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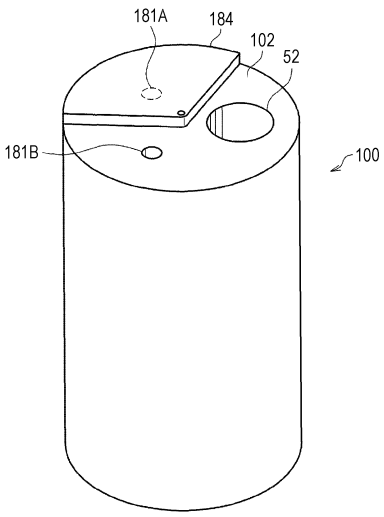
(54) **SUCTION DEVICE, CONTROL DEVICE, AND CONTROL METHOD**

(57) The present invention improves the quality of an experience in which this suction device is used. This suction device comprises: a chamber having a first opening and a second opening; a first generation part which uses a first base material inserted through the first opening and received by the chamber to generate aerosol; a first airflow path which communicates air between a first airflow hole and the second opening; a second airflow path which communicates air between a second airflow hole and the second opening, and in which a second generation part which uses a second base material to generate aerosol is disposed midway; an opening/closing part which opens/closes each of the first airflow path and the second airflow path; and a control part which controls the operations of the first generation part and the second generation part on the basis of the opening/closing states of the first airflow path and the second airflow path.

FIG. 2



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Description

Technical Field

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

Background Art

[0002] Inhaler devices, such as electronic cigarettes and nebulizers, that generate a material to be inhaled by a user is widespread. For example, an inhaler device uses a substrate that includes an aerosol source for generating aerosol, a flavor source for imparting a flavor component to the generated aerosol, and the like to generate aerosol to which a flavor component is added. A user can taste a flavor by inhaling aerosol to which a flavor component generated by the inhaler device is imparted.

[0003] In recent years, various technologies for improving quality of experience using an inhaler device have been developed. For example, Patent Literature 1 presented below discloses a technology that includes a plurality of heaters for heating a substrate and that switches ON/OFF of each heater on the basis of the number of times of inhalation and the period of use.

Citation List

Patent Literature

[0004] Patent Literature 1: JP 20 19-122403A

Summary of Invention

Technical Problem

[0005] In Patent Literature 1 presented above, however, the effect of improving the quality of experience using the inhaler device is limited since the number of substrates used in the inhaler device is one.

[0006] Thus, the present invention has been made in consideration of the aforementioned problem, and an object of the present invention is to provide a mechanism capable of further improving the quality of experience using an inhaler device.

Solution to Problem

[0007] To solve the above problem, an aspect of the present invention provides an inhaler device including a chamber that has a first opening and a second opening; a first generator that generates aerosol by using a first substrate inserted through the first opening and received by the chamber; a first airflow path through which a first air inlet hole and the second opening are in air-communication with each other; a second airflow path through which a second air inlet hole and the second opening are in air-communication with each other and in which a second generator that generates aerosol by using a second substrate is disposed at an intermediate position; an opening/closing part that opens and closes each of the first airflow path and the second airflow path; and a controller that controls operation of the first generator and the second generator based on an open/close state of each of the first airflow path and the second airflow path.

[0008] The controller may control permission/prohibition of electric power supply to each of the first generator and the second generator based on the open/close state of each of the first airflow path and the second airflow path.

[0009] The controller may permit electric power supply to the first generator and prohibit electric power supply to the second generator when the first airflow path is open and the second airflow path is closed.

[0010] The controller may permit electric power supply to both the first generator and the second generator when the second airflow path is open and the first airflow path is closed.

[0011] The controller may prohibit electric power supply to the first generator and permit electric power supply to the second generator when the second airflow path is open and the first substrate is not received by the chamber

[0012] The controller may prohibit electric power supply to the first generator and permit electric power supply to the second generator when the second airflow path is open, the first substrate is not received by the chamber, and a mouthpiece is attached.

[0013] When electric power supply to the first generator is permitted, the controller may control continuous electric power supply to the first generator to be started from a timing when a predetermined input is detected.

[0014] When electric power supply to the second generator is permitted, the controller may control electric power to be supplied to the second generator at a timing when inhalation performed by a user is detected.

[0015] The chamber may have a holder that holds the first substrate inserted through the first opening, and a non-holder that is disposed closer than the holder to the first opening. The inside diameter of the non-holder may be larger than the inside diameter of the holder. The mouthpiece may be attached to the inner side of the non-holder

[0016] A sensor for detecting whether the mouthpiece is attached may be disposed at the non-holder

[0017] The first generator may be disposed at the outer surface of the holder.

