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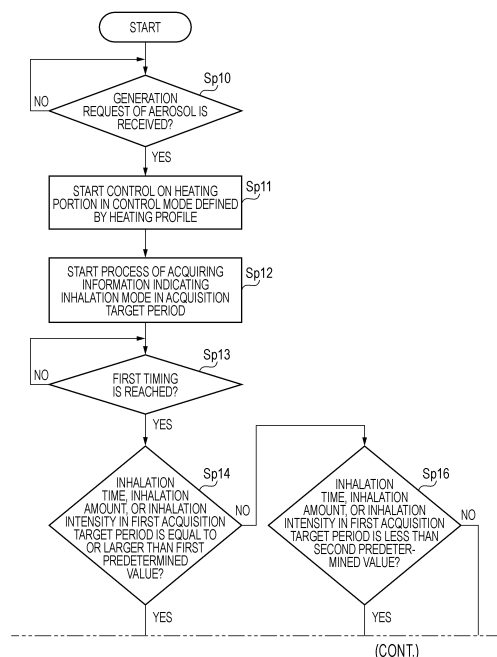
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(54) **INHALATION DEVICE, CONTROL METHOD, AND PROGRAM**

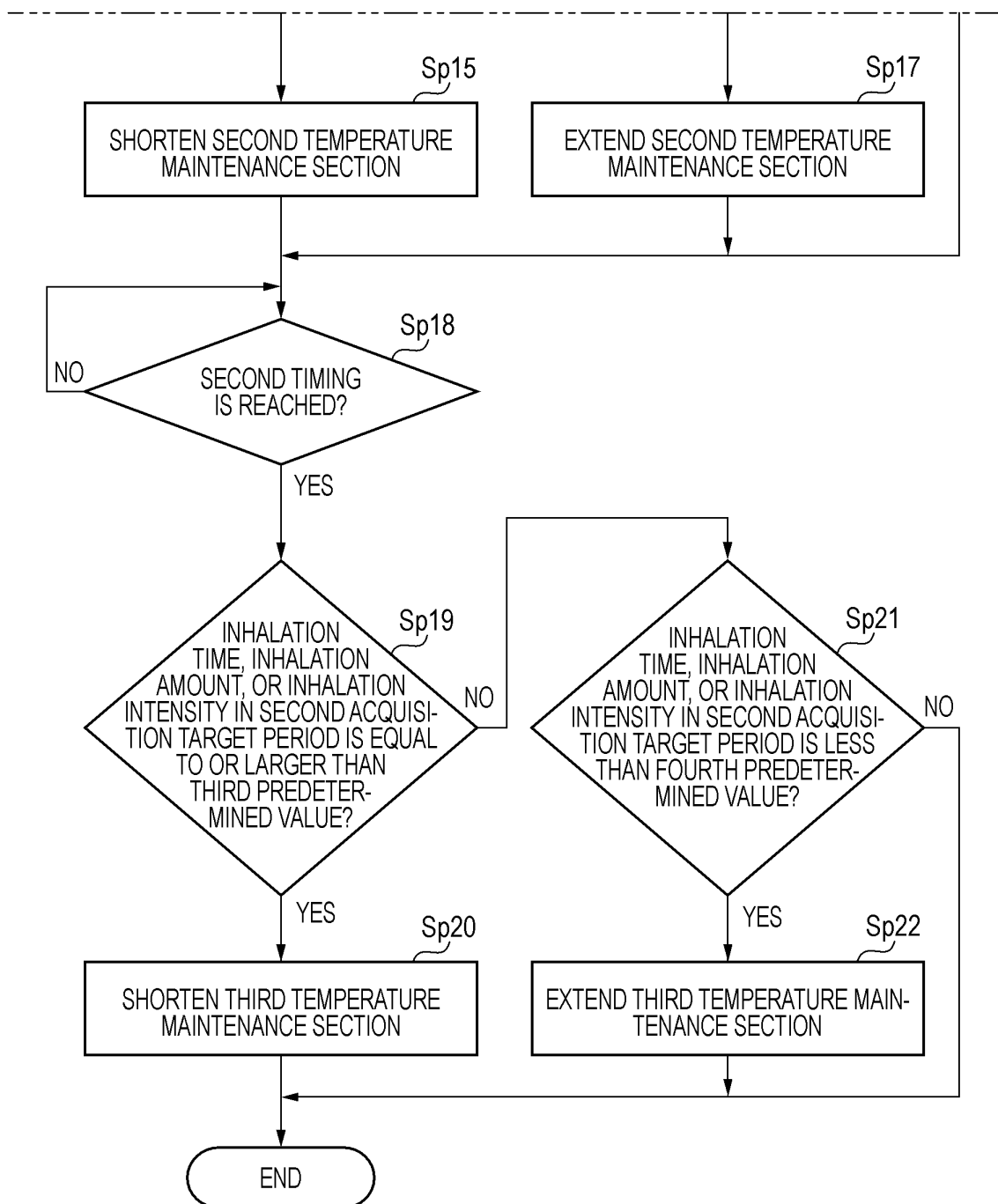
(57) A control unit (116) of an inhalation device (100) begins control of a heating unit (121) in a control mode defined by a heating profile in response to an aerosol generation request, acquires information that represents an inhalation mode for a first period in which the heating unit (121) is controlled in the control mode defined by the heating profile, and changes the control mode of the heating unit (121) for a second period that is after the first period from the control mode defined by the heating profile to a control mode based on the acquired inhalation mode for the first period.

FIG. 8



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(FIG. 8 Continued)



Description

TECHNICAL FIELD

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

BACKGROUND ART

[0002] In the related art, for example, there has been an inhalation device that generates aerosol to which a flavor component is applied and allows a user to inhale the generated aerosol. Such an inhalation device typically generates aerosol by heating a substrate containing an aerosol source with a heating portion (also referred to as a "heating element"), which is an electrical resistance heater or an induction heater, and delivers the aerosol to the user. Further, such an inhalation device may be designed to control a temperature of the heating portion according to a control profile (also referred to as a "heating profile" or a "target temperature profile") prepared in advance (for example, see the following Patent Literature 1).

CITATION LIST

PATENT LITERATURE

[0003] Patent Literature 1: Japanese Patent Application Laid-Open Publication No. 2015-524260A

SUMMARY OF INVENTION

TECHNICAL PROBLEM

[0004] Typically, the heating profile is designed to optimize a flavor experienced by the user on the premise that standard inhalation is performed. However, the standard inhalation as the premise in the heating profile is not necessarily performed to the inhalation device. For example, an inhalation mode of the inhalation device may not only individually differ for each user, but also vary depending on the feeling at the time of inhalation or the like even for the same user.

[0005] In a case in which the control as in the heating profile is performed as it is in a situation in which the standard inhalation as the premise in the heating profile is not performed, for example, an event may occur that the heating by the heating portion is stopped while the sufficient aerosol source remains in the substrate, or the heating by the heating portion is unnecessarily continued while the aerosol source in the substrate is depleting. The occurrence of such an event is not preferable from the viewpoint of improving user satisfaction with respect to the inhalation device (in other words, the commerciality of the inhalation device).

[0006] The present invention provides an inhalation device, a control method, and a program that are capable

of providing a high-quality smoking experience to a user by appropriately consuming a substrate containing an aerosol source even when inhalation in an inhalation mode different from standard inhalation as the premise in a heating profile is performed.

SOLUTION TO PROBLEM

[0007] A first invention relates to an inhalation device that includes:

a heating portion configured to generate aerosol by heating a substrate containing an aerosol source; and

a control unit configured to control an operation of the heating portion based on a heating profile defining a time-series transition of a target temperature which is a target value of a temperature of the heating portion, in which the inhalation device allows a user to inhale the aerosol generated by the heating portion, and the control unit is configured to:

start the control of the heating portion in a control mode defined by the heating profile in response to a generation request for the aerosol; acquire information indicating an inhalation mode in a first period in which the heating portion is controlled in the control mode defined by the heating profile; and change the control mode for the heating portion in a second period after the first period from the control mode defined by the heating profile to a control mode based on the inhalation mode in the first period.

[0008] A second invention relates to a control method of executing, by a computer that controls an inhalation device including a heating portion configured to generate an aerosol by heating a substrate containing an aerosol source and allowing a user to inhale the aerosol generated by the heating portion, a process comprising:

starting control of the heating portion in a control mode defined by a heating profile defining a time-series transition of a target temperature which is a target value of a temperature of the heating portion in response to a generation request for the aerosol; acquiring information indicating an inhalation mode in a first period in which the heating portion is controlled in the control mode defined by the heating profile; and changing the control mode for the heating portion in a second period after the first period from the control mode defined by the heating profile to a control mode based on the inhalation mode in the first period.

[0009] A third invention relates to a program for caus-

ing a computer, which controls an inhalation device including a heating portion configured to generate aerosol by heating a substrate containing an aerosol source and allowing a user to inhale the aerosol generated by the heating portion, to execute a process comprising:

starting control of the heating portion in a control mode defined by a heating profile defining a time-series transition of a target temperature which is a target value of a temperature of the heating portion in response to a generation request for the aerosol; acquiring information indicating an inhalation mode in a first period in which the heating portion is controlled in the control mode defined by the heating profile; and changing the control mode for the heating portion in a second period after the first period from the control mode defined by the heating profile to a control mode based on the inhalation mode in the first period.

ADVANTAGEOUS EFFECTS OF INVENTION

[0010] According to the present invention, it is possible to provide an inhalation device, a control method, and a program that are capable of providing a high-quality smoking experience to a user by appropriately consuming a substrate containing an aerosol source even when inhalation in an inhalation mode different from standard inhalation as the premise in a heating profile is performed.

BRIEF DESCRIPTION OF DRAWINGS

[0011]

[FIG. 1] FIG. 1 is a schematic diagram schematically showing an inhalation device according to the present embodiment.

[FIG. 2] FIG. 2 is a diagram showing an example of a heating profile according to the present embodiment.

[FIG. 3] FIG. 3 is a diagram showing an example of inhalation performed to the inhalation device according to the present embodiment.

[FIG. 4] FIG. 4 is a diagram (first example thereof) showing a variation of a control mode in a case in which an inhalation time, an inhalation amount, or an inhalation intensity in a first acquisition target period is equal to or larger than a first predetermined value.

[FIG. 5] FIG. 5 is a diagram (first example thereof) showing a variation of the control mode in a case in which the inhalation time, the inhalation amount, or the inhalation intensity in the first acquisition target period is less than a second predetermined value.

[FIG. 6] FIG. 6 is a diagram showing a variation of the control mode in a case in which the inhalation time, the inhalation amount, or the inhalation intensity in a second acquisition target period is equal to or larger

than a third predetermined value.

[FIG. 7] FIG. 7 is a diagram showing a variation of the control mode in a case in which the inhalation time, the inhalation amount, or the inhalation intensity in the second acquisition target period is less than a fourth predetermined value.

[FIG. 8] FIG. 8 is a flowchart showing an example of a process executed by a control unit of the inhalation device according to the present embodiment.

[FIG. 9] FIG. 9 is a diagram (second example thereof) showing the variation of the control mode in the case in which the inhalation time, the inhalation amount, or the inhalation intensity in the first acquisition target period is equal to or larger than the first predetermined value.

[FIG. 10] FIG. 10 is a diagram (second example thereof) showing the variation of the control mode in the case in which the inhalation time, the inhalation amount, or the inhalation intensity in the first acquisition target period is less than the second predetermined value.

DESCRIPTION OF EMBODIMENTS

[0012] Hereinafter, an inhalation device, a control method, and a program according to an embodiment of the present invention will be described with reference to the drawings. Hereinafter, the same or similar elements are denoted by the same or similar reference numerals, and the description thereof may be appropriately omitted or simplified.

<1. Configuration Example of Inhalation Device>

[0013] The inhalation device according to the present embodiment is a device that generates a substance to be inhaled by a user and allows the user to inhale the generated substance. In the following description, it is assumed that the substance generated by the inhalation device according to the present embodiment is aerosol, but the substance is not limited to the aerosol, and may be a gas.

[0014] FIG. 1 is a schematic diagram schematically showing the inhalation device according to the present embodiment. As shown in FIG. 1, in an inhalation device 100 according to the present embodiment, a stick-type substrate 150 having a flavor generating substrate such as a filler containing an aerosol source and a flavor source which are inhalation component sources is inserted. The stick-type substrate 150 inserted into the inhalation device 100 generates aerosol containing a flavor component by being heated from an outer periphery thereof.

[0015] The aerosol source can use, for example, a polyhydric alcohol such as glycerin and propylene glycol or a liquid such as water, but the aerosol source is not limited to the liquid, and may be a solid. The flavor source is a constituent element for applying the flavor compo-

nent to the generated aerosol, and contains, for example, a tobacco-based flavor component or a non-tobacco-based flavor component. Examples of the tobacco-based flavor component can include tobacco granules obtained by forming a tobacco raw material into granules, and a shredded tobacco. Examples of the non-tobacco-based flavor component can include a plant other than tobacco (for example, mint, Kampo herbal medicine, or herb) and a perfume such as menthol.

[0016] Note that the tobacco-based flavor component or the non-tobacco-based flavor component may be contained in the aerosol source. Further, in a case in which the inhalation device 100 is a medical inhaler such as a nebulizer, the aerosol source may contain a drug.

[0017] As shown in FIG. 1, the inhalation device 100 includes a power supply portion 111, a sensor portion 112, a notification portion 113, a storage portion 114, a communication portion 115, a control unit 116, a heating portion 121, a holding portion 140, and a heat insulation portion 144.

[0018] The power supply portion 111 stores electric power. The power supply portion 111 feeds the electric power to each constituent element of the inhalation device 100 based on control by the control unit 116. The power supply portion 111 may be implemented by, for example, a rechargeable battery such as a lithium ion secondary battery.

[0019] The sensor portion 112 acquires various types of information related to the inhalation device 100. For example, the sensor portion 112 is implemented by a pressure sensor such as a condenser microphone, a flow rate sensor, a temperature sensor, a voltage sensor, or the like, and acquires a value associated with inhalation by the user.

[0020] As an example, the sensor portion 112 may include a pressure sensor (hereinafter, also referred to as a "puff sensor") that detects a pressure in the inhalation device 100. As will be described later, the control unit 116 can detect inhalation to the inhalation device 100 based on a detection value of the puff sensor.

[0021] As another example, the sensor portion 112 may include a flow rate sensor that detects a flow rate generated by the inhalation to the inhalation device 100 (hereinafter, also simply referred to as the "flow rate"). Further, as another example, the sensor portion 112 may include a temperature sensor (hereinafter, also referred to as a "puff thermistor") that detects a temperature of the heating portion 121 (or a predetermined portion near the heating portion 121). As another example, the sensor portion 112 may include a voltage sensor that detects a potential difference (hereinafter, also referred to as a "voltage") applied to a heating resistor constituting the heating portion 121.

[0022] For example, the sensor portion 112 may further include an input device such as an operation button or an operation switch that receives input of information from the user, and may acquire the information input from the user.

[0023] The notification portion 113 notifies the user of information. The notification portion 113 may be implemented by, for example, a light emitting device that emits light, a display device that displays an image, a sound output device that outputs a sound, a vibration device that vibrates, or the like. As the light emitting device, for example, a light emitting diode (LED) can be adopted. As the display device, for example, a liquid crystal display or an organic electro luminescence diode (OLED) display can be adopted. As the sound output device, for example, a speaker capable of converting an electric signal representing a sound into a physical sound (that is, vibration of air) can be adopted. As the vibration device, for example, a vibrator including an eccentric weight and a motor for rotating the eccentric weight can be adopted.

[0024] The storage portion 114 stores various types of information (for example, various data and various programs) for an operation of the inhalation device 100. The storage portion 114 may be implemented by, for example, a nonvolatile storage medium such as a flash memory. Examples of the information stored in the storage portion 114 can include a heating profile. Here, the heating profile refers to information that defines a time-series transition of a target temperature which is a target value of the temperature of the heating portion 121 (hereinafter, also simply referred to as the "target temperature"). An example of the heating profile will be described later with reference to FIG. 2.

[0025] The communication portion 115 is a communication interface that can perform communication in accordance with any wired or wireless communication standard. In the case of wireless communication, for example, Wi-Fi (registered trademark), Bluetooth (registered trademark), or near field communication (NFC) may be adopted as the communication standard. In the case of wired communication, for example, communication may be performed by an external connection terminal such as a universal serial bus (USB) and a data communication cable.

[0026] The control unit 116 functions as an arithmetic processing device and a control device, and controls overall operations in the inhalation device 100 according to various programs. Since an example of the control performed by the control unit 116 will be described later, the description thereof is omitted here. The control unit 116 is implemented by, for example, an electronic circuit such as a central processing unit (CPU) or a microprocessor.

[0027] The holding portion 140 has an internal space 141, and holds the stick-type substrate 150 while accommodating a part of the stick-type substrate 150 in the internal space 141. The holding portion 140 has an opening 142 through which the internal space 141 communicates with the outside, and holds the stick-type substrate 150 inserted into the internal space 141 from the opening 142. For example, the holding portion 140 is a cylindrical body having the opening 142 and a bottom portion 143 as a bottom surface, and defines the colum-

nar internal space 141. The holding portion 140 also has a function of defining a flow path of air supplied to the stick-type substrate 150. An air inlet hole, which is an inlet of the air to the flow path, is disposed, for example, in the bottom portion 143. On the other hand, an air outlet hole, which is an outlet of the air from the flow path, is the opening 142.

[0028] The stick-type substrate 150 includes a substrate portion 151 and an inhalation port portion 152. The substrate portion 151 includes, for example, the aerosol source. In a state in which the stick-type substrate 150 is held by the holding portion 140, at least a part of the substrate portion 151 is accommodated in the internal space 141, and at least a part of the inhalation port portion 152 protrudes from the opening 142. When the user bites the inhalation port portion 152 protruding from the opening 142 and inhales, the air flows into the internal space 141 from the air inlet hole (not shown), and reaches the mouth of the user together with the aerosol generated from the substrate portion 151.

[0029] For example, the heating portion 121 heats the aerosol source to atomize the aerosol source to generate the aerosol. As an example, in the present embodiment, the heating portion 121 is formed in a film shape, and is disposed to cover an outer periphery of the holding portion 140. The heating portion 121 generates heat when being supplied with the electric power from the power supply portion 111. When the heating portion 121 generates heat, the substrate portion 151 of the stick-type substrate 150 is heated from an outer periphery, and the aerosol is generated.

[0030] For example, the supply of the electric power from the power supply portion 111 to the heating portion 121 may be started when the sensor portion 112 detects that the user starts the inhalation and/or that predetermined information is input. Then, the supply of the electric power from the power supply portion 111 to the heating portion 121 may be stopped when the sensor portion 112 detects that the user finishes the inhalation and/or that predetermined information is input. As described above, the supply of the electric power from the power supply portion 111 to the heating portion 121 may be controlled by the control unit 116.

[0031] The heat insulation portion 144 prevents heat transfer from the heating portion 121 to other constituent elements. For example, the heat insulation portion 144 is made of a vacuum heat insulation material or an aerogel heat insulation material.

