream smoke, or a condition relating to the amount of a component contained in at least one of a sidestream smoke and an exhalation smoke. According to such a configuration, it is possible to comply with not only a rule relating to the mainstream smoke but also a rule relating to the sidestream smoke or the exhalation smoke.

(4) Fourth modification

[0098] In the above description, the example in which the terminal device 200 transmits the heating profile satisfying the predetermined condition to the inhaler device 100 has been described, but the present invention is not limited to such an example.

[0099] As an example, when a heating profile satisfying a predetermined condition is not present, the terminal device 200 may transmit information instructing heating prohibition. The inhaler device 100 does not perform heating when receiving the information instructing the heating prohibition. By not performing heating, it is possible to prevent the user from taking in an amount of the component that exceeds the upper limit value defined in the predetermined condition. The information instructing the heating prohibition may include information indicating a period during which heating is prohibited. In this case, the inhaler device 100 does not perform heating during the designated period. The terminal device 200 preferably displays information indicating the period during which heating is prohibited or a period during which heating can be resumed.

[0100] As another example, when a heating profile satisfying a predetermined condition is not present, the terminal device 200 may transmit information indicating a predetermined heating profile. The predetermined heating profile may be, for example, a default heating profile. When receiving such information, the inhaler device 100 heats the stick substrate 150 based on the predetermined heating profile. Thus, the user can perform at least a puff.

(5) Fifth modification

[0101] In the above description, the example in which the terminal device 200 selects the heating profile to be used by the inhaler device 100 for heating has been described, but the present invention is not limited to such an example. A heating profile to be used by the inhaler device 100 for heating may be selected by the user. This point will be described in detail with reference to Fig. 5.

[0102] Fig. 5 is a diagram illustrating an example of a screen displayed by the terminal device 200 according to the fourth modification. As illustrated in Fig. 5, the terminal device 200 may display a selection screen 10 for a heating profile. The selection screen 10 is a screen for displaying one or more heating profiles satisfying a predetermined condition. The selection screen 10 displays UI elements 11A and 11B corresponding to the heating profiles P_A and P_B satisfying the predetermined condition in a selectable manner, and displays a UI element 11C corresponding to the heating profile P_C not satisfying the predetermined condition in a non-selectable manner. The user can select a heating profile to be used for heating by selecting the UI element 11A or 11B. In the example illustrated in Fig. 5, a state in which the user selects the UI element 11A is illustrated.

[0103] The terminal device 200 transmits information indicating a heating profile selected by the user from among one or more displayed heating profiles. In the example illustrated in Fig. 5, the terminal device 200 transmits information indicating the heating profile P_A . According to such a configuration, it is possible to use a heating profile that is more preferred by the user among the heating profiles satisfying the predetermined condition for heating the stick substrate 150.

4. Second embodiment

4.1. Technical features

[0104] In the first embodiment, the heating profile satisfying the predetermined condition has been selected from the existing heating profiles. In contrast, in the present embodiment, customization of a heating profile by the user is received within a range satisfying a predetermined condition.

[0105] The terminal device 200 receives a user's operation for instructing adjustment of a heating profile. Specifically, the terminal device 200 receives a user's operation for setting the duration and the target temperature of each STEP constituting the heating profile. Setting the duration and the target temperature of each STEP may be considered as setting the rate of temperature change in the STEP. This is because the rate of temperature change in a certain STEP is determined by the duration of the STEP and the difference in target temperature between the STEP and a previous STEP.

[0106] As an example, an example of options for setting the duration and the target temperature of STEP 0 of the heating profile corresponding to the brand S_A is presented in Table 4 below.

[Table 4]

Table 4. Example of options of STEP 0 of heating profile corresponding to brand S_A						
Duration	Target temperature		Consumption of aerosol source		Amount of component [mg]	
[sec]	[°C]	[mg]	A_A	A_B	A_C	A_D
30	300	100	1	1	0.8	1
30	299	99	0.99	0.99	0.79	0.99
...	...	...	...	...	...	...
10	280	10	0.2	0.2	0.15	0.2

[0107] One row in Table 4 corresponds to one option. As presented in Table 4, each option defines a duration, a target temperature, a consumption of an aerosol source, and the amounts of components. For all the STEPs constituting the heating profile, options similar to those presented in Table 4 are prepared, and the user can customize the heating profile by selecting a desired option for each STEP. The options presented in Table 4 are options corresponding to the brand S_A , and the content of the options may differ for each brand of the stick substrate 150. The terminal device 200 acquires information indicating the brand of the stick substrate 150 to be heated by the inhaler device 100, and receives a selection by the user from the options corresponding to the brand.

[0108] According to the example presented in Table 4, the user can set the duration of STEP 0 in increments of one second in a range of 10 seconds to 30 seconds. The user can set the target temperature of STEP 0 in increments of 1°C in a range of 280°C to 300°C.

[0109] As presented in Table 4, an option defines the amounts of components of an aerosol to be taken in by the user in STEP 0 corresponding to the option when the option is selected. The terminal device 200 may allow the user to select an option in which the cumulative totals of the amounts of the components to be taken in by the user in each STEP constituting the heating profile satisfy a predetermined condition. For example, when the cumulative totals of the amounts

of components defined in an option selected by the user in a STEP other than STEP 0 are large, the terminal device 200 allows the user to select only an option with small amounts of the components defined in STEP 0. According to such a configuration, the user can customize the heating profile within a range satisfying the predetermined condition.