[0018] The opening/closing part may be a slider disposed to be slidable on a surface provided with the first air inlet hole and the second air inlet hole. The first air inlet hole and the second air inlet hole may be opened and closed depending on the position of the slider.

[0019] The inhaler device may further include a hall sensor that detects the position of the slider, and the controller may determine the open/close state of each of the first airflow path and the second airflow path based on

the position of the slider detected by the hall sensor.

[0020] The second airflow path may be shorter than the first airflow path.

[0021] The inhaler device may further include a liquid reservoir in air-communication with the first airflow path and the second airflow path.

[0022] The inhaler device may further include a draining mechanism that drains liquid accumulated in the liquid reservoir to the outside of the inhaler device.

[0023] The liquid reservoir may be provided at a position facing the first opening with the second opening interposed therebetween in an insertion direction of the first substrate.

[0024] A portion of the first airflow path near the second opening and a portion of the second airflow path near the second opening may overlap each other, and the second generator may be disposed, in the second airflow path, at a position not overlapping the first airflow path.

[0025] To solve the aforementioned problem, another aspect of the present invention provides a control circuit that controls an inhaler device. The inhaler device includes a chamber that has a first opening and a second opening; a first generator that generates aerosol by using a first substrate inserted through the first opening and received by the chamber; a first airflow path through which a first air inlet hole and the second opening are in air-communication with each other; a second airflow path through which a second air inlet hole and the second opening are in air-communication with each other and in which a second generator that generates aerosol by using a second substrate is disposed at an intermediate position; and an opening/closing part that opens and closes each of the first airflow path and the second airflow path. The control circuit includes a controller that controls operation of the first generator and the second generator based on an open/close state of each of the first airflow path and the second airflow path.

[0026] In addition, to solve the aforementioned problem, another aspect of the present invention provides a control method of controlling an inhaler device. The inhaler device includes a chamber that has a first opening and a second opening; a first generator that generates aerosol by using a first substrate inserted through the first opening and received by the chamber; a first airflow path through which a first air inlet hole and the second opening are in air-communication with each other; a second airflow path through which a second air inlet hole and the second opening are in air-communication with each other and in which a second generator that generates aerosol by using a second substrate is disposed at an intermediate position; and an opening/closing part that opens and closes each of the first airflow path and the second airflow path. The control method includes controlling operation of the first generator and the second generator based on an open/close state of each of the first airflow path and the second airflow path.

Advantageous Effects of Invention

[0027] As described above, according to the present invention, a mechanism capable of further improving the quality of experience using an inhaler device is provided.

Brief Description of Drawings

[0028]

[FIG. 1] FIG. 1 is a schematic diagram schematically illustrating a configuration example of an inhaler device according to one embodiment of the present invention.

[FIG. 2] FIG. 2 illustrates one example of an exterior configuration of an inhaler device according to the present embodiment.

[FIG. 3] FIG. 3 is a top view of an inhaler device with a first opening closed by a slider.

[FIG. 4] FIG. 4 is a top view of an inhaler device with a second air inlet hole closed by a slider.

[FIG. 5] FIG. 5 is a top view of an inhaler device with a first air inlet hole closed by a slider.

[FIG. 6] FIG. 6 roughly illustrates one example of an internal configuration of an inhaler device receiving a stick substrate in the state illustrated in FIG. 4.

[FIG. 7] FIG. 7 roughly illustrates one example of an internal configuration of an inhaler device receiving a stick substrate in the state illustrated in FIG. 5.

[FIG. 8] FIG. 8 roughly illustrates one example of an internal configuration of an inhaler device not receiving a stick substrate in the state illustrated in FIG. 5.

[FIG. 9] FIG. 9 roughly illustrates one example of an internal configuration of an inhaler device to which a mouthpiece is attached in the state illustrated in FIG. 5.

[FIG. 10] FIG. 10 illustrates one example of a configuration of a chamber

[FIG. 11] FIG. 11 is a flow chart illustrating one example of flow of processes executed by an inhaler device according to the present embodiment.

Description of Embodiments

[0029] Hereinafter, a suitable embodiment of the present invention will be described in detail with reference to the attached drawings. In the present specification and the drawings, structural elements having substantially identical functional configurations are denoted by identical signs, and duplicate description is omitted.

«1. General Configuration Example of Inhaler Device»

[0030] An inhaler device generates a material to be inhaled by a user. In the example described below, the material generated by the inhaler device is aerosol. Alternatively, the material generated by the inhaler device may be gas. In the following description, an action of a

user inhaling a material generated by the inhaler device is also simply referred to as "inhalation" or "puff". Each configuration example of the inhaler device will be described below.