[0032] One configuration example of the inhalation device 100 has been described above. It is needless to say that the configuration of the inhalation device 100 is not limited to the above, and may adopt various configurations as exemplified below.

[0033] As an example, the heating portion 121 may be formed in a blade shape and disposed to protrude from the bottom portion 143 of the holding portion 140 into the internal space 141. In this case, the blade-shaped heating portion 121 is inserted into the substrate portion 151

of the stick-type substrate 150, and heats the substrate portion 151 of the stick-type substrate 150 from the inside. As another example, the heating portion 121 may be disposed to cover the bottom portion 143 of the holding portion 140. Further, the heating portion 121 may be implemented by a combination of two or more of a first heating portion covering the outer periphery of the holding portion 140, a blade-shaped second heating portion, and a third heating portion covering the bottom portion 143 of the holding portion 140.

[0034] As another example, the holding portion 140 may include an opening and closing mechanism such as a hinge that opens and closes a part of an outer shell forming the internal space 141. The holding portion 140 may open and close the outer shell to sandwich and hold the stick-type substrate 150 inserted into the internal space 141. In that case, the heating portion 121 may be provided at a sandwiching and holding place in the holding portion 140 and heat the stick-type substrate 150 while pressing the stick-type substrate 150.

[0035] Further, a method for atomizing the aerosol source is not limited to heating by the heating portion 121, and may be induction heating, for example. The inhalation device 100 may include a plurality of types of aerosol sources. A plurality of types of aerosol generated from the plurality of types of aerosol sources may be mixed to cause a chemical reaction, thereby generating another type of aerosol.

<2. Heating Profile>

[0036] The heating profile, which is information defining the time-series transition of the target temperature, can be, for example, information defining a time length and the target temperature of each time section included in a plurality of time sections consecutive along a time axis. Further, in the heating profile, the target temperature of the time section may be defined without determining the time length of the time section, and the time section may be ended when the target temperature is reached.

[0037] FIG. 2 is a diagram showing an example of the heating profile according to the present embodiment. The vertical axis in FIG. 2 represents the target temperature [°C]. The vertical axis in FIG. 2 represents a time [sec], and more specifically represents an elapsed time from the start of a control based on the heating profile.

[0038] As shown in FIG. 2, the heating profile according to the present embodiment defines the time length and the target temperature of each time section among a first time section S1, a second time section S2, a third time section S3, a fourth time section S4, a fifth time section S5, and a sixth time section S6 consecutive along the time axis.

[0039] These time sections, that is, the first time section S1, the second time section S2, the third time section S3, the fourth time section S4, the fifth time section S5, and the sixth time section S6 are provided in this order

from the front in time series. Then, with the end of the sixth time section S6 as the last time section, the heating by the heating portion 121 (in other words, the supply of the electric power to the heating portion 121) is stopped. Accordingly, as indicated by the dash-dotted line in FIG. 2, the temperature of the heating portion 121 gradually decreases after the sixth time section S6 ends.

[0040] In the heating profile according to the present embodiment, the first time section S1 is a time section in which the time length is $tm1$ [sec] and the target temperature is $T1$ [°C]. The second time section S2 is a time section in which the time length is $tm2$ [sec] and the target temperature is $T1$ [°C]. The third time section S3 is a time section in which the time length is $tm3$ [sec] and the target temperature is $T2$ [°C] (where $T2 < T1$).

[0041] The fourth time section S4 is a time section in which the time length is $tm4$ [sec] and the target temperature is $T2$ [°C]. As an example, in the present embodiment, the fourth time section S4 is the longest time section. In other words, $tm4$ is longer than any one of $tm1$ to $tm3$ described above and $tm5$ and $tm6$ to be described below.

[0042] The fifth time section S5 is a time section in which the time length is $tm5$ [sec] and the target temperature is $T3$ [°C] (where $T3 > T2$ and $T3 < T1$). The sixth time section S6 is a time section in which the time length is $tm6$ [sec] and the target temperature is $T3$ [°C]. As described above, the sixth time section S6 is the last time section and is a time section immediately before the stop of the heating by the heating portion 121.

[0043] Here, the time sections included in the heating profile can be roughly divided into three types of sections, that is, a heating section, a cooling section, and a temperature maintenance section.

[0044] Here, the heating section is a time section in which the heating portion 121 is heated (in other words, the temperature of the heating portion 121 increases). For example, the heating section is a time section in which the target temperature is assumed to be higher than the temperature of the heating portion 121 at the start (for example, the target temperature of the previous time section). In the example according to the present embodiment, the first time section S1 and the fifth time section S5 are the heating section. Hereinafter, the first time section S1 is also referred to as a "first heating section S1", and the fifth time section S5 is also referred to as a "second heating section S5".

[0045] Here, the cooling section is a time section in which the heating portion 121 is cooled (in other words, the temperature of the heating portion 121 decreases). For example, the cooling section is a time section in which the target temperature is assumed to be lower than the temperature of the heating portion 121 at the start (for example, the target temperature of the previous time section). In the example according to the present embodiment, the third time section S3 is the heating section. Hereinafter, the third time section S3 is also referred to as a "cooling section S3".

[0046] The temperature maintenance section is a time section in which the control unit 116 controls the heating portion 121 to maintain the temperature thereof at a constant temperature. For example, the temperature maintenance section is a time section in which the target temperature is assumed to be approximately equal to the temperature of the heating portion 121 at the start (for example, the target temperature of the previous time section). In the example according to the present embodiment, the second time section S2, the fourth time section S4, and the sixth time section S6 are the temperature maintenance section. Hereinafter, the second time section S2 is also referred to as a "first temperature maintenance section S2", the fourth time section S4 is also referred to as a "second temperature maintenance section S4", and the sixth time section S6 is also referred to as a "third temperature maintenance section S6".

[0047] It should be noted that while the temperature of the heating portion 121 is controlled to be maintained at the constant temperature in the temperature maintenance section, in practice, the temperature of the heating portion 121 may vary. Examples of factors that cause the temperature of the heating portion 121 to vary in the temperature maintenance section include a decrease in the temperature of the heating portion 121 due to the inhalation by the user, and hunting in a proportional-integral-differential (PID) controller.

[0048] As described above, the heating profile according to the present embodiment includes the first heating section S1 provided first, the cooling section S3 provided after the first heating section S1 and having the target temperature lower than that of the first heating section S1, the third temperature maintenance section S6 provided after the cooling section S3 and having the target temperature higher than that of the cooling section S3, and the second temperature maintenance section S4 as a low-temperature section having the target temperature lower than that of the third temperature maintenance section S6.

[0049] More specifically, in the heating profile according to the present embodiment, the first heating section S1, the first temperature maintenance section S2, the cooling section S3, the second temperature maintenance section S4, the second heating section S5, and the third temperature maintenance section S6 are provided in this order from the front in time series. Further, the target temperature of the heating portion 121 is set to $T1$ [°C] in the first heating section S1 and the first temperature maintenance section S2, is set to $T2$ [°C] ($T2 < T1$) in the cooling section S3 and the second temperature maintenance section S4, and is set to $T3$ [°C] ($T2 < T3 < T1$) in the second heating section S5 and the third temperature maintenance section S6.

[0050] In the inhalation device 100, a period in which a sufficient amount of aerosol is assumed to be generated is also referred to as an "inhalation-enabled period (or a puff-enabled period)". A period from the start of the heating to the start of the inhalation-enabled period is

also referred to as a "pre-heating period". The heating performed in the pre-heating period is also referred to as "pre-heating". In the example according to the present embodiment, the first heating section S1 is the pre-heating period. In addition, the first temperature maintenance section S2, the cooling section S3, the second temperature maintenance section S4, the second heating section S5, and the third temperature maintenance section S6 are the inhalation-enabled period.

[0051] For example, the notification portion 113 of the inhalation device 100 notifies the user of a timing at which the inhalation-enabled period starts and a timing at which the inhalation-enabled period ends. That is, the notification portion 113 notifies the user at a timing when the first temperature maintenance section S2 starts (in other words, a timing when the first heating section S1 ends) and a timing when the third temperature maintenance section S6 ends. In this way, by notifying the user of the timing at which the inhalation-enabled period starts and the timing at which the inhalation-enabled period ends, the user can perform the inhalation to the inhalation device 100 in the inhalation-enabled period with reference to the notification.

[0052] In addition, a mode of the notification performed at the timing when the inhalation-enabled period starts (that is, the timing when the first temperature maintenance section S2 starts) and a mode of the notification performed at the timing when the inhalation-enabled period ends (that is, the timing when the third temperature maintenance section S6 ends) may be different from each other. In this way, by setting the modes of the notifications performed at the timing when the inhalation-enabled period starts and the timing when the inhalation-enabled period ends different, it is possible to guide the user to easily understand the start and the end of the inhalation-enabled period.

<3. Control Unit>

[0053] The control unit 116 of the inhalation device 100 controls an operation of the heating portion 121 based on the heating profile. Accordingly, the aerosol is generated as planned by the heating profile. The heating profile is typically designed to optimize a flavor experienced by the user when the user inhales the aerosol generated from the stick-type substrate 150. Therefore, by controlling the operation of the heating portion 121 based on the heating profile, it is possible to optimize the flavor experienced by the user.

[0054] More specifically, in response to a generation request for the aerosol, the control unit 116 starts the control of the heating portion 121 in a control mode defined by the heating profile. Here, the generation request for the aerosol can be, for example, an operation of instructing the start of heating. As an example, the operation of instructing the start of heating can be pressing a predetermined operation button provided in the inhalation device 100. Further, the operation of instructing the

start of heating may be an inhalation operation to the inhalation device 100 or reception of predetermined information from another device such as a smartphone. The control unit 116 can detect the generation request for the aerosol based on, for example, information acquired by the sensor portion 112 or the communication portion 115.

[0055] Expanding upon the control of the heating portion 121 based on the heating profile in detail, the control unit 116 controls the operation of the heating portion 121 based on a difference between the target temperature corresponding to an elapsed time from the start of the control based on the heating profile and an actual temperature of the heating portion 121 (hereinafter, also referred to as the "actual temperature"). More specifically, at this time, the control unit 116 controls the temperature of the heating portion 121 such that a time-series transition of the actual temperature of the heating portion 121 is the same as the time-series transition of the target temperature defined in the heating profile.

[0056] The temperature control of the heating portion 121 can be achieved by, for example, a known feedback control. For example, the control unit 116 supplies the electric power from the power supply portion 111 to the heating portion 121 in a pulse form by pulse width modulation (PWM) or pulse frequency modulation (PFM). In this case, the control unit 116 can control the temperature of the heating portion 121 by adjusting a duty ratio of an electric power pulse.

[0057] In the feedback control, the control unit 116 may control the electric power supplied to the heating portion 121, for example, the duty ratio based on the difference between the actual temperature and the target temperature and the like. Further, the feedback control may be the PID control, for example. Alternatively, the control unit 116 may perform a simple ON-OFF control. For example, the control unit 116 may execute the heating by the heating portion 121 until the actual temperature reaches the target temperature, stop the heating by the heating portion 121 when the actual temperature reaches the target temperature, and execute the heating by the heating portion 121 again when the actual temperature becomes lower than the target temperature.

[0058] The temperature of the heating portion 121 can be acquired (in other words, quantified), for example, by measuring or estimating an electrical resistance value of the heating resistor constituting the heating portion 121. This is because the electrical resistance value of the heating resistor changes according to the temperature. The electrical resistance value of the heating resistor can be estimated (that is, acquired), for example, by measuring a voltage reduction amount in the heating resistor. The voltage reduction amount in the heating resistor can be measured (that is, acquired) by the voltage sensor that measures the potential difference applied to the heating resistor. As another example, the temperature of the heating portion 121 may be measured by the temperature sensor (the puff thermistor) provided near the heat-

ing portion 121.

[0059] Further, the control unit 116 stops the heating by the heating portion 121 at a timing when a predetermined time has elapsed from the start of the control based on the heating profile. A timing at which the heating by the heating portion 121 is stopped is, for example, a timing at which the last time section (the third temperature maintenance section S6 in the example according to the present embodiment) in the heating profile ends.

[0060] That is, after the start of the heating by the heating portion 121, the aerosol source and the flavor component of the stick-type substrate 150 being heated gradually decrease over time. The heating by the heating portion 121 is typically stopped at a timing at which it is assumed that at least one of the aerosol source and the flavor component of the stick-type substrate 150 decreases and the sufficient amount of aerosol to which an appropriate amount of the flavor component is applied cannot be delivered to the user. In other words, the heating profile is designed such that the last time section ends at a timing at which it is assumed that the aerosol source or the flavor component of the stick-type substrate 150 decreases to the extent that the sufficient amount of aerosol to which the appropriate amount of the flavor component is applied cannot be delivered to the user on the premise that standard inhalation is performed.

[0061] In addition, the aerosol source and the flavor component of the stick-type substrate 150 are also reduced by performing the inhalation to the inhalation device 100. Therefore, even before the predetermined time elapses from the start of the control based on the heating profile, when the inhalation is performed a predetermined number of times (for example, 15 times) from the start of the control based on the heating profile, the control unit 116 may stop the heating by the heating portion 121 at that time. Hereinafter, in such a case, the number of times of inhalations, which is a condition for stopping the heating by the heating portion 121, is also referred to as "the number of times of executable inhalation".

[0062] Further, for example, the control unit 116 may stop the heating by the heating portion 121 at a timing when the predetermined operation button provided in the inhalation device 100 is pressed. In this way, the user can stop the heating by the heating portion 121 at a desired timing.

[0063] Here, the heating profile is designed to optimize the flavor experienced by the user on the premise that the standard inhalation is performed. However, the standard inhalation as the premise in the heating profile is not necessarily performed to the inhalation device 100. For example, an inhalation mode to the inhalation device 100 may not only individually differ for each user, but also vary depending on the feeling at the time of inhalation or the like even for the same user.

[0064] In a case in which the control as in the heating profile is performed as it is in a situation in which the standard inhalation as the premise in the heating profile is

not performed, an event may occur that the heating by the heating portion 121 is stopped while the sufficient aerosol source and flavor component remains in the stick-type substrate 150, or that the heating by the heating portion 121 is unnecessarily continued while the aerosol source or the flavor component of the stick-type substrate 150 is depleting to the extent that the sufficient amount of aerosol to which the appropriate amount of the flavor component is applied cannot be delivered to the user (in other words, a high-quality smoking experience cannot be provided to the user). The occurrence of such an event is not preferable from the viewpoint of improving user satisfaction with respect to the inhalation device 100 (in other words, the commerciality of the inhalation device 100).

[0065] That is, even when the inhalation in an inhalation mode different from the standard inhalation as the premise in the heating profile is performed, it is desirable to appropriately consume the stick-type substrate 150 having the aerosol source and the like to provide the high-quality smoking experience to the user from the viewpoint of improving the commerciality of the **inhalation** device 100.

[0066] Thus, the control unit 116 acquires information indicating the inhalation mode to the inhalation device 100 in a first period in which the heating portion 121 is controlled in the control mode defined by the heating profile (hereinafter, also simply referred to as the "inhalation mode in the first period"). Here, the inhalation mode in the first period may be, for example, an inhalation time in the first period, an inhalation amount in the first period, or an inhalation intensity in the first period. Further, the inhalation mode in the first period may be a combination of two or more of the inhalation time in the first period, the inhalation amount in the first period, or the inhalation intensity in the first period (for example, a combination of the inhalation time and the inhalation intensity). As specific examples of the inhalation time in the first period, the inhalation amount in the first period, and the inhalation intensity in the first period, an inhalation time in an acquisition target period, an inhalation amount in the acquisition target period, and an inhalation intensity in the acquisition target period will be described later.

[0067] Then, the control unit 116 changes the control mode for the heating portion 121 in a second period, which is a period after the first period, from the control mode defined by the heating profile to a control mode based on the acquired inhalation mode in the first period. Accordingly, even when the inhalation mode in the first period is different from the standard inhalation, in the subsequent second period, the heating portion 121 can be appropriately controlled in consideration of the inhalation mode in the first period (that is, the inhalation actually performed in the first period). Therefore, it is possible to appropriately consume the stick-type substrate 150 to provide the high-quality smoking experience to the user. Hereinafter, the control unit 116 will be described in more detail.

<4-1. Acquisition Target Period>

[0068] For example, the control unit 116 acquires, based on a detection result of the sensor portion 112 during a predetermined acquisition target period in which the heating portion 121 is controlled in the control mode defined by the heating profile, information indicating the inhalation mode in the predetermined acquisition target period.

[0069] The acquisition target period can be, for example, a period from a time point when the control of the heating portion 121 is started in the control mode defined by the heating profile (that is, a time point when the control based on the heating profile is started) to a time point when a predetermined time elapses. Accordingly, it is possible to secure a certain period as the acquisition target period. In consideration of the fact that the control based on the heating profile is started when the generation request for the aerosol is received, the acquisition target period can also be referred to as a period from a time point when the generation request for the aerosol is received to a time point when a predetermined time elapses.

[0070] In the example according to the present embodiment, as shown in FIG. 2, a first acquisition target period A1 and a second acquisition target period A2 are provided as the acquisition target period.

[0071] The first acquisition target period A1 is a period from the time point when the control based on the heating profile is started (that is, when the elapsed time is 0) to a first timing $ti1$ at which a first predetermined time $Tm1$ preset by a manufacturer or the like of the inhalation device 100 has elapsed. For example, the first predetermined time $Tm1$ is set to be shorter than half of a period (that is, $tm1 + tm2 + tm3 + tm4 + tm5 + tm6$) from the time point when the control based on the heating profile is started to a time point when the heating by the heating portion 121 is stopped. Further, the first predetermined time $Tm1$ is required to satisfy, for example, $(tm1 + tm2 + tm3) < Tm1 < (tm1 + tm2 + tm3 + tm4 - \Delta ta)$. Accordingly, the first timing $ti1$ is set to a timing in the second temperature maintenance section S4. Δta will be described later.

[0072] The second acquisition target period A2 is a period from the time point when the control based on the heating profile is started (that is, when the elapsed time is 0) to a second timing $ti2$ at which a second predetermined time $Tm2$ (where $Tm2 > Tm1$) preset by the manufacturer or the like of the inhalation device 100 has elapsed. For example, the second predetermined time $Tm2$ is required to satisfy $(tm1 + tm2 + tm3 + tm6 + tm5) < Tm2 < (tm1 + tm2 + tm3 + tm4 + tm5 + tm6 - \Delta tc)$. Accordingly, the second timing $ti2$ is set to a timing in the third temperature maintenance section S6. Δtc will be described later.

[0073] In the example described here, the first acquisition target period A1 is set as a period from the time point when the control based on the heating profile is started to a time point when the first predetermined time $Tm1$

elapses, but the first acquisition target period A1 is not limited thereto.