[0110] As presented in Table 4, an option defines the amount of an aerosol source to be consumed in STEP 0 corresponding to the option when the option is selected. The terminal device 200 allows the user to select an option in which the cumulative total of the amount of an aerosol to be consumed in each STEP constituting the heating profile does not exceed the total amount of the aerosol source contained in the stick substrate 150 and the difference is smaller than a predetermined threshold. According to such a configuration, the user can customize the heating profile within a range in which the aerosol source contained in the stick substrate 150 can be consumed without excess or deficiency. This makes it possible to prevent deterioration of the flavor that the user tastes due to exhaustion of the aerosol source, and to prevent a situation in which heating is ended while a large amount of the aerosol source remains in the stick substrate 150.

[0111] The consumption of the aerosol source in each STEP can be calculated from the duration and the target temperature of the STEP. The consumption of the aerosol source is larger as the target temperature is higher, and is smaller as the target temperature is lower. The consumption of the aerosol source is larger as the duration is longer, and is smaller as the duration is shorter. The integral value of the line 21 indicating the time-series change of the target temperature as presented in Fig. 3 may be simply considered to correspond to the consumption of the aerosol source. That is, an integral value obtained by integrating the target temperature over time for the duration may correspond to the consumption of the aerosol source. However, it is desirable to perform integral calculation in which a larger weight is assigned as the target temperature is higher. The amount of a component to be taken in by the user may also be calculated from the duration and the target temperature. That is, the amount of the component to be taken in by the user may be calculated based on an integral value obtained by integrating the target temperature over time for the duration.

[0112] When options are selected for seven STEPs among the eight STEPs of STEP 0 to STEP 7, an option for the last STEP may be automatically selected by the terminal device 200. In this case, the terminal device 200 selects an option in which the cumulative values of the amounts of the components satisfy a predetermined condition and the cumulative total of the consumption of the aerosol source does not exceed the total amount of the aerosol source contained in the stick substrate 150. In this case, it is desirable to exclude an option in which the duration of the STEP is less than a predetermined time.

[0113] There are various UIs for customization by the user. As an example, the terminal device 200 may display options such as those presented in Table 4 described above in order for each of STEP 0 to STEP 7, and may receive an operation of selecting one option for each STEP. Of course, the options are displayed and the selection is received for STEP 0 to STEP 7 in any order. As another example, the terminal device 200 may display a graph indicating the time-series transition of the target temperature as presented in Fig. 3, and may receive an operation of increasing or decreasing the target temperature or increasing or decreasing the duration of each STEP.

[0114] Hereinafter, an example of a flow of processing executed in the system 1 according to the present embodiment will be described with reference to Fig. 6.

[0115] Fig. 6 is a sequence diagram presenting an example of a flow of processing executed in the system 1 according to the present embodiment. The inhaler device 100 and the terminal device 200 are involved in this sequence.

[0116] As presented in Fig. 6, first, the inhaler device 100 identifies the brand of a stick substrate 150 to be heated by the inhaler device 100 (step S202). For example, when the stick substrate 150 is inserted into the holder 140, the inhaler device 100 identifies the brand of the stick substrate 150 by image recognition on the appearance of the stick substrate 150. Here, as an example, it is assumed that the brand S_A is identified.

[0117] Next, the inhaler device 100 transmits information indicating the identified brand of the stick substrate 150 (step S204). For example, the inhaler device 100 transmits information indicating the brand S_A of the stick substrate 150 to the terminal device 200 with which Bluetooth connection has been established.

[0118] Next, the terminal device 200 reads a predetermined condition to be applied (step S206). For example, the terminal device 200 reads the table presented in Table 2 from the memory 240.

[0119] Next, the terminal device 200 receives customization of a heating profile by the user within a range that satisfies the predetermined condition when the stick substrate 150 of the brand indicated by the information received from the inhaler device 100 is heated (step S208). Specifically, the terminal device 200 receives setting of the duration and the target temperature of each of STEP 0 to STEP 7 within ranges satisfying a condition relating to the amounts of components and a condition relating to the consumption of an aerosol source. The condition relating to the amounts of the components is that the cumulative totals of the amounts of components to be taken in by the user in each of STEP 0 to STEP 7 do not exceed the upper limit values of the amounts of the components to be taken in by the user per one stick substrate

150. The condition relating to the consumption of the aerosol source is that the cumulative total of the amount of an aerosol to be consumed in each of STEP 0 to STEP 7 does not exceed the total amount of the aerosol source contained in the stick substrate 150, and the difference is smaller than a predetermined threshold.

[0120] Next, the terminal device 200 transmits information indicating the heating profile customized by the user (step S210). For example, the terminal device 200 transmits information indicating the heating profile customized by the user to the inhaler device 100 with which the Bluetooth connection has been established.

[0121] Next, the inhaler device 100 sets the heating profile indicated by the received information as a heating profile to be used for heating (step S212).

[0122] Next, when a user's operation for instructing the start of heating has been performed, the inhaler device 100 heats the stick substrate 150 based on the set heating profile (step S214). For example, the inhaler device 100 heats the stick substrate 150 of the brand S_A based on the heating profile customized by the user. An example of the user's operation for instructing the start of heating is pressing of a button provided on the inhaler device 100.

[0123] The example of the flow of the processing executed in the system 1 has been described above.

4.2. Modifications

[0124] In the second embodiment, the first to third modifications described above for the first embodiment are also considered. Other modifications will be described below.