[0031] The inhaler device according to the present configuration example generates aerosol by heating an aerosol source as liquid and heating a substrate that includes an aerosol source. The present configuration example will be described below with reference to FIG. 1.

[0032] FIG. 1 is a schematic diagram schematically illustrating a configuration example of an inhaler device according to one embodiment of the present invention. As illustrated in FIG. 1, an inhaler device 100 according to the present configuration example includes a power supply 111, a sensor 112, a notifier 113, a memory 114, a communicator 115, a controller 116, a liquid guide 122, a liquid storage 123, a heater 40A, a heater 40B, a chamber 50, and a heat insulator 70. In addition, an airflow path 180 is defined in the inhaler device 100.

[0033] The heater 40B, the liquid guide 122, and the liquid storage 123 are included in a cartridge 120. The cartridge 120 is detachable from the inhaler device 100. Typically, inhalation is performed by a user in a state in which the cartridge 120 is mounted on the inhaler device 100 and in which a stick substrate 150 is received by the chamber 50. Hereinafter, structural elements will be described in order.

[0034] The power supply 111 stores electric power. Then, the power supply 111 supplies electric power to structural elements of the inhaler device 100. The power supply 111 may be, for example, a rechargeable battery such as a lithium ion secondary battery. The power supply 111 may be charged by being connected to an external power supply by a USB (Universal Serial Bus) cable or the like. The power supply 111 may be charged in a state of not being connected to a device on the power transmission side by a wireless power transmission technology. In addition, only the power supply 111 may be detachable from the inhaler device 100 and may be replaceable with a new power supply 111.

[0035] The sensor 112 detects various items of information regarding the inhaler device 100. Then, the sensor 112 outputs the detected information to the controller 116. In one example, the sensor 112 is a pressure sensor such as a microphone condenser, a flow sensor, or a temperature sensor. When the sensor 112 detects a numerical value due to inhalation by a user, the sensor 112 outputs information indicating that inhalation is performed by a user to the controller 116. In another example, the sensor 112 is an input device, such as a button or a switch, that receives an information input from the user. In particular, the sensor 112 can include a button for instructing start/stop of generation of aerosol. The sensor 112 outputs information that is input by the user to the controller 116. In another example, the sensor 112 is a temperature sensor that detects the temperature of the heater 40A. The temperature sensor detects the temperature of the heater 40A on the basis of, for example, the value of electric resistance of a conducting track of the heater 40A. The sensor 112 may detect the temperature of the stick substrate 150 received by the chamber 50 on the basis of the temperature of the heater 40A.

[0036] The notifier 113 provides information to the user. In one example, the notifier 113 is a light-emitting device such as an LED (Light Emitting Diode). In this case, the notifier 113 emits light in light-emission patterns that are different for each of cases such as a case where the power supply 111 is in a state of requiring charging, a case where the power supply 111 is being charged, and a case where an abnormality has occurred in the inhaler device 100. The light-emission patterns described here are concepts including colors, the timing of turning on/off, and the like. The notifier 113 may be, in addition to or instead of the light-emitting device, a display device that displays an image, a sound output device that outputs sound, a vibration device that vibrates, or the like. In addition, the notifier 113 may provide information indicating that inhalation by a user is possible. The information indicating that inhalation by a user is possible is provided when the temperature of the stick substrate 150 heated by the heater 40A has reached a predetermined temperature.

[0037] The memory 114 stores various items of information for operation of the inhaler device 100. The memory 114 is, for example, a non-volatile storage medium such as a flash memory. One example of the information stored in the memory 114 is information, such as the content of control of various structural elements by the controller 116, on the OS (Operating System) of the inhaler device 100. Another example of the information stored in the memory 114 is information, such as the number of times of inhalation, the inhalation time, and the accumulated inhalation time period, on inhalation by the user.

[0038] The communicator 115 is a communication interface for transmitting and receiving information between the inhaler device 100 and the other devices. The communicator 115 performs communication in conformity with any wired or wireless communication standard. As such communication standard, for example, a wireless LAN (Local Area Network), a wired LAN, Wi-Fi (registered trademark), Bluetooth (registered trademark), or the like is employable. In one example, the communicator 115 transmits information on inhalation by a user to a smartphone to cause the smartphone to display the information on the inhalation by the user. In another example, the communicator 115 receives information on new OS from a server to update OS information stored in the memory 114.