[0074] For example, the first acquisition target period A1 may be set to a period from the time point when the control based on the heating profile is started (that is, the control of the heating portion 121 is started in the control mode defined by the heating profile) to a time point when the inhalation is performed a first predetermined number of times (for example, 5 times). Also in this way, it is possible to secure a certain period as the first acquisition target period A1. Similarly, the second acquisition target period A2 may be set to a period from the time point when the control based on the heating profile is started to a time point when the inhalation is performed a second predetermined number of times (for example, 10 times) larger than the first predetermined number of times. In such a case, it is assumed that the first predetermined number of times and the second predetermined number of times are larger than 0 and less than the number of times of executable inhalation described above.

[0075] Further, in the example described here, a starting time point of the first acquisition target period A1 is set to the time point when the control based on the heating profile is started, but the starting time point is not limited thereto, and may be a time point when the inhalation-enabled period starts (for example, a timing at which the first temperature maintenance section S2 starts). Also in this way, it is possible to secure a certain period as the first acquisition target period A1. Similarly, a starting time point of the second acquisition target period A2 is not limited to the time point when the control based on the heating profile is started, and may be, for example, the time point when the inhalation-enabled period starts.

<4-2. Inhalation Time in Acquisition Target Period>

[0076] Next, the "inhalation time in the acquisition target period" that can be acquired by the control unit 116 will be described. Here, the inhalation time in the acquisition target period can be, for example, a maximum value of an inhalation time by one inhalation in the acquisition target period, or an accumulated value of inhalation times by a plurality of inhalations in the acquisition target period. Accordingly, the inhalation time in the acquisition target period acquired by the control unit 116 can be set to represent the inhalation mode in the acquisition target period.

[0077] FIG. 3 is a diagram showing an example of the inhalation performed to the inhalation device according to the present embodiment. The horizontal axis in FIG. 3 represents a period. (a) of FIG. 3 shows the presence or absence (ON/OFF) of the heating in each period indicated by the horizontal axis in FIG. 3. (b) of FIG. 3 shows the presence or absence (ON/OFF) of the inhalation in each period indicated by the horizontal axis in FIG. 3. Further, (c) of FIG. 3 shows the flow rate in each period indicated by the horizontal axis in FIG. 3.

[0078] The example shown in FIG. 3 is an example of a

case in which two inhalations, that is, a first inhalation Pf1 and a second inhalation Pf2 are performed in an acquisition target period AX (for example, the first acquisition target period A1) from the time point when the generation request for the aerosol is received to a time point when a predetermined time (for example, the first predetermined time Tm1) elapses.

[0079] The first inhalation Pf1 is performed from a period t11 to a period t12 after the period t11, and an inhalation time thereof is tm10. Here, the inhalation time refers to a length (that is, a time) of a period from a time point when the inhalation is started (the period t11 in the case of the first inhalation Pf1) to a time point when the inhalation is completed (the period t12 in the case of the first inhalation Pf1). The second inhalation Pf2 is performed from a period t21 after the period t12 to a period t22 after the period t21, and an inhalation time thereof is tm20 (where $tm20 > tm10$).

[0080] More specifically, when the detection value detected by the puff sensor described above is changed from a state in which the detection value is less than a predetermined threshold value to a state in which the detection value is equal to or larger than the threshold value, the control unit 116 determines that the inhalation to the inhalation device 100 is started. In this way, the "time point when the inhalation is started" can be set to, for example, a time point when the control unit 116 determines that the inhalation to the inhalation device 100 is started. Further, when the detection value detected by the puff sensor is changed from the state in which the detection value is equal to or larger than the threshold value to the state in which the detection value is less than the threshold value, the control unit 116 determines that the inhalation to the inhalation device 100 is completed. The "time point when the inhalation is completed" can be set to, for example, a time point when the control unit 116 determines that the inhalation to the inhalation device 100 is completed. That is, the control unit 116 can acquire the inhalation time based on a detection result of the puff sensor.

[0081] As another example, when a detection value detected by the flow rate sensor described above is changed from a state in which the detection value is less than a predetermined threshold value to a state in which the detection value is equal to or larger than the threshold value, the control unit 116 may determine that the inhalation to the inhalation device 100 is started. **Further**, when the detection value detected by the flow rate sensor is changed from the state in which the detection value is equal to or larger than the threshold value to the state in which the detection value is less than the threshold value, the control unit 116 may determine that the inhalation to the inhalation device 100 is completed. That is, the control unit 116 may acquire the inhalation time based on a detection result of the flow rate sensor.

[0082] In the example shown in FIG. 3, the maximum value of the inhalation time by one inhalation in the acquisition target period AX is tm20. Therefore, when

the control unit 116 acquires the maximum value of the inhalation time by one inhalation in the acquisition target period as the inhalation time in the acquisition target period, the control unit 116 may acquire tm20 as the inhalation time in the acquisition target period AX.

[0083] Further, the accumulated value of the inhalation times by a plurality of inhalations in the acquisition target period AX is $tm10 + tm20$. Therefore, when the control unit 116 acquires the accumulated value of the inhalation times by the plurality of inhalations in the acquisition target period as the inhalation time in the acquisition target period, the control unit 116 may acquire $tm10 + tm20$ as the inhalation time in the acquisition target period AX. That is, the control unit 116 may acquire the accumulated value of the inhalation times by all the inhalations in the acquisition target period as the inhalation time in the acquisition target period.

[0084] In addition, for example, in a case in which the sensor portion 112 includes the flow rate sensor capable of detecting the flow rate generated by the inhalation to the inhalation device 100, the control unit 116 may acquire, based on the detection result of the flow rate sensor, a length of a period in which the flow rate is equal to or larger than a threshold value in the acquisition target period as the inhalation time in the acquisition target period. Also in this way, the inhalation time in the acquisition target period acquired by the control unit 116 can be set to represent the inhalation mode in the acquisition target period.

[0085] More specifically, in the example shown in FIG. 3, a length of a period in which the flow rate per unit time is equal to or larger than a predetermined threshold value ThX in the inhalation time tm10 of the first inhalation Pf1 is set to tm11. Further, a length of a period in which the flow rate per unit time is equal to or larger than the threshold value ThX in the inhalation time tm20 of the second inhalation Pf2 is set to tm21 (where $tm21 > tm11$).

[0086] In such a case, in the acquisition target period AX, the length of the period in which the flow rate per unit time is equal to or larger than the threshold value ThX is $tm11 + tm21$. Therefore, when the control unit 116 acquires the length of the period in which the flow rate is equal to or larger than the threshold value in the acquisition target period as the inhalation time in the acquisition target period, the control unit 116 may acquire $tm11 + tm21$ as the inhalation time in the acquisition target period AX. The threshold value ThX is preset in the control unit 116 by, for example, the manufacturer or the like of the inhalation device 100.

<4-3. Inhalation Amount in Acquisition Target Period>

[0087] Next, the "inhalation amount in the acquisition target period" that can be acquired by the control unit 116 will be described. When the control unit 116 acquires the inhalation amount in the acquisition target period to be described below, the sensor portion 112 may include, for example, the flow rate sensor described above. Then, the

control unit 116 acquires the inhalation amount in the acquisition target period to be described below based on the detection result of the flow rate sensor.

[0088] Here, the inhalation amount in the acquisition target period can be set to, for example, a maximum value of a flow rate generated by one inhalation in the acquisition target period, an accumulated value of flow rates generated by a plurality of inhalations in the acquisition target period, or a maximum value of a flow rate per unit time in the acquisition target period. Accordingly, the inhalation amount in the acquisition target period acquired by the control unit 116 can be set to represent the inhalation mode in the acquisition target period.

[0089] In the example shown in FIG. 3, a flow rate generated by the first inhalation Pf1, more specifically, an accumulated value of flow rates in respective periods during the first inhalation Pf1 is Fw10. Further, a flow rate generated by the second inhalation Pf2, more specifically, an accumulated value of flow rates in respective periods during the second inhalation Pf2 is Fw20 (where $Fw20 > Fw10$). It is assumed that the maximum value of the flow rate per unit time in the acquisition target period AX is Fw21 in a period t23 during the second inhalation Pf2.

[0090] In the example shown in FIG. 3, the maximum value of the flow rate generated by one inhalation in the acquisition target period AX is Fw20. Therefore, when the control unit 116 acquires the maximum value of the flow rate generated by one inhalation in the acquisition target period as the inhalation amount in the acquisition target period, the control unit 116 may acquire Fw20 as the inhalation amount in the acquisition target period AX.

[0091] In addition, the accumulated value of the flow rates generated by the plurality of inhalations in the acquisition target period AX is $Fw10 + Fw20$. Therefore, when the control unit 116 acquires the accumulated value of the flow rates generated by the plurality of inhalations in the acquisition target period as the inhalation amount in the acquisition target period, the control unit 116 may acquire $Fw10 + Fw20$ as the inhalation amount in the acquisition target period AX. That is, the control unit 116 may acquire the accumulated value of the flow rates by all the inhalations in the acquisition target period as the inhalation amount in the acquisition target period.

[0092] The maximum value of the flow rate per unit time in the acquisition target period AX is Fw21. Therefore, when the control unit 116 acquires the maximum value of the flow rate per unit time in the acquisition target period as the inhalation amount in the acquisition target period, the control unit 116 may acquire Fw21 as the inhalation amount in the acquisition target period AX.

[0093] Further, the control unit 116 may acquire the inhalation amount in the acquisition target period based on the inhalation time in the acquisition target period and FwX which is a standard inhalation amount per unit time. For example, when an estimated value of the flow rate generated by the first inhalation Pf1 is set to Fw10', the estimated value Fw10' can be represented as $Fw10' =$

$tm10 \times FwX$ by using the inhalation time tm10 of the first inhalation Pf1 and the standard inhalation amount per unit time FwX. Similarly, when an estimated value of the flow rate generated by the second inhalation Pf2 is set to Fw20', the estimated value Fw20' can be represented as $Fw20' = tm20 \times FwX$ by using the inhalation time tm20 of the second inhalation Pf2 and the standard inhalation amount per unit time FwX.

[0094] Then, when the estimated value Fw10' and the estimated value Fw20' are used, the accumulated value (an estimated value) of the flow rates generated by the plurality of inhalations in the acquisition target period AX can be represented as $Fw10' + Fw20'$. Therefore, when the control unit 116 acquires the accumulated value of the flow rates generated by the plurality of inhalations in the acquisition target period as the inhalation amount in the acquisition target period, the control unit 116 may acquire $Fw10' + Fw20'$ as the inhalation amount in the acquisition target period AX. In this way, even when the sensor portion 112 does not include the flow rate sensor, it is possible to acquire the inhalation amount in the acquisition target period. That is, the acquisition of the inhalation amount in the acquisition target period can be achieved by a simpler configuration.

<4-4. Inhalation Intensity in Acquisition Target Period>

[0095] Next, the "inhalation intensity in the acquisition target period" that can be acquired by the control unit 116 will be described. Here, the inhalation intensity can be set to, for example, an evaluation value representing the intensity (in other words, the "depth") of the inhalation performed to the inhalation device 100.

[0096] For example, as the intensity (in other words, the "depth") of the inhalation to the inhalation device 100 increases, the flow rate generated by the inhalation increases, and thus a decrease amount (that is, a change amount) of the temperature of the heating portion 121 increases. Therefore, the change amount of the temperature of the heating portion 121 may be used as the inhalation intensity. In such a case, the control unit 116 determines that as the temperature of the heating portion 121 decreases steeply, the flow rate increases and the inhalation intensity increases.

[0097] Further, in consideration of the fact that the electrical resistance value of the heating resistor constituting the heating portion 121 changes depending on the temperature of the heating portion 121, a change amount of the electrical resistance value of the heating resistor may be used as the inhalation intensity. Also in such a case, the control unit 116 determines that when the electrical resistance value of the heating resistor changes to indicate that the temperature of the heating portion 121 decreases steeply, the flow rate increases and the inhalation intensity increases.

[0098] In addition, as the intensity of the inhalation to the inhalation device 100 increases, the flow rate generated by the inhalation increases, and thus a change

amount of the pressure in the inhalation device 100 also increases. Therefore, the change amount of the pressure in the inhalation device 100 may be used as the inhalation intensity. In such a case, the control unit 116 determines that as the pressure in the inhalation device 100 increases steeply, the flow rate increases and the inhalation intensity increases.

[0099] Further, as the intensity of the inhalation to the inhalation device 100 increases, the flow rate generated by the inhalation increases, and thus the flow rate (for example, the flow rate per unit time) itself may be used as the inhalation intensity. In such a case, the control unit 116 determines that as the flow rate increases, the inhalation intensity increases.

[0100] More specifically, for example, it is assumed that the sensor portion 112 includes the puff thermistor. In this case, during the acquisition target period, the control unit 116 acquires, based on a detection result of the puff thermistor, the change amount of the temperature of the heating portion 121 (or the predetermined place near the heating portion 121) per unit time as the inhalation intensity per unit time. Then, the control unit 116 acquires a maximum value of the acquired inhalation intensity (here, for example, the change amount of the temperature of the heating portion 121) per unit time or an accumulated value of the acquired inhalation intensity per unit time as the inhalation intensity in the acquisition target period.

[0101] As another example, it is assumed that the sensor portion 112 includes the voltage sensor described above. In this case, during the acquisition target period, the control unit 116 may acquire, based on a detection result of the voltage sensor, the change amount of the electrical resistance value of the heating resistor per unit time as the inhalation intensity per unit time. Then, the control unit 116 may acquire a maximum value of the acquired inhalation intensity (here, the change amount of the electrical resistance value of the heating resistor) per unit time or an accumulated value of the acquired inhalation intensity per unit time as the inhalation intensity in the acquisition target period.

[0102] As another example, it is assumed that the sensor portion 112 includes the puff sensor. In this case, during the acquisition target period, the control unit 116 may acquire, based on the detection result of the puff sensor, the change amount of the pressure in the inhalation device 100 per unit time as the inhalation intensity per unit time. Then, the control unit 116 may acquire a maximum value of the acquired inhalation intensity (here, the change amount of the pressure in the inhalation device 100) per unit time or an accumulated value of the acquired inhalation intensity per unit time as the inhalation intensity in the acquisition target period.

[0103] The control unit 116 may acquire the inhalation intensity for each inhalation performed during the acquisition target period, and acquire a maximum value of the acquired inhalation intensity for each inhalation as the inhalation intensity in the acquisition target period.

Further, the control unit 116 may acquire an accumulated value of inhalation intensities acquired by performing the inhalation a predetermined number of times in the acquisition target period as the inhalation intensity in the acquisition target period. In addition, at the time of acquiring the inhalation intensity for each inhalation, the control unit 116 may acquire, as the inhalation intensity of the inhalation, a value calculated by multiplying the maximum value of the inhalation intensity for the inhalation by the inhalation time of the inhalation.

[0104] As another example, when the sensor portion 112 includes the flow rate sensor, the control unit 116 may acquire, for example, the maximum value of the flow rate per unit time in the acquisition target period described above as the inhalation intensity in the acquisition target period.

[0105] Which one of the inhalation time, the inhalation amount, or the inhalation intensity in the acquisition target period the control unit 116 acquires can be appropriately determined by the manufacturer or the like of the inhalation device 100. In a case in which the control unit 116 acquires the inhalation time in the acquisition target period, which one of the values described above is acquired as the inhalation time in the acquisition target period can also be appropriately determined by the manufacturer or the like of the inhalation device 100. Similarly, in a case in which the control unit 116 acquires the inhalation amount in the acquisition target period, which one of the values described above is acquired as the inhalation amount in the acquisition target period can also be appropriately determined by the manufacturer or the like of the inhalation device 100. In addition, in a case in which the control unit 116 acquires the inhalation intensity in the acquisition target period, which one of the values described above is acquired as the inhalation intensity in the acquisition target period can also be appropriately determined by the manufacturer or the like of the inhalation device 100.

<5. Change in Control Mode based on Inhalation Mode in Acquisition Target Period>

[0106] Next, a variation of the control mode for the heating portion 121 based on the inhalation mode in the acquisition target period by the control unit 116 will be described. As described above, in the example according to the present embodiment, two acquisition target periods, that is, the first acquisition target period A1 up to the first timing t_{i1} and the second acquisition target period A2 up to the second timing t_{i2} are provided. Hereinafter, first, a variation of the control mode for the heating portion **121 based** on the inhalation mode in the first acquisition target period A1 will be described.

[0107] FIG. 4 is a diagram (first example thereof) showing the variation of the control mode in a case in which the inhalation time, the inhalation amount, or the inhalation intensity in the first acquisition target period is equal to or larger than a first predetermined value. The vertical axis

in FIG. 4 represents the target temperature [°C]. The vertical axis in FIG. 4 represents the time [sec].

[0108] As shown in FIG. 4, in the case in which the inhalation time, the inhalation amount, or the inhalation intensity in the first acquisition target period A1 is equal to or larger than a first predetermined value Th1, for example, the control unit 116 changes (that is, shortens) the time length of the second temperature maintenance section S4 (that is, the fourth time section S4) from initial tm4 [sec] to tm4a [sec] shorter than tm4 [sec]. Here, tm4a can be, for example, a value acquired by subtracting a constant value Δta (where $\Delta ta > 0$) from tm4 (that is, $tm4a = tm4 - \Delta ta$). The first predetermined value Th1 and the constant value Δta are preset in the control unit 116 by, for example, the manufacturer or the like of the inhalation device 100.

[0109] That is, in the case in which the inhalation time, the inhalation amount, or the inhalation intensity in the first acquisition target period A1 is equal to or larger than the first predetermined value Th1, it is considered that the consumption amount of the aerosol source and the flavor component in the first acquisition target period A1 is larger than that assumed at the time of designing the heating profile. Therefore, in this case, it is considered that the aerosol source or the flavor component contained in the stick-type substrate 150 decreases at a faster rate than that assumed at the time of designing the heating profile.

[0110] Thus, in the case in which the inhalation time, the inhalation amount, or the inhalation intensity in the first acquisition target period A1 is equal to or larger than the first predetermined value Th1, the control unit 116 shortens the second temperature maintenance section S4 to set the timing at which the heating by the heating portion 121 is stopped earlier by a corresponding amount. Accordingly, it is possible to avoid the occurrence of an event that the heating by the heating portion 121 is unnecessarily continued while the aerosol source or flavor component contained in the stick-type substrate 150 is depleting. Further, it is also possible to restrain waste of the electric power of the power supply portion 111 by restraining the unnecessary heating by the heating portion 121.

[0111] FIG. 5 is a diagram (first example thereof) showing the variation of the control mode in a case in which the inhalation time, the inhalation amount, or the inhalation intensity in the first acquisition target period is less than a second predetermined value. The vertical axis in FIG. 5 represents the target temperature [°C]. The vertical axis in FIG. 5 represents the time [sec].