(1) Sixth modification

[0125] In the above description, the example in which a finite option in which each of the duration and the target temperature of a STEP is defined as a discrete value is prepared in advance has been described, but the present invention is not limited to such an example. For example, a default value and a selectable range may be given as each of the duration and the target temperature of a STEP, and the duration and the target temperature of the STEP each may be changed within the selectable range. That is, the duration and the target temperature of a STEP may be set as continuous values.

[0126] The consumption of an aerosol source in each STEP may be calculated based on the set duration and target temperature. As described in the second embodiment, the integral value obtained by integrating the target temperature over time for the duration can be calculated as the consumption of the aerosol source. The amount of a component to be taken in by the user in each STEP can also be calculated based on the integral value obtained by integrating the target temperature over time for the duration.

(2) Seventh modification

[0127] In the above description, the example in which the duration and the target temperature of each STEP are set has been described, but the present invention is not limited to such an example. The terminal device 200 may receive a user's operation for setting a time-series change in the target temperature in each of a plurality of periods constituting the heating profile, and the periods are not limited to the STEPS. For example, the terminal device 200 may receive a user's operation for setting a time-series change in the target temperature in each of the three periods of the early stage, the middle stage, and the final stage constituting the heating profile.

[0128] As an example, an example of options for setting the early stage of the heating profile corresponding to the brand S_A is presented in Table 5 below.

[Table 5]

Table 5. Example of options of early stage of heating profile corresponding to brand S_A							
(Duration [sec], target temperature [°C]) in each STEP			Consumption of aerosol source [mg]	Amount of component [mg]			
STEP 0	STEP 1	STEP 2		A_A	A_B	A_C	A_D
(30, 300)	(30, 300)	(30, 300)	300	3	3	2.4	3
(30,299)	(30,299)	(30,299)	297	2.97	2.97	2.37	2.97
...	...	...	...	...	...	...	...
(10,280)	(10,280)	(10,280)	100	0.6	0.6	0.45	0.6

[0129] One row in Table 5 corresponds to one option. As presented in Table 5, each option defines a combination of a duration and a target temperature in each of STEP 0 to 2, a consumption of an aerosol source, and the amounts of components. For each of the periods of the early stage, the middle stage, and the final stage constituting the heating profile, options similar to the options presented in Table 5 are prepared, and the user can customize the heating profile by selecting a desired option for each period. Instead of options for STEPs in each period, heating profiles presented for three of the early stage, the middle stage, and the final stage may be selected. The options presented in Table 5 are options corresponding to the brand S_A , and the content of the options may differ for each brand of the stick substrate 150. The terminal device 200 acquires information indicating the brand of the stick substrate 150 to be heated by the inhaler device 100, and receives a selection by the user from the options corresponding to the brand.

[0130] As the consumption of the aerosol source and the amounts of the components in each option presented in Table 5, values corresponding to the duration and the target temperature defined for each option are stored. The duration and the target temperature defined for each option may be set as default values, and a duration and a target temperature changed from the default values may be set. That is, the durations and the target temperatures in the three periods of the early stage, the middle stage, and the final stage may be set as continuous values as described in the sixth modification. In this case, the consumption of the aerosol source and the amounts of the components to be taken in by the user in the actually set heating profile can be calculated in accordance with the differences from the default values. The consumption of the aerosol source and the amounts of the components to be taken in by the user may be calculated based on an integral value obtained by integrating the target temperature over time for the duration.

[0131] According to such a configuration, the user can customize the heating profile by dividing the heating profile into the three periods of the early stage, the middle stage, and the final stage.

5. Supplement

[0132] Although the preferred embodiments of the present invention have been described in detail with reference to the accompanying drawings, the present invention is not limited to these examples. It will be apparent to those who have ordinary knowledge in the technical field to which the present invention pertains that various changes and modifications can be made within the scope of the technical idea as defined in the appended claims. It is to be understood that the changes and modifications also obviously pertain to the technical scope of the present invention.

[0133] For example, in the above-described embodiments, the example in which the terminal device 200 performs the processing of selecting the heating profile satisfying the predetermined condition and receiving the customization of the heating profile by the user within the range satisfying the predetermined condition has been described, but the invention is not limited to such an example. The inhaler device 100 or any device such as a server on the Internet may perform these processing.

[0134] For example, in the above-described embodiments, the heating profile has been described as the information that defines the time-series transition of the target value for the temperature of the heater 121, but the present invention is not limited to such an example. The heating profile may be information that defines a time-series transition of a target value for a parameter relating to the temperature of the heater 121. Then, the controller 116 may control the operation of the heater 121 so that an actual measurement value of the parameter relating to the temperature of the heater 121 transitions in a manner similar to the target value for the parameter relating to the temperature of the heater 121 defined in the heating profile. Examples of the parameter relating to the temperature of the heater 121 include a resistance value of the heater 121 in addition to the temperature of the heater 121 itself described in the above embodiments.

[0135] The series of processing performed by each device described in the present description may be implemented using any of software, hardware, and a combination of software and hardware. A program constituting software is stored in advance in a recording medium (specifically, a non-transitory computer-readable storage medium) provided inside or outside each device, for example. For example, each program is read into a RAM and executed by a processing circuit such as a CPU at the time of execution by a computer that controls each device described in the present description. The recording medium is, for example, a magnetic disk, an optical disk, a magneto-optical disk, flash memory, or the like. The above-described computer program may be distributed via a network, for example, without using a recording medium. The computer may be an application specific integrated circuit 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 series of processing performed by each device described in the present description may be distributed and processed by a plurality of computers.