[0039] The controller 116 functions as an arithmetic processing unit and a control circuit, and controls the overall operations of the inhaler device 100 in accordance with various programs. The controller 116 is realized by, for example, an electronic circuit such as a CPU (Central Processing Unit) and a microprocessor. In addition, the controller 116 may include a ROM (Read Only

Memory) that stores programs, arithmetic parameters, and the like that are to be used, and a RAM (Random Access Memory) that temporarily stores parameters and the like that change, as appropriate. The inhaler device 100 executes various processes on the basis of control by the controller 116. Examples of processes controlled by the controller 116 include supplying of electric power from the power supply 111 to the other structural elements, charge of the power supply 111, detection of information by the sensor 112, notice of information by the notifier 113, storing and reading-out of information by the memory 114, and transmission and reception of information by the communicator 115. The controller 116 also controls the other processes, such as input of information to structural elements and processes based on information output from structural elements, to be executed by the inhaler device 100.

[0040] The liquid storage 123 stores an aerosol source. The aerosol source is atomized by being heated to generate aerosol. The aerosol source is, for example, liquid such as polyhydric alcohol or water. Examples of the polyhydric alcohol include glycerine and propylene glycol. The aerosol source may further include a tobacco raw material or a tobacco-raw-material-derived extract that releases a flavor component by being heated. The aerosol source may further include nicotine. For the inhaler device 100 that is a medical inhaler such as a nebulizer, the aerosol source may include a medicine that is to be inhaled by a patient.

[0041] The liquid guide 122 guides the aerosol source, which is liquid stored in the liquid storage 123, from the liquid storage 123 and holds the aerosol source. The liquid guide 122 is, for example, a wick formed by twining a fiber material such as glass fiber or a porous material such as porous ceramic. The liquid guide 122 is in liquid-communication with the liquid storage 123. The aerosol source stored in the liquid storage 123 thus spreads throughout the entirety of the liquid guide 122 due to the capillary action.

[0042] The heater 40B heats the aerosol source to atomize the aerosol source and generate the aerosol. The heater 40B is formed of any material such as metal or polyimide into any shape such as a coil shape, a film shape, or a blade shape. The heater 40B is disposed close to the liquid guide 122. In the example illustrated in FIG. 1, the heater 40B is constituted by a coil made of metal and is wound around the liquid guide 122. Therefore, when the heater 40B produces heat, the aerosol source held by the liquid guide 122 is heated and atomized to generate the aerosol. The heater 40B produces heat when receiving electric power from the power supply 111. In one example, the electric power may be supplied to generate the aerosol during a period in which the sensor 112 detects inhalation performed by a user. In another example, the electric power may be supplied to generate the aerosol in response to the sensor 112 detecting that a predetermined user input (for example, pressing of a button for instructing start/stop of generation of aerosol) is performed. Subsequently, the supply of the electric power may be stopped in response to the sensor 112 detecting that a predetermined user input (for example, re-pressing of the button for instructing start/stop of generation of aerosol) is performed.

[0043] The chamber 50 receives the stick substrate 150 inserted through a first opening 52. For example, the chamber 50 is a tubular body having the first opening 52 and a bottom 54 as bottom surfaces, and defines a pillar-shaped internal space 80. The bottom 54 of the chamber 50 is provided with a second opening 56. The chamber 50 also has a function of defining a flow path of air that passes through the stick substrate 150. An inlet of the air into the flow path is the second opening 56. An outlet of the air from the flow path is the first opening 52.

[0044] The stick substrate 150 is a stick-type member. The stick substrate 150 includes a substrate 151 and an inhalation port 152.

[0045] The substrate 151 includes an aerosol source. The aerosol source is atomized by being heated to generate aerosol. The aerosol source may be, for example, a tobacco-derived product, such as a product obtained by molding shredded tobacco or a tobacco raw material into a particle shape, a sheet shape, or a power shape. The aerosol source may include a non-tobacco-derived product made from plants (for example, mint, herbs, and the like) other than tobacco. In one example, the aerosol source may include a flavor component such as menthol. For the inhaler device 100 that is a medical inhaler, the aerosol source may include a medicine that is to be inhaled by a patient. The aerosol source is not limited to a solid and may be, for example, liquid such as polyhydric alcohol or water. Examples of the polyhydric alcohol include glycerine and propylene glycol. At least a portion of the substrate 151 is accommodated in the internal space 80 of the chamber 50 in a state in which the stick substrate 150 is received by the chamber 50.