[0112] As shown in FIG. 5, in the case in which the inhalation time, the inhalation amount, or the inhalation intensity in the first acquisition target period A1 is less than a second predetermined value Th2 (for example, the second predetermined value $Th2 <$ the first predetermined value Th1), for example, the control unit 116 changes (that is, extends) the time length of the second temperature maintenance section S4 from initial tm4

[sec] to tm4b [sec] longer than tm4 [sec]. Here, tm4b can be, for example, a value acquired by adding a constant value Δtb (where $\Delta ta > 0$) to tm4 (that is, $tm4b = tm4 + \Delta tb$). The second predetermined value Th2 and the constant value Δtb are preset in the control unit 116 by, for example, the manufacturer or the like of the inhalation device 100. An absolute value of the constant value Δtb may be equal to an absolute value of the constant value Δta described above.

[0113] That is, in the case in which the inhalation time, the inhalation amount, or the inhalation intensity in the first acquisition target period A1 is less than the second predetermined value Th2, it is considered that the consumption amount of the aerosol source and the flavor component in the first acquisition target period A1 is smaller than that assumed at the time of designing the heating profile. Therefore, in this case, it is considered that the aerosol source or the flavor component contained in the stick-type substrate 150 remains in the stick-type substrate 150 for a longer time than that assumed at the time of designing the heating profile.

[0114] Thus, in the case in which the inhalation time, the inhalation amount, or the inhalation intensity in the first acquisition target period A1 is less than the second predetermined value Th2, the control unit 116 extends the second temperature maintenance section S4 to extend a period during which the heating by the heating portion 121 is continued (in other words, a period during which the aerosol is generated) by a corresponding amount. Accordingly, it is possible to avoid the occurrence of the event that the heating by the heating portion 121 is stopped while the sufficient aerosol source and flavor component remain in the stick-type substrate 150.

[0115] Further, in a case in which the inhalation time, the inhalation amount, or the inhalation intensity in the first acquisition target period A1 is equal to or larger than the second predetermined value Th2 and is less than the first predetermined value Th1, for example, the control unit 116 keeps the time length of the second temperature maintenance section S4 (that is, the fourth time section S4) to initial tm4 [sec]. Accordingly, when it is considered that the consumption amount of the aerosol source and the flavor component in the first acquisition target period A1 is not significantly different from that assumed at the time of designing the heating profile, it is possible to continuously generate the aerosol as planned by the heating profile.

[0116] Next, a variation of the control mode based on the inhalation mode in the second acquisition target period A2 will be described. FIG. 6 is a diagram showing the variation of the control mode in a case in which the inhalation time, the inhalation amount, or the inhalation intensity in the second acquisition target period is equal to or larger than a third predetermined value. The vertical axis in FIG. 6 represents the target temperature [°C]. The vertical axis in FIG. 6 represents the time [sec].

[0117] As shown in FIG. 6, in the case in which the inhalation time, the inhalation amount, or the inhalation

intensity in the second acquisition target period A2 is equal to or larger than a third predetermined value Th3, for example, the control unit 116 changes (that is, shortens) the time length of the third temperature maintenance section S6 (that is, the sixth time section S6) from initial tm6 [sec] to tm6a [sec] shorter than tm6 [sec]. Here, tm6a can be, for example, a value acquired by subtracting a constant value Δtc (where $\Delta tc > 0$) from tm6 (that is, $tm6a = tm6 - \Delta tc$). The third predetermined value Th3 and the constant value Δtc are preset in the control unit 116 by, for example, the manufacturer or the like of the inhalation device 100. The constant value Δtc may be equal to the constant value Δta described above.

[0118] That is, in the case in which the inhalation time, the inhalation amount, or the inhalation intensity in the second acquisition target period A2 is equal to or larger than the third predetermined value Th3, it is considered that the consumption amount of the aerosol source and the flavor component in the second acquisition target period A2 is larger than that assumed at the time of designing the heating profile. Therefore, in this case, it is considered that the aerosol source or the flavor component contained in the stick-type substrate 150 decreases at a faster rate than that assumed at the time of designing the heating profile.

[0119] Thus, in the case in which the inhalation time, the inhalation amount, or the inhalation intensity in the second acquisition target period A2 is equal to or larger than the third predetermined value Th3, the control unit 116 shortens the third temperature maintenance section S6 to set the timing at which the heating by the heating portion 121 is stopped earlier by a corresponding amount. Accordingly, it is possible to avoid the occurrence of the event that the heating by the heating portion 121 is unnecessarily continued while the aerosol source or flavor component contained in the stick-type substrate 150 is depleting. Further, it is also possible to restrain waste of the electric power of the power supply portion 111 by restraining the unnecessary heating by the heating portion 121.

[0120] FIG. 7 is a diagram showing a variation of the control mode in a case in which the inhalation time, the inhalation amount, or the inhalation intensity in the second acquisition target period is less than a fourth predetermined value. The vertical axis in FIG. 7 represents the target temperature [°C]. The vertical axis in FIG. 7 represents the time [sec].

[0121] As shown in FIG. 7, in the case in which the inhalation time, the inhalation amount, or the inhalation intensity in the second acquisition target period A2 is less than a fourth predetermined value Th4 (for example, the fourth predetermined value Th4 < the third predetermined value Th3), for example, the control unit 116 changes (that is, extends) the time length of the third temperature maintenance section S6 from initial tm6 [sec] to tm6b [sec] longer than tm6 [sec]. Here, tm6b can be, for example, a value acquired by adding a constant value Δtd (where $\Delta td > 0$) to tm6 (that is, $tm6b = tm6$

+ Δtd). The fourth predetermined value Th4 and the constant value Δtd are preset in the control unit 116 by, for example, the manufacturer or the like of the inhalation device 100. The constant value Δtd may be equal to the constant value Δtb described above.

[0122] That is, in the case in which the inhalation time, the inhalation amount, or the inhalation intensity in the second acquisition target period A2 is less than the fourth predetermined value Th4, it is considered that the consumption amount of the aerosol source and the flavor component in the second acquisition target period A2 is smaller than that assumed at the time of designing the heating profile. Therefore, in this case, it is considered that the aerosol source or the flavor component contained in the stick-type substrate 150 remains in the stick-type substrate 150 for a longer time than that assumed at the time of designing the heating profile.

[0123] Thus, in the case in which the inhalation time, the inhalation amount, or the inhalation intensity in the second acquisition target period A2 is less than the fourth predetermined value Th4, the control unit 116 extends the third temperature maintenance section S6 to extend the period during which the heating by the heating portion 121 is continued (in other words, the period during which the aerosol is generated) by a corresponding amount. Accordingly, it is possible to avoid the occurrence of the event that the heating by the heating portion 121 is stopped while the sufficient aerosol source and flavor component remain in the stick-type substrate 150.

[0124] Further, in a case in which the inhalation time, the inhalation amount, or the inhalation intensity in the second acquisition target period A2 is equal to or larger than the fourth predetermined value Th4 and is less than the third predetermined value Th3, for example, the control unit 116 keeps the time length of the third temperature maintenance section S6 (that is, the sixth time section S6) to initial tm6 [sec]. Accordingly, when it is considered that the consumption amount of the aerosol source and the flavor component in the second acquisition target period A2 is not significantly different from that assumed at the time of designing the heating profile, it is possible to continuously generate the aerosol as planned by the heating profile.

<6. Process Executed by Control Unit>

[0125] Next, an example of a process executed by the control unit 116 to change the control mode for the heating portion 121 will be described. FIG. 8 is a flowchart showing the example of the process executed by the control unit of the inhalation device according to the present embodiment. A program that causes the control unit 116 to execute the series of processes shown in FIG. 8 is stored in the storage portion 114 in advance, for example.

[0126] As shown in FIG. 8, the control unit 116 waits until the generation request for the aerosol is received (step Sp10: No loop), and starts the control of the heating

portion 121 in the control mode defined by the heating profile (step Sp11) when the generation request for the aerosol is received (step Sp10: Yes). In addition, the control unit 116 starts a process of acquiring information indicating the inhalation mode (that is, the inhalation time, the inhalation amount, or the inhalation intensity described above) in the first acquisition target period A1 and the second acquisition target period A2 (hereinafter, also referred to as an "inhalation mode acquisition process") (step Sp12).

[0127] For example, when the first acquisition target period A1 and the second acquisition target period A2 are started from the start of the control based on the heating profile, step Sp12 is executed (that is, the inhalation mode acquisition process is started) as the control based on the heating profile is started. Further, when the first acquisition target period A1 and the second acquisition target period A2 are started from the start of the inhalation-enabled period, step Sp12 is executed (that is, the inhalation mode acquisition process is started) as the inhalation-enabled period is started.

[0128] The inhalation mode acquisition process is a process related to at least one of the inhalation time as described in <4-2. Inhalation Time in Acquisition Target Period>, the inhalation amount as described in <4-3. Inhalation Amount in Acquisition Target Period>, or the inhalation intensity as described in <4-4. Inhalation Intensity in Acquisition Target Period>. These parameters to be acquired by the inhalation mode acquisition process are preset by the manufacturer or the like of the inhalation device 100.

[0129] More specifically, in the inhalation mode acquisition process, for example, the control unit 116 monitors the presence or absence of the inhalation to the inhalation device 100, and each time the inhalation to the inhalation device 100 is detected, the control unit 116 acquires the inhalation time by the inhalation, the flow rate generated by the inhalation, or the inhalation intensity of the inhalation. Then, when the maximum value of the inhalation time, the flow rate, or the inhalation intensity by one inhalation is acquired as the inhalation time, the flow rate, or the inhalation intensity in the acquisition target period, the control unit 116 compares the maximum value acquired by the inhalation performed so far in the acquisition target period with a value acquired by the current inhalation, and keeps the larger value in the storage portion 114 in advance. In addition, when the accumulated value of the inhalation time, the flow rate, or the inhalation intensity by the plurality of inhalations is acquired as the inhalation time, the flow rate, or the inhalation intensity in the acquisition target period, the control unit 116 accumulates a value acquired by the current inhalation to the accumulated value acquired by the inhalation performed so far in the acquisition target period, and keeps an accumulated result in the storage portion 114 in advance. Accordingly, the storage portion 114 can store the inhalation time, the inhalation amount, or the inhalation intensity in the first acquisition target

period A1 and the second acquisition target period A2.

[0130] The control unit 116 may store a history of the inhalation time, the flow rate, or the inhalation intensity by the respective inhalations performed to the inhalation device 100 in the storage portion 114 in advance, and may acquire the inhalation time, the flow rate, or the inhalation intensity in the acquisition target period with reference to the history when determining that the first timing ti1 or the second timing ti2 is reached (see steps Sp13 and Sp18).

[0131] Then, the control unit 116 waits for the first timing ti1 while executing the inhalation mode acquisition process (step Sp13: No loop), and determines whether the inhalation time, the inhalation amount, or the inhalation intensity in the first acquisition target period A1 is equal to or larger than the first predetermined value Th1 (step Sp14) when the first timing ti1 is reached (step Sp13: Yes).

[0132] Then, when determining that the inhalation time, the inhalation amount, or the inhalation intensity in the first acquisition target period A1 is equal to or larger than the first predetermined value Th1 (step Sp14: Yes), the control unit 116 shortens the second temperature maintenance section S4 (step Sp15), and proceeds to the process in step Sp18.

[0133] Further, when determining that the inhalation time, the inhalation amount, or the inhalation intensity in the first acquisition target period A1 is not equal to or larger than the first predetermined value Th1 (step Sp14: No), the control unit 116 determines whether the inhalation time, the inhalation amount, or the inhalation intensity in the first acquisition target period A1 is less than the second predetermined value Th2 (Step Sp16).

[0134] Then, when determining that the inhalation time, the inhalation amount, or the inhalation intensity in the first acquisition target period A1 is less than the second predetermined value Th2 (step Sp16: Yes), the control unit 116 extends the second temperature maintenance section S4 (step Sp17), and proceeds to the process in step Sp18.

[0135] When determining that the inhalation time, the inhalation amount, or the inhalation intensity in the first acquisition target period A1 is not less than the second predetermined value Th2 (step Sp16: No), the control unit 116 proceeds to the process in step Sp18 as it is. In this case, the time length of the second temperature maintenance section S4 is kept at initial tm4 [sec].

[0136] Then, the control unit 116 waits for the second timing ti2 while continuously executing the inhalation mode acquisition process (step Sp18: No loop), and ends the inhalation mode acquisition process started in step Sp12 and determines whether the inhalation time, the inhalation amount, or the inhalation intensity in the second acquisition target period A2 is equal to or larger than the third predetermined value Th3 (step Sp19) when the second timing ti2 is reached (step Sp18: Yes).

[0137] Then, when determining that the inhalation time, the inhalation amount, or the inhalation intensity

in the second acquisition target period A2 is equal to or larger than the third predetermined value Th3 (step Sp19: Yes), the control unit 116 shortens the third temperature maintenance section S6 (step Sp20) and ends the series of processes shown in FIG. 8.

[0138] Further, when determining that the inhalation time, the inhalation amount, or the inhalation intensity in the second acquisition target period A2 is not equal to or larger than the third predetermined value Th3 (step Sp19: No), the control unit 116 determines whether the inhalation time, the inhalation amount, or the inhalation intensity in the second acquisition target period A2 is less than the fourth predetermined value Th4 (Step Sp21).

[0139] Then, when determining that the inhalation time, the inhalation amount, or the inhalation intensity in the second acquisition target period A2 is less than the fourth predetermined value Th4 (step Sp21: Yes), the control unit 116 extends the third temperature maintenance section S6 (step Sp22) and ends the series of processes shown in FIG. 8.

[0140] When determining that the inhalation time, the inhalation amount, or the inhalation intensity in the second acquisition target period A2 is not less than the fourth predetermined value Th4 (step Sp21: No), the control unit 116 ends the series of processes shown in FIG. 8 as it is. In this case, the time length of the third temperature maintenance section S6 is kept at initial tm6 [sec].

[0141] As described above, the control unit 116 acquires, based on the detection result of the sensor portion 112 during the first acquisition target period A1 in which the heating portion 121 is controlled in the control mode defined by the heating profile, information indicating the inhalation mode in the first acquisition target period A1. Then, the control unit 116 changes the control mode for the heating portion 121 in a period after the first acquisition target period A1 from the control mode defined by the heating profile to a control mode based on the inhalation mode in the first acquisition target period A1.

[0142] Specifically, in the case in which the inhalation time, the inhalation amount, or the inhalation intensity in the first acquisition target period A1 is equal to or larger than the first predetermined value Th1, the control unit 116 sets the time length of the second temperature maintenance section S4 to be shorter than tm4 [sec] defined by the heating profile. Accordingly, when it is considered that the consumption amount of the aerosol source and the flavor component in the first acquisition target period A1 is larger than that assumed at the time of designing the heating profile, the second temperature maintenance section S4 is shortened, and the timing at which the heating by the heating portion 121 is stopped can be set to be earlier than that in a case in which the timing is controlled as in the heating profile. Therefore, it is possible to avoid the occurrence of the event that the heating by the heating portion 121 is unnecessarily continued while the aerosol source or flavor component contained in the stick-type substrate 150 is depleting.

[0143] Similarly, in the case in which the inhalation

time, the inhalation amount, or the inhalation intensity in the second acquisition target period A2 is equal to or larger than the third predetermined value Th3, the control unit 116 sets the time length of the third temperature maintenance section S6 to be shorter than tm6 [sec] defined by the heating profile. Accordingly, when it is considered that the consumption amount of the aerosol source and the flavor component in the second acquisition target period A2 is larger than that assumed at the time of designing the heating profile, the third temperature maintenance section S6 is shortened, and the timing at which the heating by the heating portion 121 is stopped can be set to be earlier than that in the case in which the timing is controlled as in the heating profile. Therefore, it is possible to avoid the occurrence of the event that the heating by the heating portion 121 is unnecessarily continued while the aerosol source or flavor component contained in the stick-type substrate 150 is depleting.

[0144] Further, in the case in which the inhalation time, the inhalation amount, or the inhalation intensity in the first acquisition target period A1 is less than the second predetermined value Th2, the control unit 116 sets the time length of the second temperature maintenance section S4 to be longer than tm4 [sec] defined by the heating profile. Accordingly, when it is considered that the consumption amount of the aerosol source and the flavor component in the first acquisition target period A1 is smaller than that assumed at the time of designing the heating profile, the second temperature maintenance section S4 is extended, and the period during which the heating by the heating portion 121 is continued (in other words, the period during which the aerosol is generated) can be set to be longer than that in a case in which the period is controlled as in the heating profile. Therefore, it is possible to avoid the occurrence of the event that the heating by the heating portion 121 is stopped while the sufficient aerosol source and flavor component remain in the stick-type substrate 150.

[0145] Similarly, in the case in which the inhalation time, the inhalation amount, or the inhalation intensity in the second acquisition target period A2 is less than the fourth predetermined value Th4, the control unit 116 sets the time length of the third temperature maintenance section S6 to be longer than tm6 [sec] defined by the heating profile. Accordingly, when it is considered that the consumption amount of the aerosol source and the flavor component in the second acquisition target period A2 is smaller than that assumed at the time of designing the heating profile, the third temperature maintenance section S6 is extended, and the period during which the heating by the heating portion 121 is continued (in other words, the period during which the aerosol is generated) can be set to be longer than that in the case in which the period is controlled as in the heating profile. Therefore, it is possible to avoid the occurrence of the event that the heating by the heating portion 121 is stopped while the sufficient aerosol source and flavor component remain in the stick-type substrate 150.

[0146] In the example described above, the first acquisition target period A1 and the second acquisition target period A2 are provided as the acquisition target period, and the control unit 116 can change the time length of the second temperature maintenance section S4 based on the inhalation time, the inhalation amount, or the inhalation intensity in the first acquisition target period A1 and change the time length of the third temperature maintenance section S6 based on the inhalation time, the inhalation amount, or the inhalation intensity in the second acquisition target period A2, but the present invention is not limited thereto.

[0147] For example, only the first acquisition target period A1 may be provided as the acquisition target period, and the control unit 116 may change only the time length of the second temperature maintenance section S4 based on the inhalation time, the inhalation amount, or the inhalation intensity in the first acquisition target period A1. Further, only the first acquisition target period A1 may be provided as the acquisition target period, and the control unit 116 may change only the time length of the third temperature maintenance section S6 based on the inhalation time, the inhalation amount, or the inhalation intensity in the first acquisition target period A1. Alternatively, only the first acquisition target period A1 may be provided as the acquisition target period, and the control unit 116 may change the time lengths of a second temperature maintenance section S2 and the third temperature maintenance section S6 based on the inhalation time, the inhalation amount, or the inhalation intensity in the first acquisition target period A1. As another example, only the second acquisition target period A2 may be provided as the acquisition target period, and the control unit 116 may change only the time length of the third temperature maintenance section S6 based on the inhalation time, the inhalation amount, or the inhalation intensity in the second acquisition target period A2.

[0148] By shortening the acquisition target period as much as possible, for example, by providing only the first acquisition target period A1, it is possible to reduce the burden on the control unit 116 required for the process of acquiring the information indicating the inhalation mode (that is, the inhalation time, the inhalation amount, or the inhalation intensity) in the acquisition target period.