[0136] The processing described using the flowcharts and the sequence diagrams in the present description do not have to be executed in the presented order. Some of the processing steps may be performed in parallel. An additional processing step may be employed, or the processing steps may be partially omitted.

[0137] The following configurations also pertain to the technical scope of the present invention.

- (1) A system comprising:

an aerosol generation device that heats a substrate containing an aerosol source based on a heating setting; and a terminal device that transmits information indicating the heating setting based on a type of the substrate to be heated by the aerosol generation device and a predetermined condition relating to an amount of a component of an aerosol to be generated when the aerosol generation device heats the substrate,
 wherein the aerosol generation device heats the substrate based on the heating setting indicated by the information received from the terminal device.

(2) The system according to said (1),
 wherein the terminal device transmits information indicating the heating setting satisfying the predetermined condition further based on a combination of one or more of the heating setting, the type of the substrate, and the amount of the component of the aerosol when the substrate of the type is heated based on the heating setting.

(3) The system according to said (1) or (2),
 wherein the predetermined condition relates to an amount of the component of the aerosol to be taken in by a user per the one substrate.

(4) The system according to said (1) or (2),
 wherein the predetermined condition relates to an amount of the component of the aerosol to be taken in by a user per one inhalation.

(5) The system according to said (1) or (2),
 wherein the predetermined condition relates to an amount of the component of the aerosol to be taken in by a user per unit time.

(6) The system according to said (5),
 wherein the terminal device transmits the information indicating the heating setting further based on a cumulative value of an amount of the component of the aerosol already taken in by the user in the unit time.

(7) The system according to said (1) or (2),
 wherein the predetermined condition relates to an amount of the component of the aerosol to be discharged to a surrounding area per the one substrate, one inhalation, or unit time.

(8) The system according to any one of said (1) to (7),
 wherein the predetermined condition is set by a user

(9) The system according to any one of said (1) to (8),
 wherein the predetermined condition is set in accordance with a place where the aerosol generation device is used.

(10) The system according to any one of said (1) to (9),
 wherein the terminal device displays one or more of the heating settings satisfying the predetermined condition, and transmits information indicating the heating setting selected by a user from among the displayed one or more of the heating settings.

(11) The system according to any one of said (1) to (10),
 wherein the terminal device transmits information instructing heating prohibition when the heating setting satisfying the predetermined condition is not present.

(12) The system according to any one of said (1) to (11),

wherein the aerosol generation device transmits information indicating the type of the substrate to be heated, and wherein the terminal device transmits the information indicating the heating setting based on the type of the substrate to be heated by the aerosol generation device indicated by the information received from the aerosol generation device.

(13) The system according to any one of said (1) to (12), further comprising:
 the substrate.

(14) A method comprising:

transmitting, by a terminal device, information indicating a heating setting based on a type of a substrate to be heated by an aerosol generation device that heats the substrate containing an aerosol source based on the heating setting, and a predetermined condition relating to an amount of a component of an aerosol to be generated when the aerosol generation device heats the substrate; and
 heating, by the aerosol generation device, the substrate based on the heating setting indicated by the information received from the terminal device.

Reference Signs List

[0138]

	1	system
	100	inhaler device
	111	power supply
	112	sensor
5	113	notifier
	114	memory
	115	communicator
	116	controller
	121	heater
10	140	holder
	144	heat insulator
	150	stick substrate
	151	substrate
	152	inhalation port
15	200	terminal device
	210	inputter
	220	outputter
	230	communicator
	240	memory
20	250	controller

Claims

25 1. A system comprising:

an aerosol generation device that heats a substrate containing an aerosol source based on a heating setting; and
 a terminal device that transmits information indicating the heating setting based on a type of the substrate to
 be heated by the aerosol generation device and a predetermined condition relating to an amount of a component
 30 of an aerosol to be generated when the aerosol generation device heats the substrate,
 wherein the aerosol generation device heats the substrate based on the heating setting indicated by the infor-
 mation received from the terminal device.

2. The system according to claim 1,
 35 wherein the terminal device transmits information indicating the heating setting satisfying the predetermined condition
 further based on a combination of one or more of the heating setting, the type of the substrate, and the amount of
 the component of the aerosol when the substrate of the type is heated based on the heating setting.

3. The system according to claim 1 or 2,
 40 wherein the predetermined condition relates to an amount of the component of the aerosol to be taken in by a user
 per the one substrate.

4. The system according to claim 1 or 2,
 45 wherein the predetermined condition relates to an amount of the component of the aerosol to be taken in by a user
 per one inhalation.

5. The system according to claim 1 or 2,
 wherein the predetermined condition relates to an amount of the component of the aerosol to be taken in by a user
 per unit time.

50 6. The system according to claim 5,
 wherein the terminal device transmits the information indicating the heating setting further based on a cumulative
 value of an amount of the component of the aerosol already taken in by the user in the unit time.

55 7. The system according to claim 1 or 2,
 wherein the predetermined condition relates to an amount of the component of the aerosol to be discharged to a
 surrounding area per the one substrate, one inhalation, or unit time.