[0149] For example, as described above, by providing only the first acquisition target period A1 shorter than half of the period from the time point when the control based on the heating profile is started to the time point when the heating by the heating portion 121 is stopped, the control unit 116 may execute the process of acquiring the information indicating the inhalation mode in the acquisition target period only in the first half of a period in which the control based on the heating profile is performed. Therefore, in the latter half of the period in which the control based on the heating profile is performed, the control unit 116 can be set not to execute the process of acquiring the information indicating the inhalation mode in the acquisition target period, and the burden related to

the process on the control unit 116 can be reduced.

[0150] Further, for example, the number of acquisition target periods may be three or more as in a case in which other acquisition target periods are further provided in addition to the first acquisition target period A1 and the second acquisition target period A2. By finely setting the acquisition target period, it is possible to finely change the control mode for the heating portion 121 according to the inhalation mode in each acquisition target period.

[0151] In addition, the control unit 116 changes the time length of the third temperature maintenance section S6, which is a time section immediately before the stop of the heating by the heating portion 121, according to the inhalation mode in the acquisition target period such as the second acquisition target period A2. Accordingly, until the third temperature maintenance section S6, which is a time section immediately before the stop of the heating by the heating portion 121, is reached, it is possible to generate the aerosol as planned by the heating profile regardless of the inhalation mode of the user (that is, even when the inhalation time, the inhalation amount, or the inhalation intensity in the acquisition target period such as the second acquisition target period A2 is equal to or larger than the predetermined value or is less than the predetermined value).

[0152] Further, in the example described above, a temperature maintenance section in which the temperature of the heating portion 121 is maintained substantially constant, such as the second temperature maintenance section S4 and the third temperature maintenance section S6, is set as a time section whose time length is to be changed. It is also considered that instead of the temperature maintenance section, a time section (for example, the second heating section S5) in which the temperature of the heating portion 121 changes, such as the heating section and the cooling section, may be set as the time section whose time length is to be changed. However, in this way, when the time section in which the temperature of the heating portion 121 changes is shortened, an event may occur that the time is insufficient and the temperature of the heating portion 121 does not reach the target temperature, or that the temperature of the heating portion 121 rapidly changes to reach the target temperature. The occurrence of such an event is not preferable from the viewpoint of providing the high-quality smoking experience to the user.

[0153] On the other hand, when the temperature maintenance section in which the temperature of the heating portion 121 is maintained substantially constant, such as the second temperature maintenance section S4 and the third temperature maintenance section S6, is set as the time section whose time length is to be changed, even when the time section is shortened, the event is unlikely to occur that the temperature of the heating portion 121 does not reach the target temperature, or that the temperature of the heating portion 121 rapidly changes. Therefore, by setting the temperature maintenance section as the time section whose time length is to be

changed, even when the time length of the time section is changed, it is possible to restrain the occurrence of an event that the quality of the smoking experience of the user may decrease.

[0154] Further, in the example described above, the second temperature maintenance section S4 as the low-temperature section in which the target temperature is relatively low is set as the time section whose time length is to be changed. In the low-temperature section such as the second temperature maintenance section S4, the electric power supplied to the heating portion 121 per unit time is smaller than that in a time section in which the target temperature is relatively high. Therefore, by setting the low-temperature section such as the second temperature maintenance section S4 as the time section whose time length is to be changed, it is possible to extend the time section while restraining an increase in the electric power consumed by the heating portion 121. In addition, the low-temperature section such as the second temperature maintenance section S4 is typically set to have a certain time length, and room for changing the time length is sufficiently secured, and thus the time length can be easily changed.

[0155] Further, in the example described above, the time length of the subsequent time section is changed based on the inhalation mode in the acquisition target period such as the first acquisition target period A1, but the present invention is not limited thereto. For example, the control unit 116 may change the target temperature of the subsequent time section based on the inhalation mode in the acquisition target period such as the first acquisition target period A1.

[0156] Hereinafter, an example of the case in which the control unit 116 changes the target temperature of the subsequent time section based on the inhalation mode in the acquisition target period such as the first acquisition target period A1 will be specifically described. In the following description, only parts different from the example described above will be mainly described, and the description of the same parts as the example described above will be appropriately omitted or simplified.

[0157] FIG. 9 is a diagram (second example thereof) showing the variation of the control mode in the case in which the inhalation time, the inhalation amount, or the inhalation intensity in the first acquisition target period is equal to or larger than the first predetermined value. FIG. 10 is a diagram (second example thereof) showing the variation of the control mode in the case in which the inhalation time, the inhalation amount, or the inhalation intensity in the first acquisition target period is less than the second predetermined value. The vertical axis in each of FIGS. 9 and 10 represents the target temperature [°C]. The vertical axis in each of FIGS. 9 and 10 represents the time [sec]. In the examples shown in FIGS. 9 and 10, it is assumed that only the first acquisition target period A1 is provided as the acquisition target period.

[0158] As shown in FIG. 9, in the case in which the inhalation time, the inhalation amount, or the inhalation

intensity in the first acquisition target period A1 is equal to or larger than the first predetermined value Th1, for example, the control unit 116 changes (that is, increases) the target temperature of the third temperature maintenance section S6 (that is, the sixth time section S6) from initial T3 [°C] to T3a [°C] higher than T3 [°C]. Here, T3a can be, for example, a value acquired by adding a constant value ΔTa (where $\Delta Ta > 0$) to T3 (that is, $T3a = T3 + \Delta Ta$). The constant value ΔTa is preset in the control unit 116 by, for example, the manufacturer or the like of the inhalation device 100.

[0159] The aerosol generated when the stick-type substrate 150 is heated and the flavor component applied to the aerosol depend on a heating temperature and the amounts of the aerosol source and the flavor component remaining in the stick-type substrate 150 at the time of heating. More specifically, the aerosol generated when the stick-type substrate 150 is heated and the flavor component applied to the aerosol increase as the heating temperature becomes higher, and increase as the amounts of the aerosol source and the flavor component remaining in the stick-type substrate 150 at the time of heating increase.

[0160] In the case in which the inhalation time, the inhalation amount, or the inhalation intensity in the first acquisition target period A1 is equal to or larger than the first predetermined value Th1, it is considered that the amounts of the aerosol source and the flavor component remaining in the stick-type substrate 150 are smaller than those assumed at the time of designing the heating profile. Therefore, in such a case, even when the heating is performed at the target temperature defined by the heating profile, there is a possibility that the aerosol or the flavor component applied to the aerosol is insufficient, and the high-quality smoking experience cannot be provided to the user.

[0161] Therefore, in the case in which the inhalation time, the inhalation amount, or the inhalation intensity in the first acquisition target period A1 is equal to or larger than the first predetermined value Th1, the control unit 116 sets the target temperature of the third temperature maintenance section S6 to be higher than the target temperature defined by the heating profile. Accordingly, it is possible to increase the aerosol generated in the third temperature maintenance section S6 and the flavor component applied to the aerosol as compared with a case in which the control is performed as in the heating profile. Therefore, it is also possible to provide the high-quality smoking experience to the user in the third temperature maintenance section S6.

[0162] As shown in FIG. 10, in the case in which the inhalation time, the inhalation amount, or the inhalation intensity in the first acquisition target period A1 is less than the second predetermined value Th2, for example, the control unit 116 changes (that is, decreases) the target temperature of the third temperature maintenance section S6 (that is, the sixth time section S6) from initial T3 [°C] to T3b [°C] lower than T3 [°C]. Here, T3b can be,

for example, a value acquired by subtracting a constant value ΔT_b (where $\Delta T_a > 0$) from T_3 (that is, $T_{3b} = T_3 - \Delta T_b$). The constant value ΔT_b is preset in the control unit 116 by, for example, the manufacturer or the like of the inhalation device 100.

[0163] In the case in which the inhalation time, the inhalation amount, or the inhalation intensity in the first acquisition target period A1 is less than the second predetermined value Th_2 , it is considered that the amounts of the aerosol source and the flavor component remaining in the stick-type substrate 150 are larger than those assumed at the time of designing the heating profile. Therefore, in such a case, when the heating is performed at the target temperature defined by the heating profile, there is a possibility that the aerosol or the flavor component applied to the aerosol is excessive, and the high-quality smoking experience cannot be provided to the user.

[0164] Therefore, in the case in which the inhalation time, the inhalation amount, or the inhalation intensity in the first acquisition target period A1 is less than the second predetermined value Th_2 , the control unit 116 sets the target temperature of the third temperature maintenance section S6 to be lower than the target temperature defined by the heating profile. Accordingly, it is possible to decrease the aerosol generated in the third temperature maintenance section S6 and the flavor component applied to the aerosol as compared with the case in which the control is performed as in the heating profile. Therefore, it is also possible to provide the high-quality smoking experience to the user in the third temperature maintenance section S6.

[0165] As described above, the control unit 116 may change the target temperature of the subsequent time section based on the inhalation mode in the acquisition target period such as the first acquisition target period A1.

[0166] Further, the control unit 116 may change both the time length and the target temperature of the subsequent time section based on the inhalation mode in the acquisition target period such as the first acquisition target period A1.

[0167] As an example, in the case in which the inhalation time, the inhalation amount, or the inhalation intensity in the first acquisition target period A1 is equal to or larger than the first predetermined value Th_1 , the control unit 116 may shorten the time length of the third temperature maintenance section S6 to tm_{6a} [sec] described above and increase the target temperature of the third temperature maintenance section S6 to T_{3a} [°C] described above.

[0168] As another example, in the case in which the inhalation time, the inhalation amount, or the inhalation intensity in the first acquisition target period A1 is less than the second predetermined value Th_2 , the control unit 116 may extend the time length of the third temperature maintenance section S6 to tm_{6b} [sec] described above and decrease the target temperature of the third temperature maintenance section S6 to T_{3b} [°C] de-

scribed above.

[0169] In this way, even when the control unit 116 changes both the time length and the target temperature of the subsequent time section based on the inhalation mode in the acquisition target period such as the first acquisition target period A1, it is possible to appropriately consume the stick-type substrate 150 containing the aerosol source and provide the high-quality smoking experience to the user.

[0170] Further, the inhalation device 100 may have a plurality of heating profiles. For example, in a case in which there are two types of substrates, that is, a "menthol type" substrate in which menthol is contained in the flavor component and a "regular type" substrate in which no menthol is contained in the flavor component as the stick-type substrate 150, it is considered to provide a heating profile for the menthol type substrate and a heating profile for the regular type substrate.

[0171] In such a case, the control unit 116 can determine, for example, the type of the stick-type substrate 150 (that is, the menthol type or the regular type). As an example, the control unit 116 can receive information indicating the type of the stick-type substrate 150 from the user via the input device of the sensor portion 112, and determine the type of the stick-type substrate 150 based on the received information.

[0172] As another example, the sensor portion 112 may detect a predetermined physical quantity (for example, transmittance or reflectance of light, the electrical resistance value, or the like) of the stick-type substrate 150 that differs depending on the type. Then, the control unit 116 may determine the type of the stick-type substrate 150 based on the physical quantity detected by the sensor portion 112.

[0173] Then, the control unit 116 selects the heating profile used for the current control of the heating portion 121 from the plurality of heating profiles of the inhalation device 100 based on a determination result of the type of the stick-type substrate 150, and controls the heating portion 121 based on the selected heating profile. For example, the control unit 116 selects the heating profile for the menthol type substrate when determining the type of the stick-type substrate 150 to the menthol type, and selects the heating profile for the regular type substrate when determining the type of the stick-type substrate 150 to the regular type.

[0174] In this way, the control unit 116 determines the type of the stick-type substrate 150 and selects the heating profile based on the determination result, and thus it is possible to control the heating portion 121 according to the appropriate heating profile corresponding to the type of the stick-type substrate 150. Therefore, it is possible to optimize the flavor experienced by the user and provide the high-quality smoking experience to the user regardless of the type of the stick-type substrate 150.

[0175] In this way, the heating profile described in the present embodiment may be the heating profile selected

by the control unit 116 based on the determination result of the type of the stick-type substrate 150.

[0176] When there are the plurality of heating profiles, the acquisition target period may be different for each heating profile. Similarly, the time section in which the time length or the target temperature is changed may be different for each heating profile. Further, the change amount of the time length (for example, Δt_a to Δt_d described above) and the change amount of the target temperature (for example, ΔT_a and ΔT_b described above) may be different for each heating profile.

[0177] In addition, the control unit 116 uses the time length or the target temperature (that is, the control mode) defined by the heating profile as the basis, and then changes the time length or the target temperature based on the inhalation mode in the acquisition target period such as the first acquisition target period A1.

[0178] As an example, as shown in FIG. 4, in the case in which the inhalation time, the inhalation amount, or the inhalation intensity in the first acquisition target period A1 is equal to or larger than the first predetermined value Th_1 , the control unit 116 sets the time length of the second temperature maintenance section S4 to tm_4a [sec] acquired by subtracting the constant value Δt_a [sec] from tm_4 [sec] defined by the heating profile. As another example, as shown in FIG. 9, in the case in which the inhalation time, the inhalation amount, or the inhalation intensity in the first acquisition target period A1 is equal to or larger than the first predetermined value Th_1 , the control unit 116 sets the target temperature of the third temperature maintenance section S6 to T_3a [°C] acquired by adding the constant value ΔT_a [°C] to T_3 [°C] defined by the heating profile.

[0179] In this way, by using the time length or the target temperature defined by the heating profile as the basis and changing the time length or the target temperature based on the inhalation mode in the acquisition target period such as the first acquisition target period A1, it is possible to appropriately consume the stick-type substrate 150 and provide the high-quality smoking experience to the user while restraining the configuration of the inhalation device 100 from becoming complicated.

[0180] On the other hand, for example, a method may be considered in which a plurality of heating profiles corresponding to inhalation modes different from each other are prepared in the inhalation device 100 in advance, and the control unit 116 appropriately selects the heating profile corresponding to the inhalation mode of the user. However, in such a case, the plurality of heating profiles are required, and it is also necessary to increase the capacity of the storage portion 114 in order to store the plurality of heating profiles. Therefore, in such a case, the configuration of the inhalation device 100 may be complicated.

[0181] As described above, according to the present embodiment, it is possible to provide the inhalation device 100 that is capable of providing the high-quality smoking experience to the user by appropriately con-

suming the stick-type substrate 150 containing the aerosol source even when the inhalation in an inhalation mode different from the standard inhalation as the premise in the heating profile is performed.

[0182] A control method of the inhalation device 100 described in the above embodiment can be achieved by executing a program prepared in advance on a computer (a processor). The program is stored in a computer-readable storage medium and is executed by being read from the storage medium. In addition, the program may be provided in the form of being stored in a non-transitory storage medium such as a flash memory, and may be provided via a network such as the Internet. Although the computer that executes the program can be, for example, a member included in the inhalation device 100 (for example, the CPU of the inhalation device 100), the computer is not limited thereto, and may be a member included in another device (for example, a smartphone or a server device) capable of communicating with the inhalation device 100.

[0183] Although the embodiment of the present invention has been described above with reference to the accompanying drawings, it is needless to say that the present invention is not limited to such an embodiment. It is apparent to a person skilled in the art that various variations and corrections may be conceived within the scope described in the claims, and it is understood that the variations and corrections naturally fall within the technical scope of the present invention. In addition, the constituent elements described in the above embodiment may be optionally combined without departing from the spirit of the invention.

[0184] In the present description, at least the following matters are described. In parentheses, corresponding constituent elements and the like in the above embodiment are illustrated as examples, but the present invention is not limited thereto.

(1) An inhalation device (inhalation device 100) includes:

a heating portion (the heating portion 121) configured to generate aerosol by heating a substrate (the stick-type substrate 150) containing an aerosol source; and

a control unit (the control unit 116) configured to control an operation of the heating portion based on a heating profile defining a time-series transition of a target temperature which is a target value of a temperature of the heating portion, in which

the inhalation device allows a user to inhale the aerosol generated by the heating portion, and the control unit is configured to:

start the control of the heating portion in a control mode defined by the heating profile in response to a generation request for the

aerosol;
 acquire information indicating an inhalation
 mode in a first period in which the heating
 portion is controlled in the control mode
 defined by the heating profile; and
 5 change the control mode for the heating
 portion in a second period after the first
 period from the control mode defined by
 the heating profile to a control mode based
 10 on the inhalation mode in the first period.

According to (1), the control mode for the heat-
 ing portion in the second period after the first
 period in which the heating portion is controlled
 in the control mode defined by the heating profile
 15 can be changed to the control mode based on
 the inhalation mode in the first period. Accord-
 ingly, even when the inhalation mode in the first
 period is different from the standard inhalation
 as the premise in the heating profile, in the
 20 subsequent second period, the heating portion
 can be appropriately controlled in consideration
 of the inhalation actually performed in the first
 period. Therefore, it is possible to appropriately
 25 consume the substrate to provide the high-quality
 smoking experience to the user.

(2) In the inhalation device according to (1),

the heating profile is information defining a time
 30 length and the target temperature of each time
 section included in a plurality of time sections
 (the first time section S1 to the sixth time section
 S6) consecutive along a time axis, and
 35 the control mode based on the inhalation mode
 in the first period is a mode in which the time
 length of any time section among time sections
 included in the second period is changed accord-
 ing to the inhalation mode in the first period.
 According to (2), the time length of any time
 40 section included in the second period after the
 first period can be changed according to the
 inhalation mode in the first period. Accordingly,
 according to the inhalation mode in the first
 45 period, the timing at which the heating by the
 heating portion is stopped can be set earlier, and
 the period in which the heating by the heating
 portion is continued can be set longer. There-
 fore, it is possible to avoid the occurrence of an
 event that the heating by the heating portion is
 50 stopped while the sufficient aerosol source re-
 mains in the substrate, or that the heating by the
 heating portion is unnecessarily continued while
 the aerosol source contained in the substrate is
 55 depleting.

(3) In the inhalation device according to (2),

the control mode based on the inhalation mode
 in the first period is a mode in which the time
 length of a time section (the sixth time section
 S6) immediately before stop of heating by the
 heating portion among the time sections in-
 5 cluded in the second period is changed accord-
 ing to the inhalation mode in the first period.
 According to (3), since the time section whose
 time length is to be changed is the time section
 immediately before the stop of the heating by the
 heating portion, it is possible to generate the
 aerosol as planned by the heating profile regard-
 10 less of the inhalation mode of the user until the
 time section immediately before the stop of the
 heating by the heating portion is reached.

(4) In the inhalation device according to (2),

the plurality of time sections include a first heat-
 ing section (the first time section S1) provided
 first, a cooling **section** (the third time section S3)
 provided after the first heating section and in
 which the target temperature is lower than the
 target temperature of the first heating section, a
 second heating section (the fifth time section S5)
 provided after the cooling section and in which
 the target temperature is higher than the target
 temperature of the cooling section, and a low-
 temperature section (the fourth time section S4)
 in which the target temperature is lower than the
 target temperature of the second heating sec-
 35 tion, and

the control mode based on the inhalation mode
 in the first period is a mode in which the time
 length of the low-temperature section among
 the time sections included in the second period
 is changed according to the inhalation mode in
 the first period.

According to (4), since the time section whose
 time length is to be changed is the low-tempera-
 40 ture section in which the target temperature is
 relatively low, the time section can be extended
 while restraining the increase in the electric
 power consumed by the heating portion.

(5) In the inhalation device according to (2),

the plurality of time sections include a tempera-
 45 ture maintenance section (the fourth time sec-
 tion S4 and the sixth time section S6) in which
 the control unit controls the temperature of the
 heating portion to maintain the temperature of
 the heating portion at a constant temperature,
 and

the control mode based on the inhalation mode
 in the first period is a mode in which the time
 length of the temperature maintenance section
 among the time sections included in the second

period is changed according to the inhalation mode in the first period.

According to (5), since the time section whose time length is to be changed is the temperature maintenance section in which the temperature of the heating portion is maintained substantially constant, even when the time length of the time section is changed, it is possible to restrain the occurrence of the event that the quality of the smoking experience of the user may decrease.

(6) In the inhalation device according to (1),

the heating profile is information defining a time length and the target temperature of each time section included in a plurality of time sections (the first time section S1 to the sixth time section S6) consecutive along a time axis, and the control mode based on the inhalation mode in the first period is a mode in which the target temperature in any time section included in the second period is changed according to the inhalation mode in the first period.

According to (6), the target temperature of any time section included in the second period after the first period can be changed according to the inhalation mode in the first period. Accordingly, even when the inhalation mode in the first period is different from the standard inhalation as the premise in the heating profile, in the second period, it is possible to generate an appropriate amount of the aerosol and provide the high-quality smoking experience to the user.

(7) In the inhalation device according to any one of (1) to (6),

the first period is a period from a time point when the control of the heating portion is started in the control mode defined by the heating profile or a time point when an inhalation-enabled period is started to a time point when a predetermined time (the first predetermined time Tm1 and the second predetermined time Tm2) elapses or a time point when inhalation is performed for a predetermined number of times.

According to (7), it is possible to secure a certain period as the first period.

(8) In the inhalation device according to (7),

the first period is a period from the time point when the control of the heating portion is started in the control mode defined by the heating profile or the time point when the inhalation-enabled period is started to the time point when the predetermined time elapses, and the predetermined time is shorter than half of a

period ($t_{m1} + t_{m2} + t_{m3} + t_{m4} + t_{m5} + t_{m6}$) from the time point when the control of the heating portion is started in the control mode defined by the heating profile or the time point when the inhalation-enabled period is started to a time point when the heating by the heating portion is stopped.

According to (8), in the latter half of the period in which the heating portion is controlled in the control mode defined by the heating profile, the control unit can be set not to execute the process of acquiring the inhalation mode in the first **period**, and the burden related to the process on the control unit can be reduced.

(9) In the inhalation device according to any one of (1) to (8),

the heating profile is one heating profile selected from a plurality of heating profiles prepared in advance, the control unit is configured to determine a type of the substrate, and the one heating profile is a heating profile selected by the control unit based on a determination result of the type of the substrate.

According to (9), it is possible to control the heating portion by the appropriate heating profile corresponding to the type of the substrate.

(10) In the inhalation device according to any one of (1) to (9),

the inhalation mode in the first period is one of or a combination of two or more of an inhalation time in the first period, an inhalation amount in the first period, or an inhalation intensity in the first period.

According to (10), the control mode for the heating portion in the second period can be changed according to the inhalation time in the first period, the inhalation amount in the first period, or the inhalation intensity in the first period.

(11) In the inhalation device according to (10),

the inhalation mode in the first period includes at least the inhalation amount in the first period, and

the inhalation amount in the first period is any one of a maximum value (Fw20) of a flow rate generated by one inhalation in the first period, an accumulated value (Fw10 + Fw20) of flow rates generated by a plurality of inhalations in the first period, or a maximum value (Fw21) of a flow rate per unit time in the first period.

According to (11), it is possible to change the control mode for the heating portion in the sec-

ond period according to the maximum value of the flow rate generated by one inhalation in the first period, the accumulated value of the flow rates generated by the plurality of inhalations in the first period, or the maximum value of the flow rate per unit time in the first period.

(12) In the inhalation device according to (10),

the inhalation mode in the first period includes at least the inhalation time in the first period, and the inhalation time in the first period is a length ($t_{m11} + t_{m21}$) of a period in which a flow rate generated by inhalation in the first period is equal to or larger than a threshold value (the threshold value ThX), a maximum value (t_{m20}) of an inhalation time by one inhalation in the first period, or an accumulated value ($t_{m10} + t_{m20}$) of inhalation times by a plurality of inhalations in the first period.

According to (12), it is possible to change the control mode for the heating portion in the second period according to the length of the period in which the flow rate generated by the inhalation in the first period is equal to or larger than the threshold value, the maximum value of the inhalation time by one inhalation in the first period, or the accumulated value of the inhalation times by the plurality of inhalations in the first period.

(13) In the inhalation device according to (10),

the inhalation mode in the first period includes at least the inhalation intensity in the first period, and

the inhalation intensity in the first period is a maximum value of an inhalation intensity per unit time in the first period or an accumulated value of the inhalation intensity per unit time in the first period.

According to (13), it is possible to change the control mode for the heating portion in the second period according to the maximum value of the inhalation intensity per unit time in the first period or the accumulated value of the inhalation intensity per unit time in the first period.

(14) A control method of executing, by a computer (the control unit 116) that controls an inhalation device (the inhalation device 100) including a heating portion (the heating portion 121) configured to generate aerosol by heating a substrate (the stick-type substrate 150) containing an aerosol source and allowing a user to inhale the aerosol generated by the heating portion, a process comprising:

starting control of the heating portion in a control mode defined by a heating profile defining a

time-series transition of a target temperature which is a target value of a temperature of the heating portion in response to a generation request for the aerosol (step Sp11);

acquiring information indicating an inhalation mode in a first period in which the heating portion is controlled in the control mode defined by the heating profile (step Sp12); and

changing the control mode for the heating portion in a second period after the first period from the control mode defined by the heating profile to a control mode based on the inhalation mode in the first period (step Sp14 to step Sp17, step Sp19 to step Sp22).

According to (14), the control mode for the heating portion in the second period after the first period in which the heating portion is controlled in the control mode defined by the heating profile can be changed to the control mode based on the inhalation mode in the first period. Accordingly, even when the inhalation mode in the first period is different from the standard inhalation as the premise in the heating profile, in the subsequent second period, the heating portion can be appropriately controlled in consideration of the inhalation actually performed in the first period. Therefore, it is possible to appropriately consume the substrate to provide the high-quality smoking experience to the user.

(15) A program for causing a computer (the control unit 116), which controls an inhalation device (the inhalation device 100) including a heating portion (the heating portion 121) configured to generate aerosol by heating a substrate (the stick-type substrate 150) containing an aerosol source and allowing a user to inhale the aerosol generated by the heating portion, to execute a process comprising:

starting control of the heating portion in a control mode defined by a heating profile defining a time-series transition of a target temperature which is a target value of a temperature of the heating portion in response to a generation request for the aerosol (step Sp11);

acquiring information indicating an inhalation mode in a first period in which the heating portion is controlled in the control mode defined by the heating profile (step Sp12); and

changing the control mode for the heating portion in a second period after the first period from the control mode defined by the heating profile to a control mode based on the inhalation mode in the first period (step Sp14 to step Sp17, step Sp19 to step Sp22).

[0185] According to (15), the control mode for the heating portion in the second period after the first period

in which the heating portion is controlled in the control mode defined by the heating profile can be changed to the control mode based on the inhalation mode in the first period. Accordingly, even when the inhalation mode in the first period is different from the standard inhalation as the premise in the heating profile, in the subsequent second period, the heating portion can be appropriately controlled in consideration of the inhalation actually performed in the first period. Therefore, it is possible to appropriately consume the substrate to provide the high-quality smoking experience to the user.

REFERENCE SIGNS LIST

[0186]

100 inhalation device
 112 sensor portion (detection portion)
 116 control unit
 121 heating portion
 150 stick-type substrate (substrate)
 S1 first time section (time section, first heating section)
 S2 second time section (time section)
 S3 third time section (time section, cooling section)
 S4 fourth time section (time section, low-temperature section, temperature maintenance section)
 S5 fifth time section (time section, second heating section)
 S6 sixth time section (time section, temperature maintenance section)

Claims

1. An inhalation device, comprising:

a heating portion configured to generate aerosol by heating a substrate containing an aerosol source; and
 a control unit configured to control an operation of the heating portion based on a heating profile defining a time-series transition of a target temperature which is a target value of a temperature of the heating portion, wherein
 the inhalation device allows a user to inhale the aerosol generated by the heating portion, and the control unit is configured to:

start control of the heating portion in a control mode defined by the heating profile in response to a generation request for the aerosol;
 acquire information indicating an inhalation mode in a first period in which the heating portion is controlled in the control mode defined by the heating profile; and
 change the control mode for the heating

portion in a second period after the first period from the control mode defined by the heating profile to a control mode based on the inhalation mode in the first period.

2. The inhalation device according to claim 1, wherein

the heating profile is information defining a time length and the target temperature of each time section included in a plurality of time sections consecutive along a time axis, and
 the control mode based on the inhalation mode in the first period is a mode in which the time length of any time section among time sections included in the second period is changed according to the inhalation mode in the first period.

3. The inhalation device according to claim 2, wherein the control mode based on the inhalation mode in the first period is a mode in which the time length of a time section immediately before stop of heating by the heating portion among the time sections included in the second period is changed according to the inhalation mode in the first period.

4. The inhalation device according to claim 2, wherein

the plurality of time sections include a first heating section provided first, a cooling section provided after the first heating section and in which the target temperature is lower than the target temperature of the first heating section, a second heating section provided after the cooling section and in which the target temperature is higher than the target temperature of the cooling section, and a low-temperature section in which the target temperature is lower than the target temperature of the second heating section, and the control mode based on the inhalation mode in the first period is a mode in which the time length of the low-temperature section among the time sections included in the second period is changed according to the inhalation mode in the first period.

5. The inhalation device according to claim 2, wherein

the plurality of time sections include a temperature maintenance section in which the control unit controls the temperature of the heating portion to maintain the temperature of the heating portion at a constant temperature, and
 the control mode based on the inhalation mode in the first period is a mode in which the time length of the temperature maintenance section among the time sections included in the second period is changed according to the inhalation mode in the first period.

6. The inhalation device according to claim 1, wherein

the heating profile is information defining a time length and the target temperature of each time section included in a plurality of time sections consecutive along a time axis, and
the control mode based on the inhalation mode in the first period is a mode in which the target temperature in any time section included in the second period is changed according to the inhalation mode in the first period.

7. The inhalation device according to any one of claims 1 to 6, wherein

the first period is a period from a time point when the control of the heating portion is started in the control mode defined by the heating profile or a time point when an inhalation-enabled period is started to a time point when a predetermined time elapses or a time point when inhalation is performed for a predetermined number of times.

8. The inhalation device according to claim 7, wherein

the first period is a period from the time point when the control of the heating portion is started in the control mode defined by the heating profile or the time point when the inhalation-enabled period is started to the time point when the predetermined time elapses, and
the predetermined time is shorter than half of a period from the time point when the control of the heating portion is started in the control mode defined by the heating profile or the time point when the inhalation-enabled period is started to a time point when the heating by the heating portion is stopped.

9. The inhalation device according to any one of claims 1 to 8, wherein

the heating profile is one heating profile selected from a plurality of heating profiles prepared in advance,
the control unit is configured to determine a type of the substrate, and
the one heating profile is a heating profile selected by the control unit based on a determination result of the type of the substrate.

10. The inhalation device according to any one of claims 1 to 9, wherein

the inhalation mode in the first period is one of or a combination of two or more of an inhalation time in the first period, an inhalation amount in the first period, or an inhalation intensity in the first period.

11. The inhalation device according to claim 10, wherein

the inhalation mode in the first period includes at least the inhalation amount in the first period, and

the inhalation amount in the first period is any one of a maximum value of a flow rate generated by one inhalation in the first period, an accumulated value of flow rates generated by a plurality of inhalations in the first period, or a maximum value of a flow rate per unit time in the first period.

12. The inhalation device according to claim 10, wherein

the inhalation mode in the first period includes at least the inhalation time in the first period, and the inhalation time in the first period is a length of a period in which a flow rate generated by inhalation in the first period is equal to or larger than a threshold value, a maximum value of an inhalation time by one inhalation in the first period, or an accumulated value of inhalation times by a plurality of inhalations in the first period.

13. The inhalation device according to claim 10, wherein

the inhalation mode in the first period includes at least the inhalation intensity in the first period, and

the inhalation intensity in the first period is a maximum value of an inhalation intensity per unit time in the first period or an accumulated value of the inhalation intensity per unit time in the first period.

14. A control method of executing, by a computer that controls an inhalation device including a heating portion configured to generate aerosol by heating a substrate containing an aerosol source and allowing a user to inhale the aerosol generated by the heating portion, a process comprising:

starting control of the heating portion in a control mode defined by a heating profile defining a time-series transition of a target temperature which is a target value of a temperature of the heating portion in response to a generation request for the aerosol;

acquiring information indicating an inhalation mode in a first period in which the heating portion is controlled in the control mode defined by the heating profile; and

changing the control mode for the heating portion in a second period after the first period from the control mode defined by the heating profile to a control mode based on the inhalation mode in the first period.

15. A program for causing a computer, which controls an

inhalation device including a heating portion configured to generate aerosol by heating a substrate containing an aerosol source and allowing a user to inhale the aerosol generated by the heating portion, to execute a process comprising:

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starting control of the heating portion in a control mode defined by a heating profile defining a time-series transition of a target temperature which is a target value of a temperature of the heating portion in response to a generation request for the aerosol; 10

acquiring information indicating an inhalation mode in a first period in which the heating portion is controlled in the control mode defined by the heating profile; and 15

changing the control mode for the heating portion in a second period after the first period from the control mode defined by the heating profile to a control mode based on the inhalation mode in the first period. 20