8. The system according to any one of claims 1 to 7,
wherein the predetermined condition is set by a user.
- 5 9. The system according to any one of claims 1 to 8,
wherein the predetermined condition is set in accordance with a place where the aerosol generation device is used.
- 10 10. The system according to any one of claims 1 to 9,
wherein the terminal device displays one or more of the heating settings satisfying the predetermined condition,
and transmits information indicating the heating setting selected by a user from among the displayed one or more
of the heating settings.
- 15 11. The system according to any one of claims 1 to 10,
wherein the terminal device transmits information instructing heating prohibition when the heating setting satisfying
the predetermined condition is not present.
- 20 12. The system according to any one of claims 1 to 11,
wherein the aerosol generation device transmits information indicating the type of the substrate to be heated, and
wherein the terminal device transmits the information indicating the heating setting based on the type of the substrate
to be heated by the aerosol generation device indicated by the information received from the aerosol generation
device.
- 25 13. The system according to any one of claims 1 to 12, further comprising:
the substrate.
- 30 14. A method comprising:

transmitting, by a terminal device, information indicating a heating setting based on a type of a substrate to be
heated by an aerosol generation device that heats the substrate containing an aerosol source based on the
heating setting, and a predetermined condition relating to an amount of a component of an aerosol to be
generated when the aerosol generation device heats the substrate; and
heating, by the aerosol generation device, the substrate based on the heating setting indicated by the information
received from the terminal device.