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FIG. 1

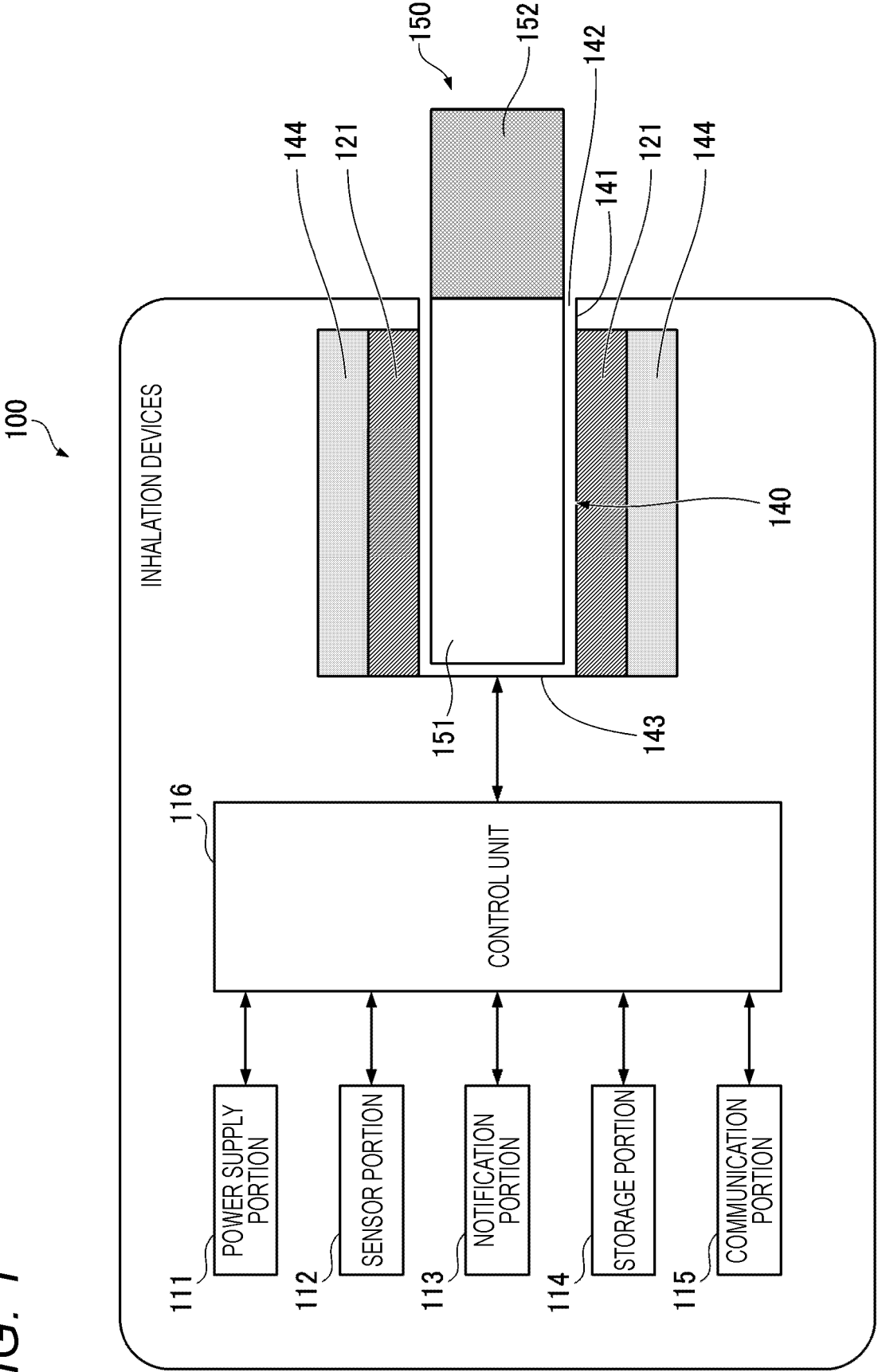


FIG. 2

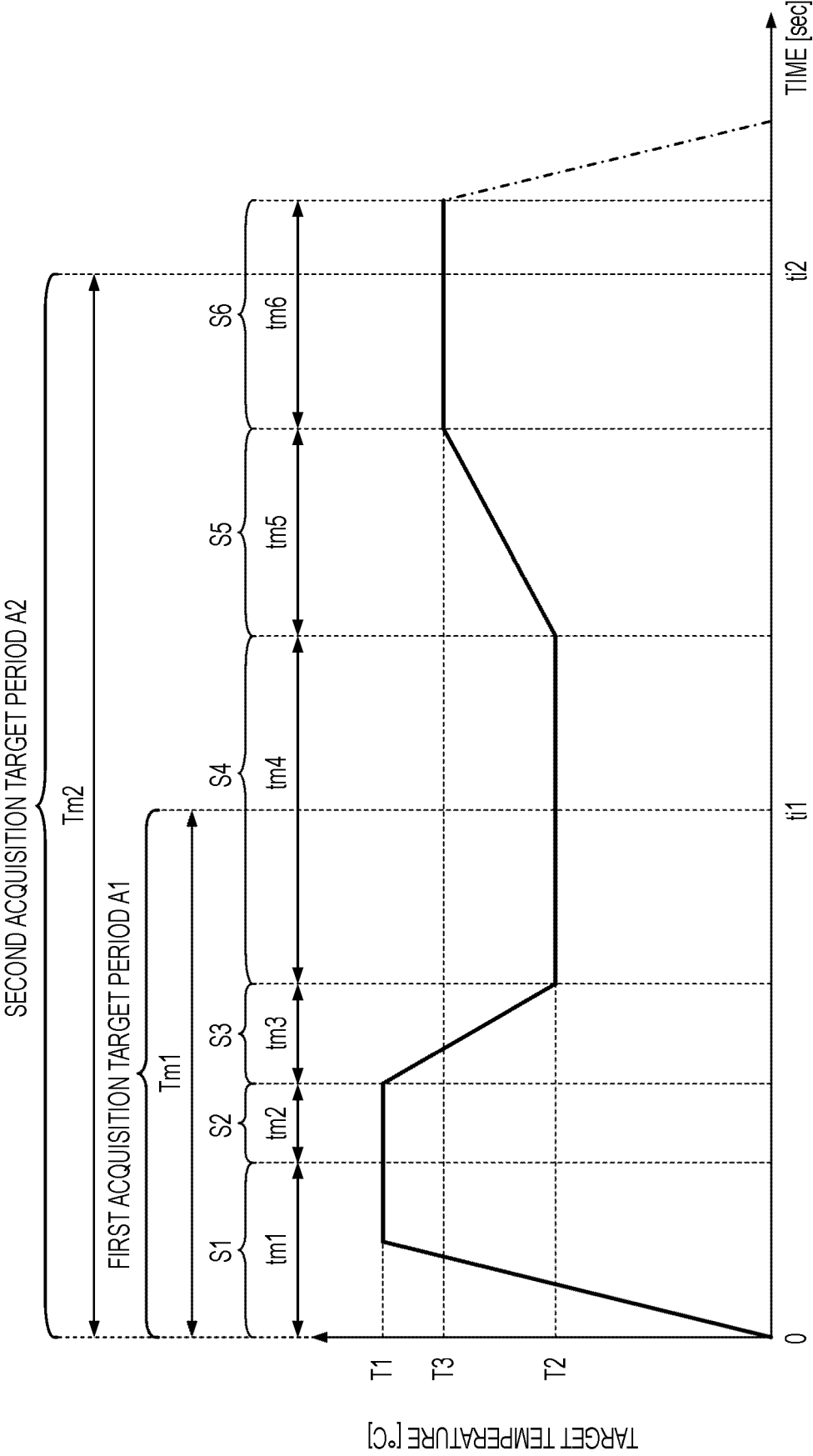


FIG. 3

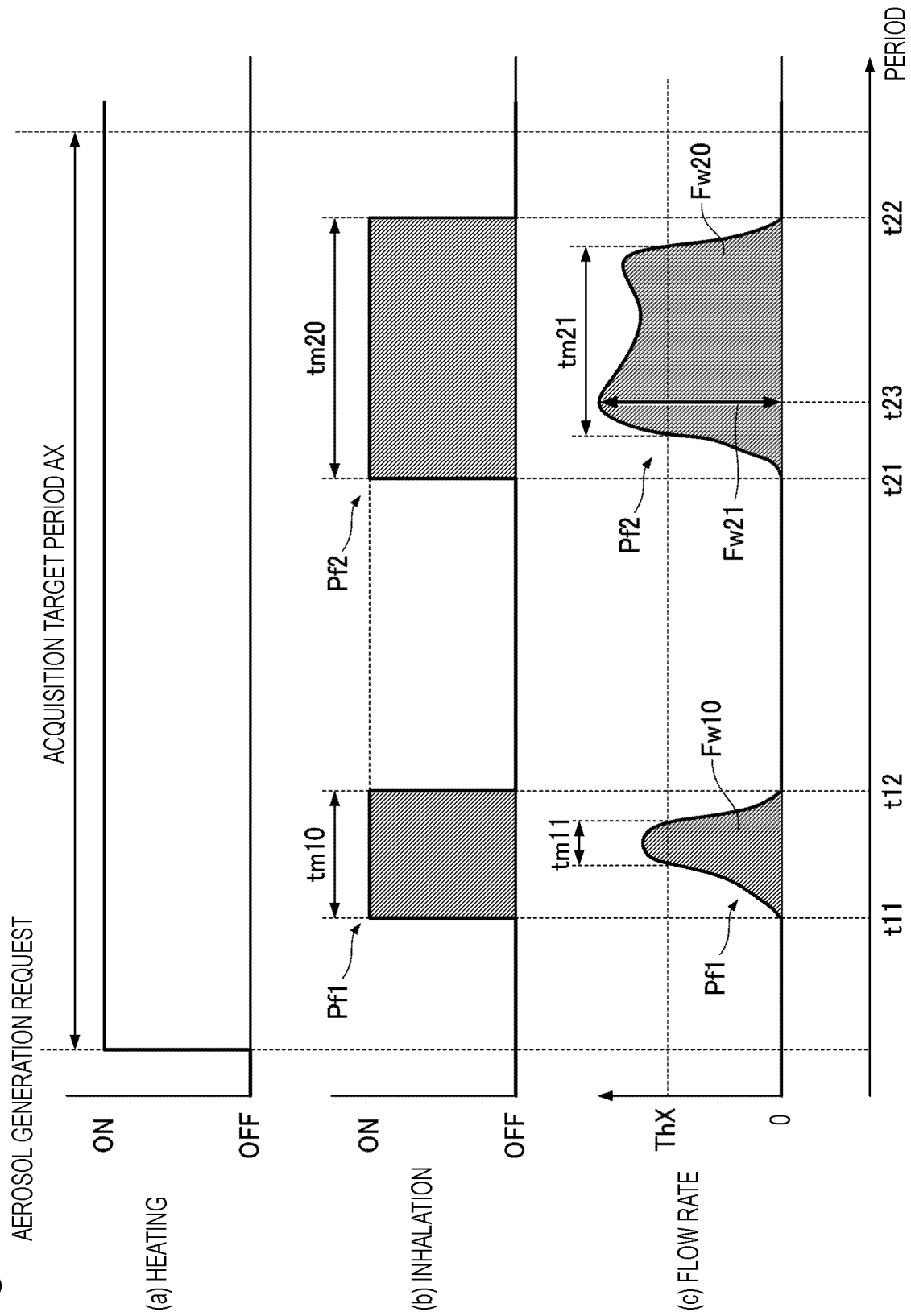


FIG. 4

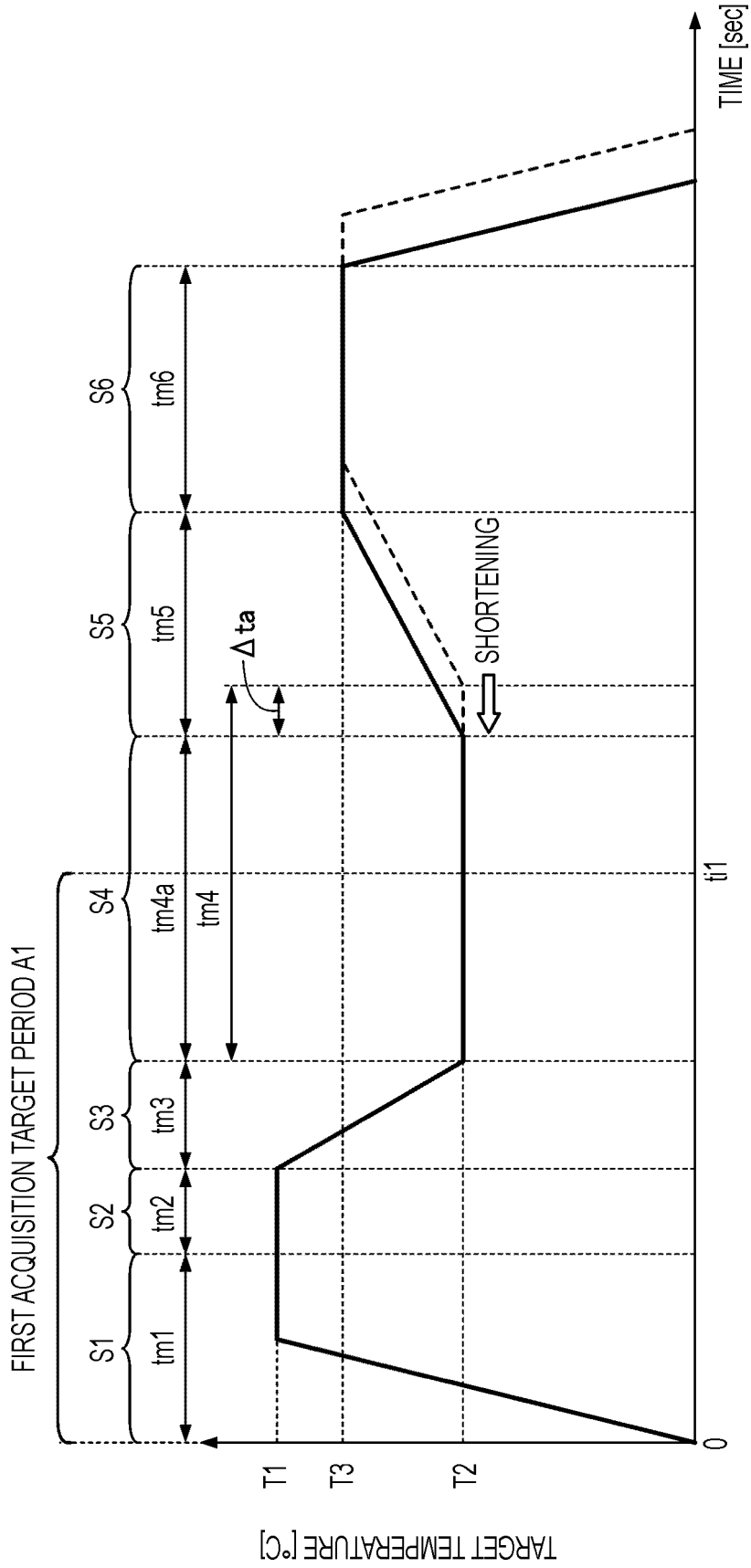


FIG. 5

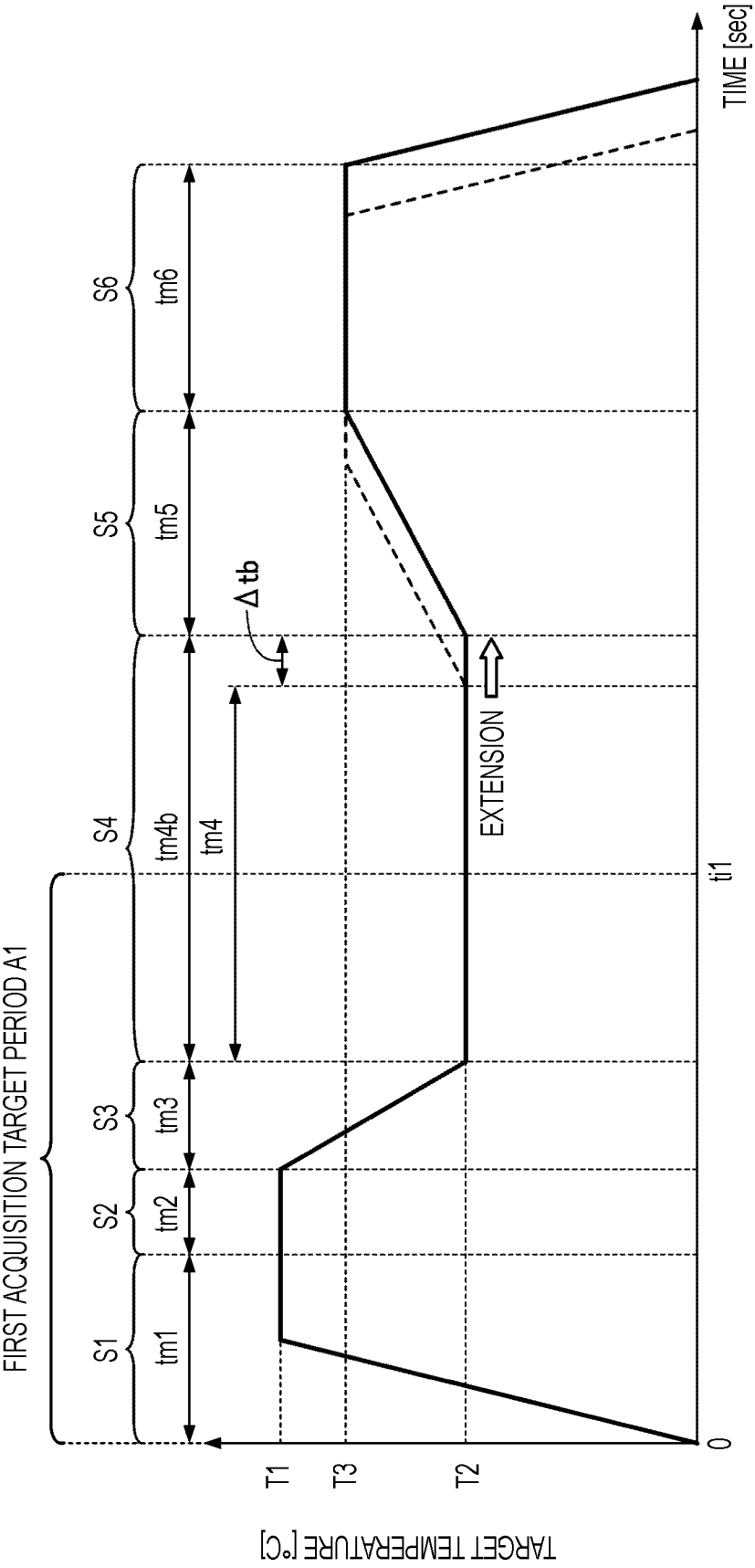


FIG. 6

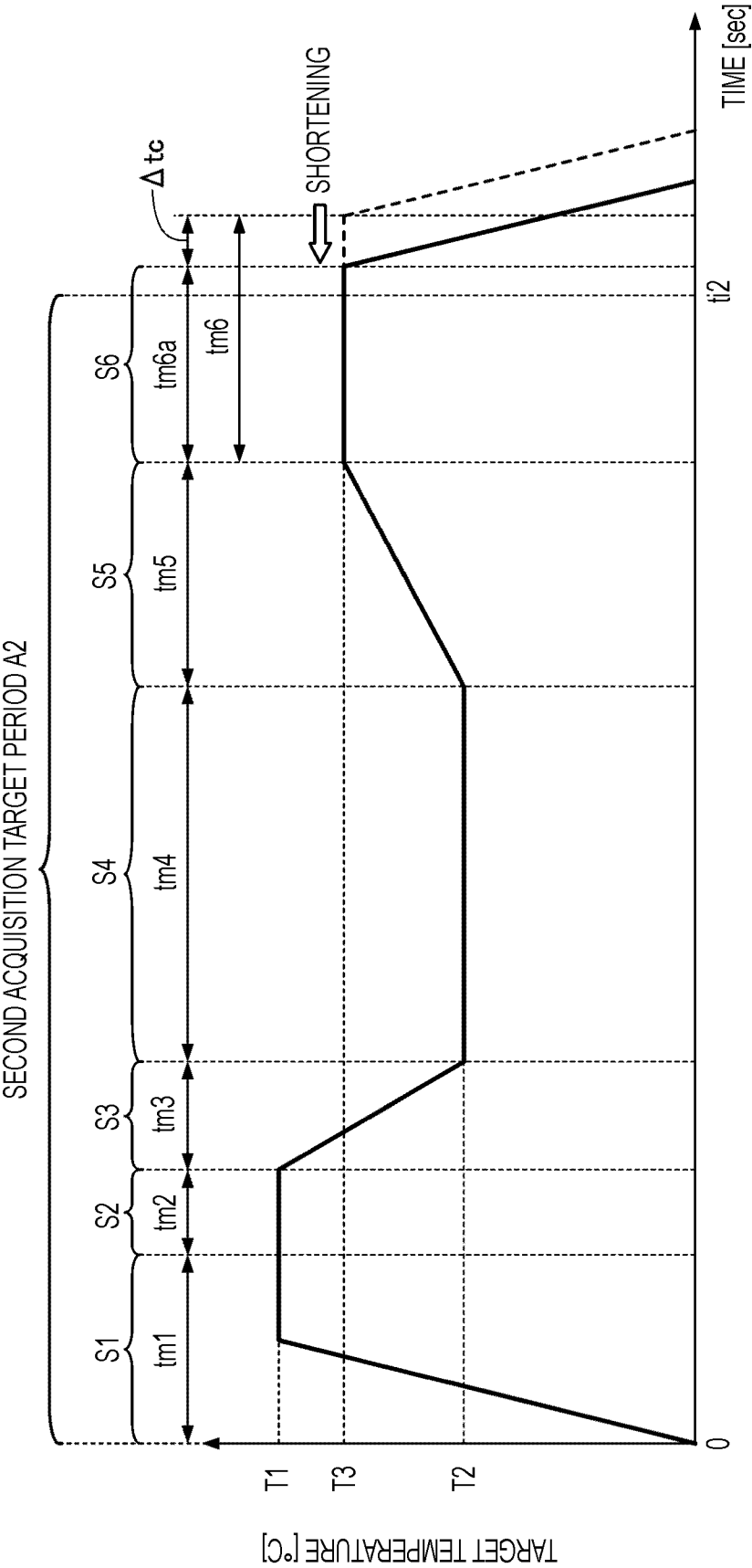


FIG. 7

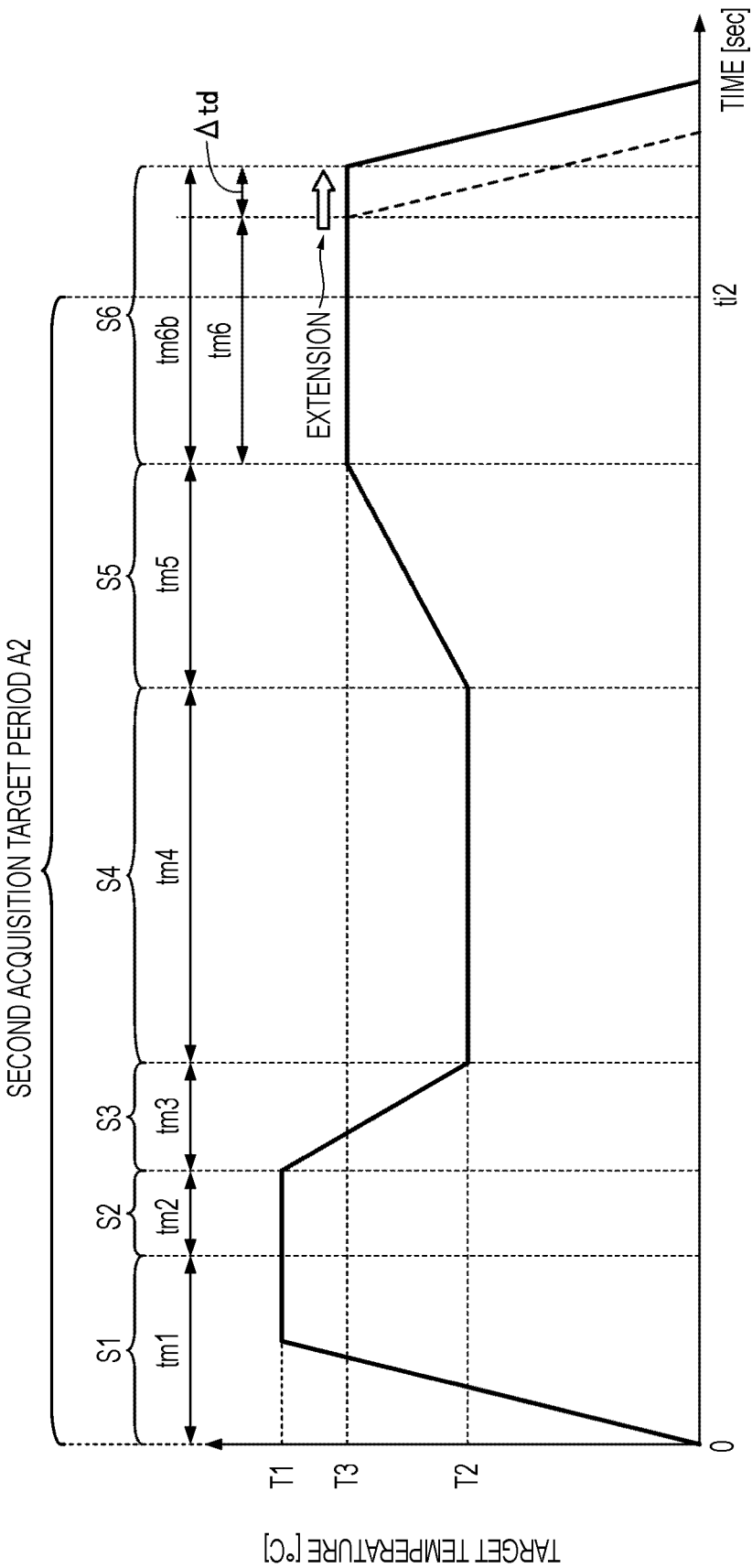
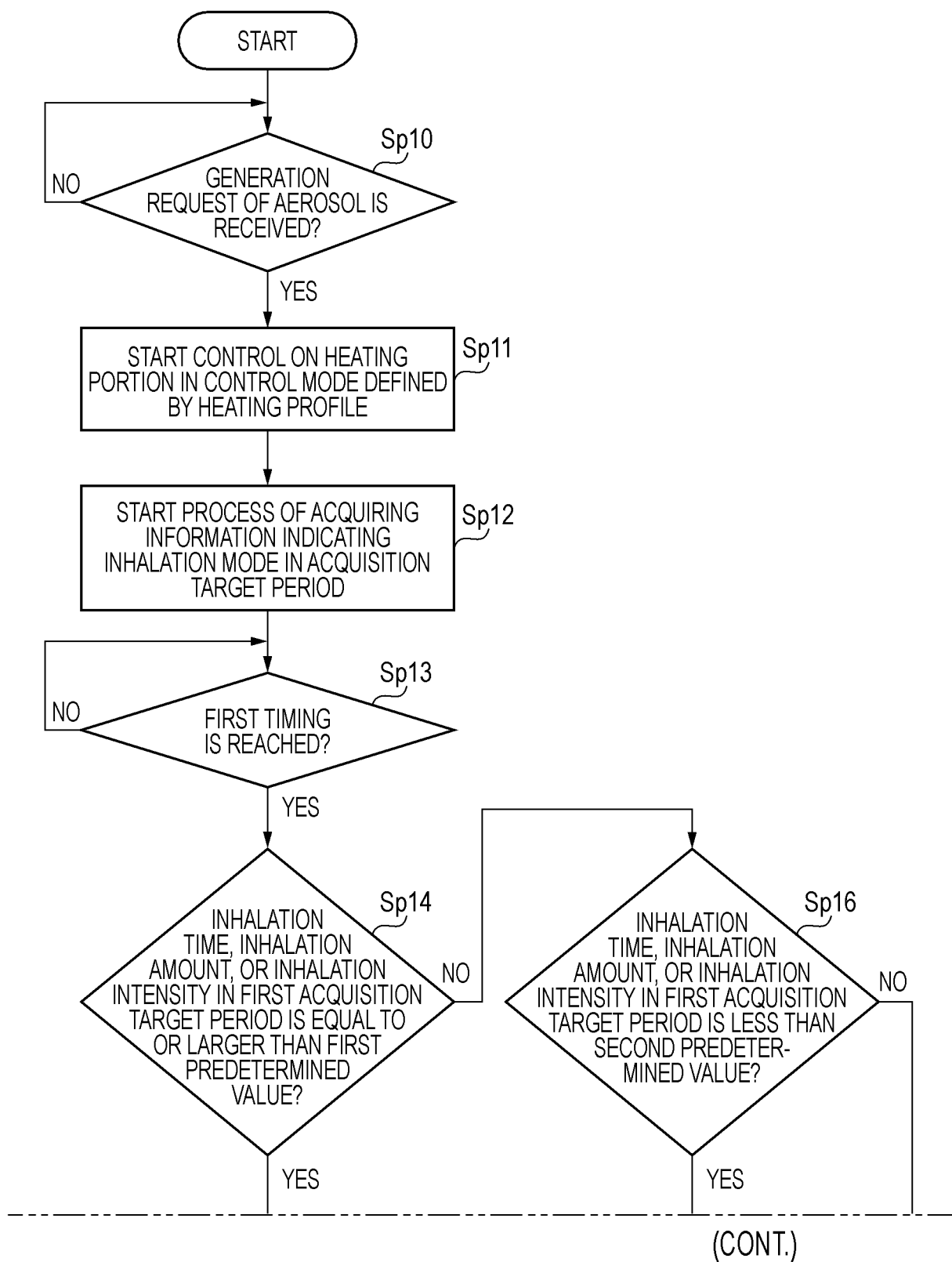


FIG. 8



(FIG. 8 Continued)

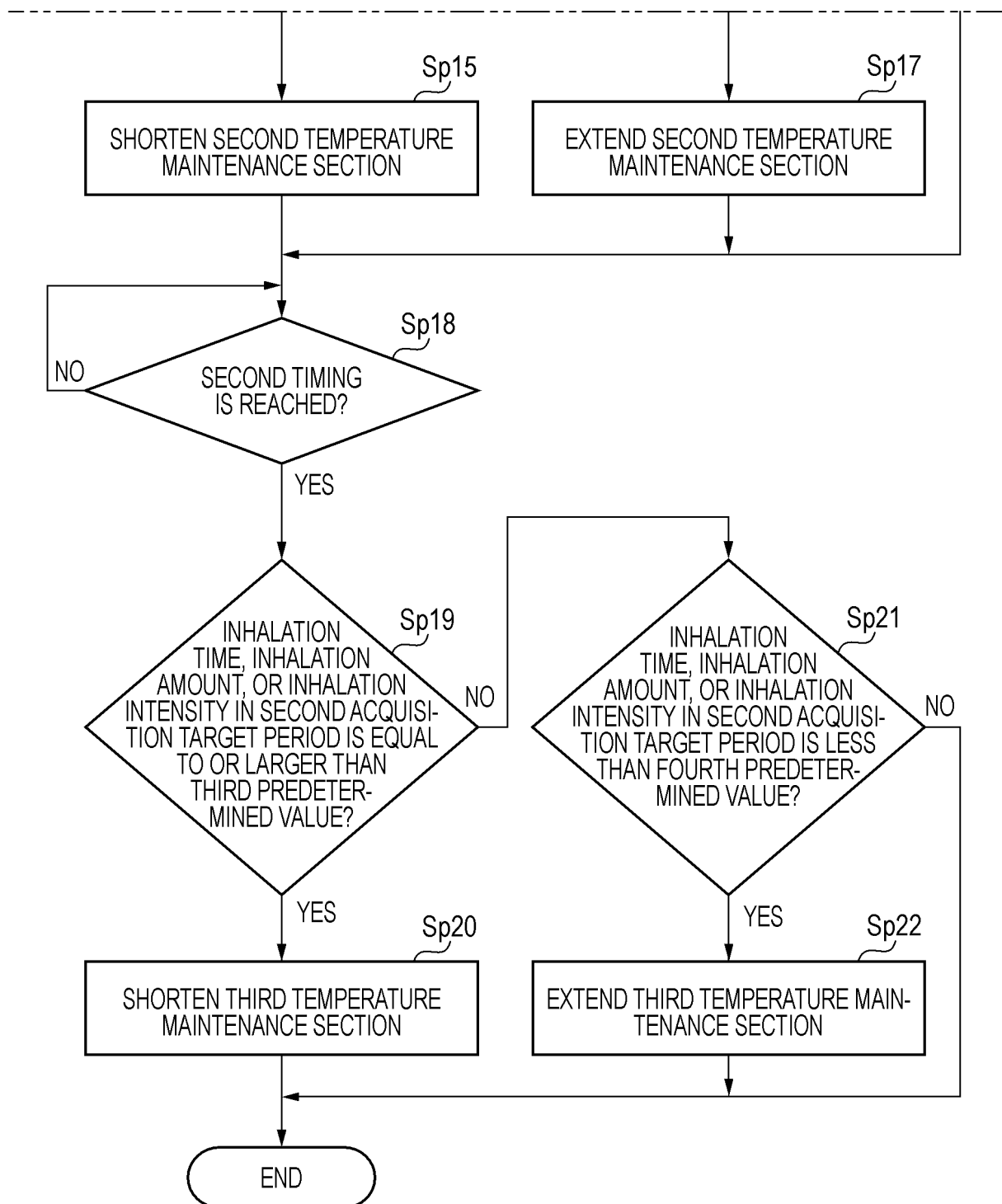


FIG. 9

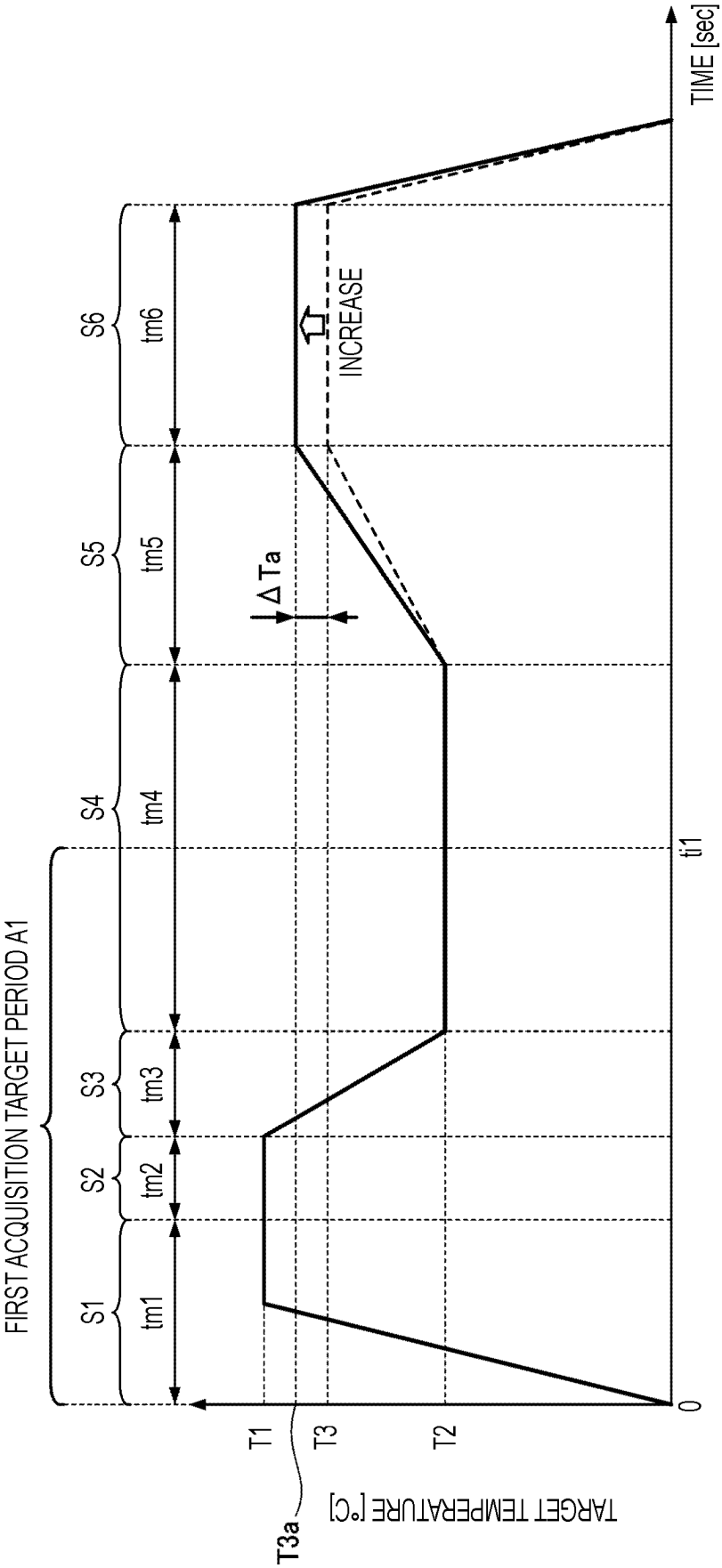
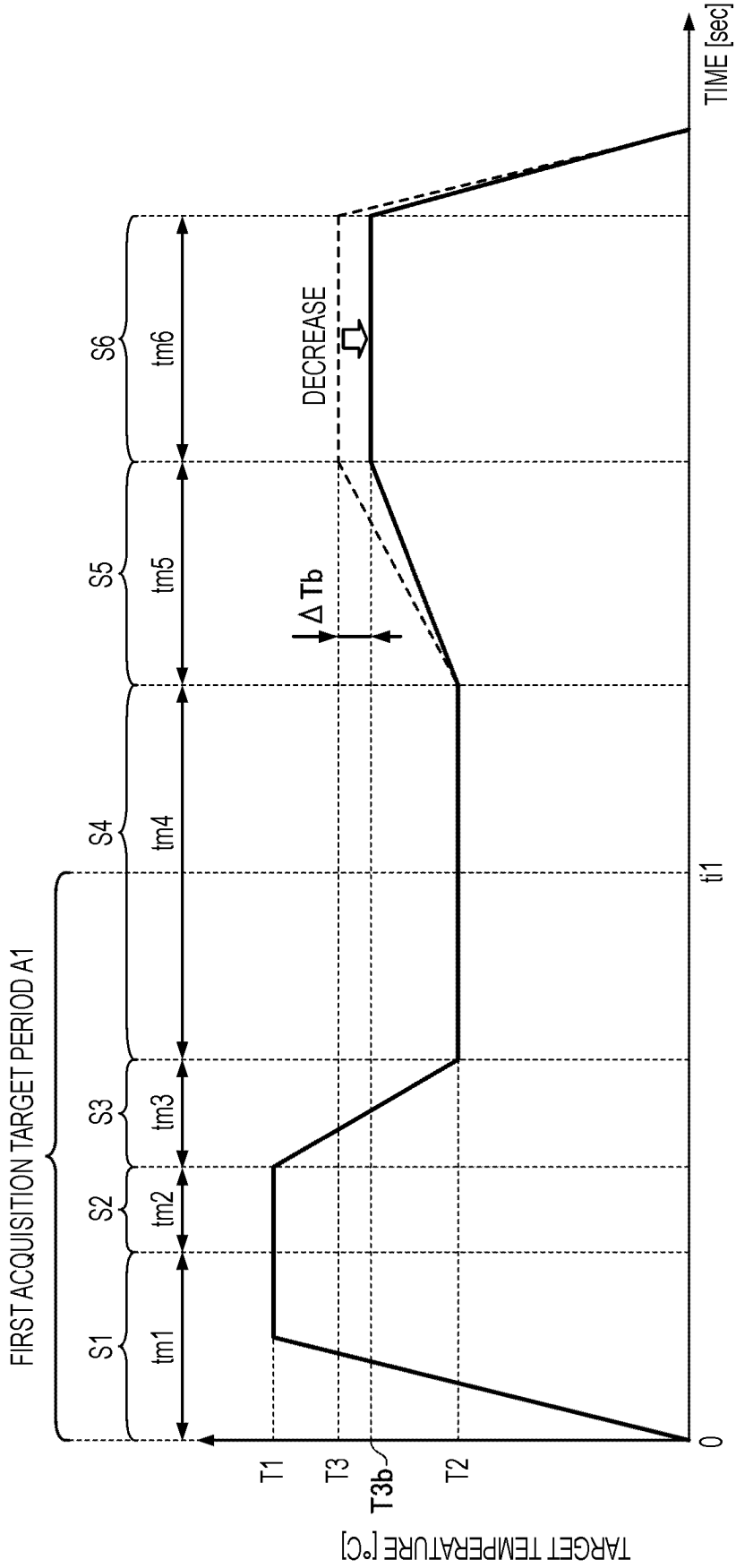


FIG. 10



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2022/026839

A. CLASSIFICATION OF SUBJECT MATTER <i>A24F 40/50</i> (2020.01)i FI: A24F40/50 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) A24F40/50 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>X</td> <td>WO 2022/079751 A1 (JAPAN TOBACCO INC.) 21 April 2022 (2022-04-21) paragraphs [0130]-[0154], fig. 16-18</td> <td>1-9, 14-15</td> </tr> <tr> <td>Y</td> <td></td> <td>10-13</td> </tr> <tr> <td>Y</td> <td>CN 111053299 A (SHENZHEN CHENYU TECHNOLOGY CO., LTD.) 24 April 2020 (2020-04-24) paragraph [0129]</td> <td>10-13</td> </tr> </tbody> </table>	Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	X	WO 2022/079751 A1 (JAPAN TOBACCO INC.) 21 April 2022 (2022-04-21) paragraphs [0130]-[0154], fig. 16-18	1-9, 14-15	Y		10-13	Y	CN 111053299 A (SHENZHEN CHENYU TECHNOLOGY CO., LTD.) 24 April 2020 (2020-04-24) paragraph [0129]	10-13
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.										
X	WO 2022/079751 A1 (JAPAN TOBACCO INC.) 21 April 2022 (2022-04-21) paragraphs [0130]-[0154], fig. 16-18	1-9, 14-15										
Y		10-13										
Y	CN 111053299 A (SHENZHEN CHENYU TECHNOLOGY CO., LTD.) 24 April 2020 (2020-04-24) paragraph [0129]	10-13										
☐ 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 15 August 2022 Date of mailing of the international search report 30 August 2022												
Name and mailing address of the ISA/IP Japan Patent Office (ISA/IP) 3-4-3 Kasumigaseki, Chiyoda-ku, Tokyo 100-8915 Japan Authorized officer Telephone No.												

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No. PCT/JP2022/026839

Patent document cited in search report			Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
WO	2022/079751	A1	21 April 2022	(Family: none)	
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REFERENCES CITED IN THE DESCRIPTION

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