FIG. 1

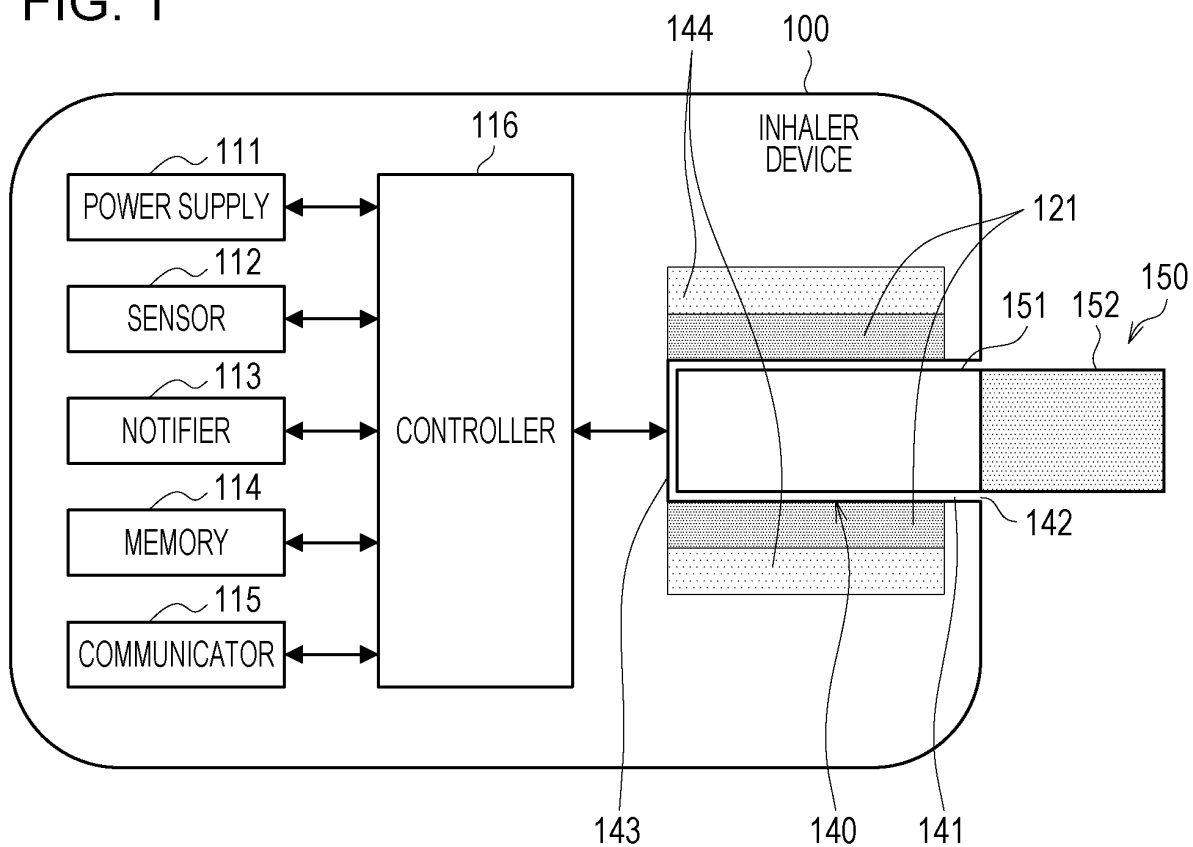


FIG. 2

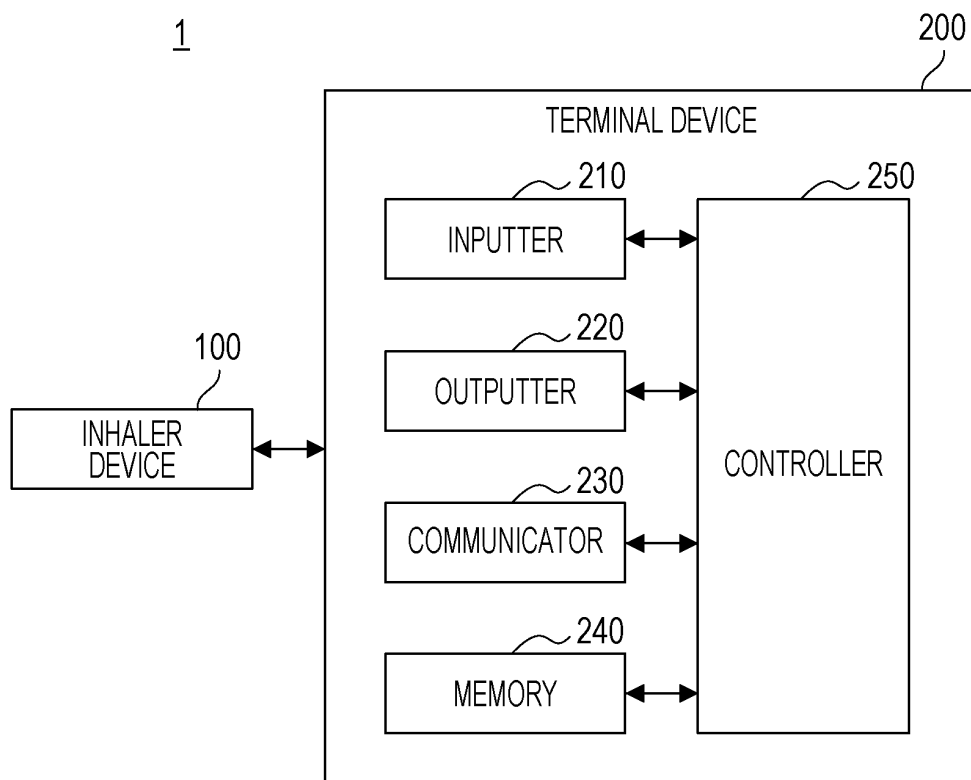


FIG. 3

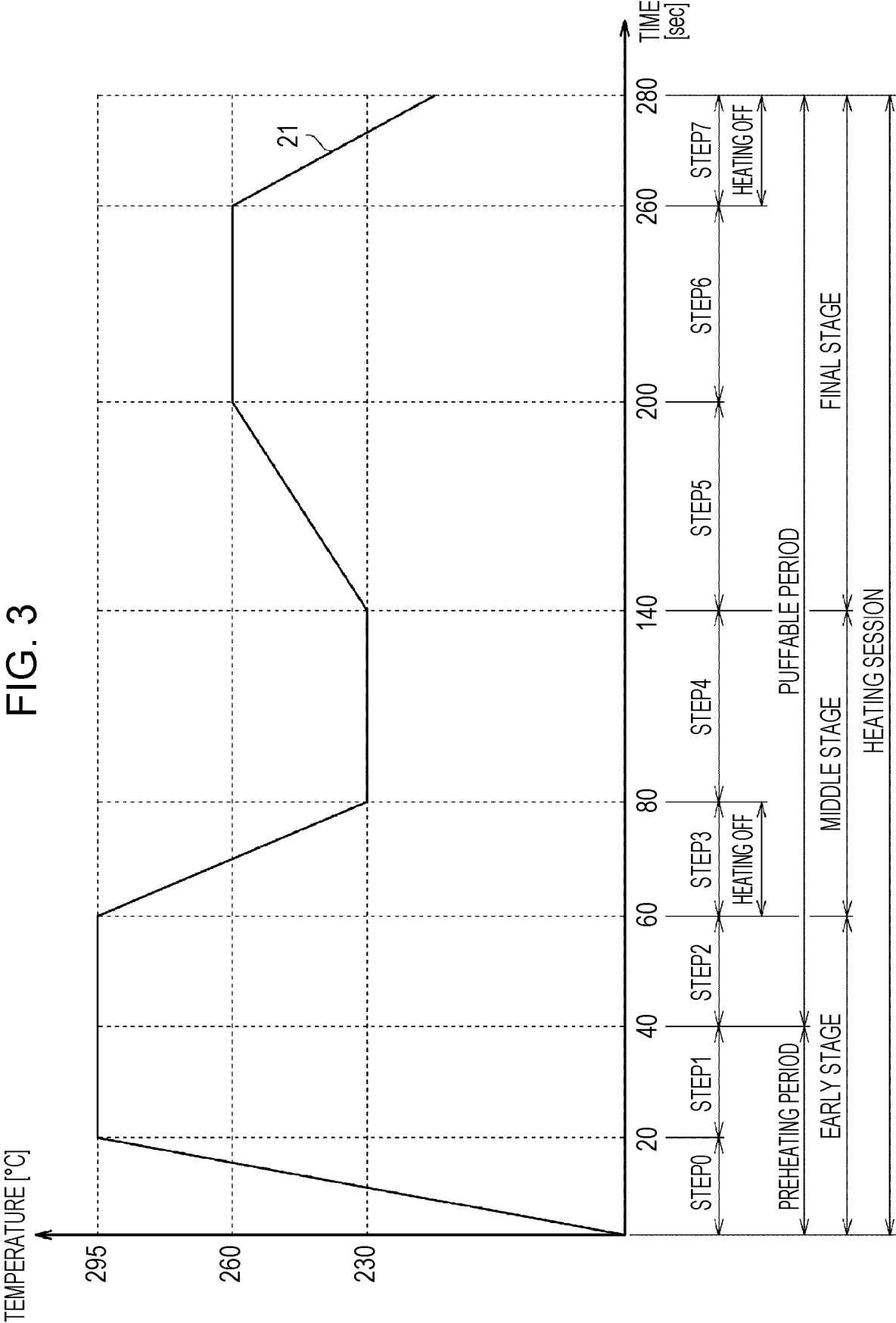


FIG. 4

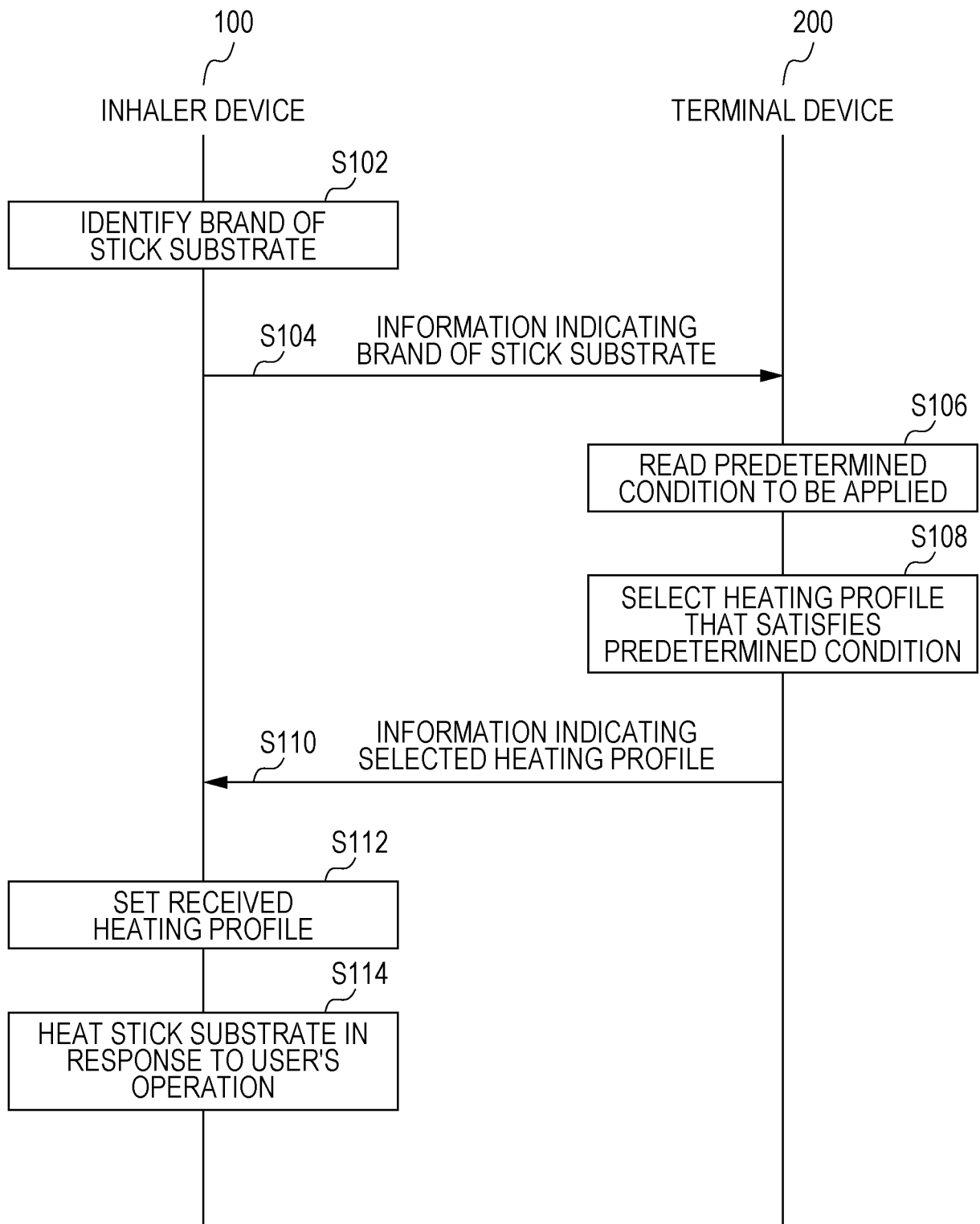


FIG. 5

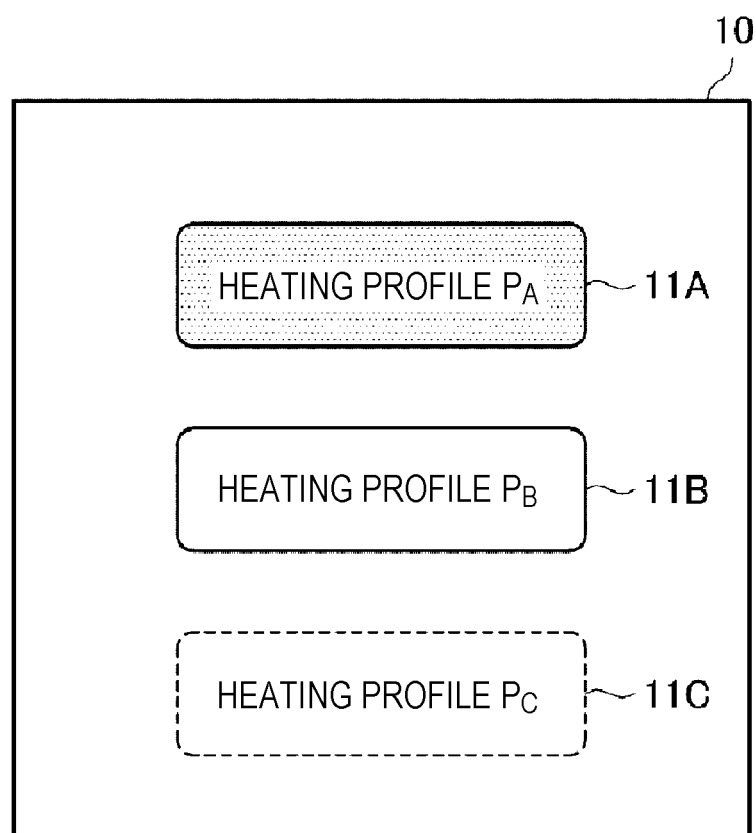
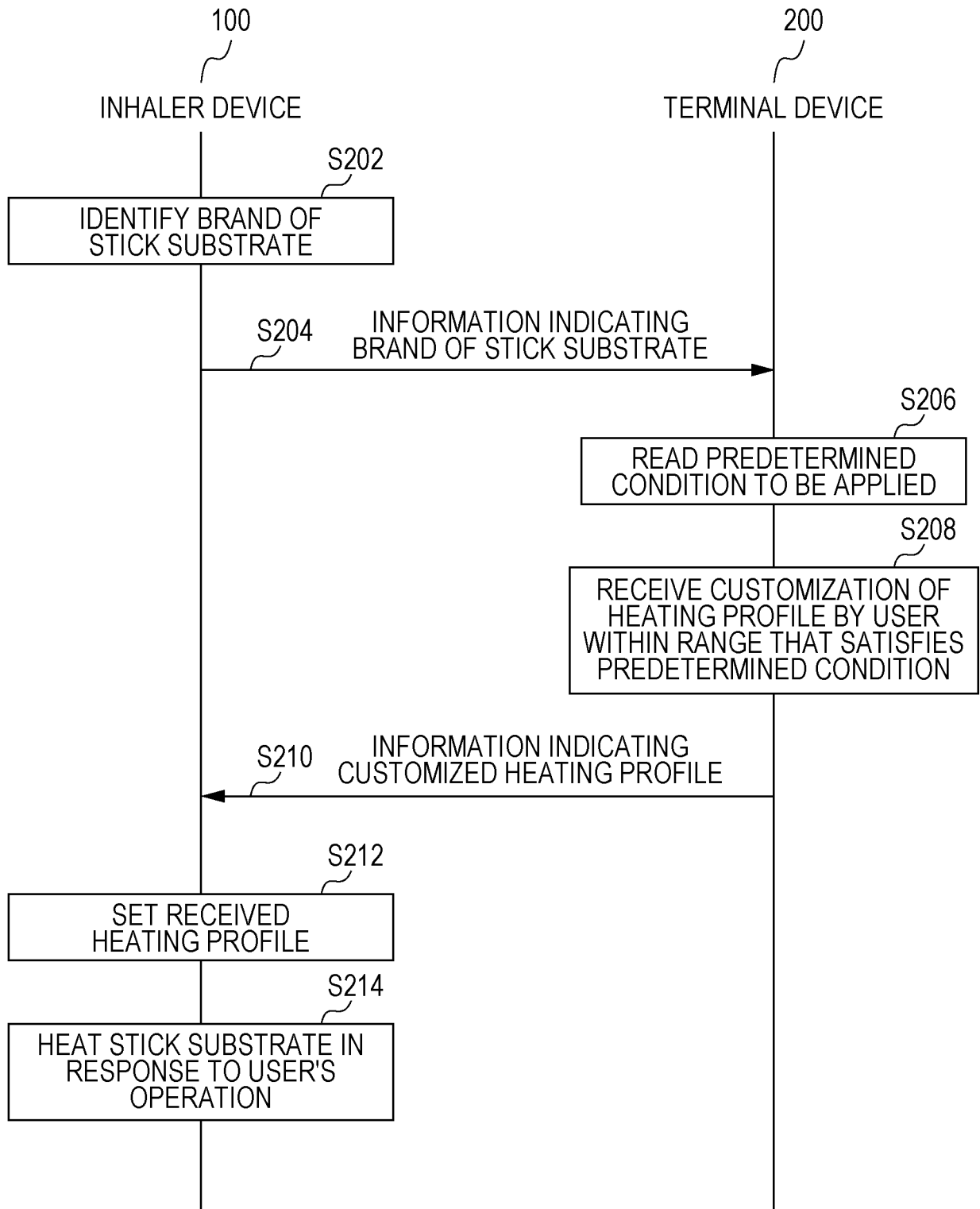


FIG. 6



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2021/043036

A. CLASSIFICATION OF SUBJECT MATTER

A24F 40/57(2020.01)i; *A24F 40/65*(2020.01)i
FI: A24F40/65; 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)

A24F40/57; 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 1971-2021
Registered utility model specifications of Japan 1996-2021
Published registered utility model applications of Japan 1994-2021

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.
A	JP 2020-526208 A (KT & G CORP.) 31 August 2020 (2020-08-31) fig. 1	1-14
A	JP 2020-505063 A (KT & G CORP.) 20 February 2020 (2020-02-20) paragraphs [0185]-[0191]	1-14
A	JP 2021-136943 A (JAPAN TOBACCO INC.) 16 September 2021 (2021-09-16) paragraphs [0089]-[0091]	1-14

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

* Special categories of cited documents:

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“&” document member of the same patent family

Date of the actual completion of the international search

04 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.

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/JP2021/043036

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
JP 2020-526208 A	31 August 2020	US 2020/0305512 A1 fig. 1 WO 2019/088382 A1 EP 3704962 A1 CN 110691523 A	
JP 2020-505063 A	20 February 2020	US 2019/0380389 A1 paragraphs [0197]-[0203] WO 2018/135887 A1 EP 3571941 A1 CN 110191650 A	
JP 2021-136943 A	16 September 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

- JP 2020526208 A [0004]