[0046] The inhalation port 152 is a member to be held in the mouth of a user during inhalation. At least a portion of the inhalation port 152 projects from the first opening 52 in the state in which the stick substrate 150 is received by the chamber 50. When the user holds the inhalation port 152 projecting from the first opening 52 in the mouth of the user and inhales, air flows through the second opening 56 into the internal space 80 of the chamber 50. The flowed-in air passes through the internal space 80 of the chamber 50, more specifically, passes through the substrate 151 and reaches, together with aerosol generated from the substrate 151, the inside of the mouth of the user

[0047] The heater 40A heats the aerosol source to atomize the aerosol source and generate aerosol. The heater 40A is constituted by any material such as metal or polyimide. For example, the heater 40A is formed in a film shape and disposed to cover the outer circumference of the chamber 50. When the heater 40A produces heat, the aerosol source included in the stick substrate 150 is heated through the outer circumference of the stick

substrate 150 and atomized, and aerosol is generated. The heater 40A produces heat when receiving electric power from the power supply 111. In one example, electric power may be supplied to generate aerosol in response to the sensor 112 detecting that a predetermined user input is performed. When the temperature of the stick substrate 150 heated by the heater 40A reaches a predetermined temperature, inhalation by a user becomes possible. Subsequently, electric power supply may be stopped in response to the sensor 112 detecting that a predetermined user input is performed. In another example, electric power is supplied to generate aerosol during a period in which the sensor 112 detects that inhalation by a user is performed.

[0048] The heat insulator 70 prevents heat from transferring from the heater 40A to the other structural elements of the inhaler device 100. The heat insulator 70 is disposed to cover at least the outer circumference of the heater 40A. For example, the heat insulator 70 is constituted by a vacuum heat insulator, an aerogel heat insulator, or the like. The vacuum heat insulator is, for example, an insulator in which heat conduction by gas is made to be as close as possible to zero by wrapping, for example, glass wool and silica (silicon powder) with a resin film into a high-vacuum state.

[0049] The airflow path 180 is a flow path of air that is to be introduced into the internal space 80 of the chamber 50. The airflow path 180 can have, at both ends, a tubular structure having an air inlet hole 181 that is an inlet of air into the airflow path 180 and the bottom 54 of the chamber 50. The second opening 56 provided in the bottom 54 of the chamber 50 is an outlet of air from the airflow path 180. That is, the internal space 80 of the chamber 50 is in air-communication with the airflow path 180 through the second opening 56 of the chamber 50. Along with inhalation by a user, air flows into the airflow path 180 through the air inlet hole 181, and the air flows out to the internal space 80 of the chamber 50 through the second opening 56. The liquid guide 122 and the heater 40B are disposed at intermediate positions in the airflow path 180. The aerosol generated by the heater 40B mixes with the air that has flowed in through the air inlet hole 181. Next, along with inhalation by the user, a mixture fluid of the aerosol and the air is conveyed to the internal space 80 of the chamber 50 via the second opening 56 as indicated by an airflow 190. The mixture fluid of the aerosol and the air conveyed to the internal space 80 of the chamber 50 reaches the inside of the mouth of the user together with the aerosol generated by the heater 40A.

- Modifications -

[0050] A configuration example of the inhaler device 100 has been described above. Needless to say, the configuration of the inhaler device 100 is not limited to the aforementioned configuration. As the configuration of the inhaler device 100, various configurations presented below as examples are employable.

[0051] In one example, aerosol may be generated by vibration or induction heating, instead of heating by the heater 40B.

[0052] To generate aerosol by vibration, the inhaler device 100 includes a vibrator instead of the heater 40B. For example, the vibrator is constituted by a tabular member including a piezoceramic that functions as an ultrasonic vibrator. When the vibrator vibrates, the aerosol source guided to a surface of the vibrator by the liquid guide 122 is atomized by ultrasonic waves generated along with the vibration of the vibrator, and aerosol is generated.

[0053] To generate aerosol by induction heating, the inhaler device 100 includes a susceptor and an electromagnetic induction source instead of the heater 40B. The susceptor produces heat by electromagnetic induction. The susceptor is constituted by a conductive material such as metal. The susceptor is disposed close to the liquid guide 122. For example, the susceptor is constituted by a conductive wire made of metal and is wound around the liquid guide 122. The electromagnetic induction source causes the susceptor to produce heat by electromagnetic induction. The electromagnetic induction source is constituted by, for example, a coiled conductive wire. When alternating current is supplied from the power supply 111 to the electromagnetic induction source, the electromagnetic induction source generates a magnetic field. The electromagnetic induction source is disposed at a position where the susceptor overlaps the generated magnetic field. Therefore, when a magnetic field is generated, eddy current is generated in the susceptor, and Joule heat is generated. The aerosol source held by the liquid guide 122 is heated by the Joule heat and atomized, and aerosol is generated.

[0054] In another example, aerosol may be generated by induction heating, instead of heating by the heater 40A.

[0055] In this case, the stick substrate 150 further includes a susceptor. The susceptor produces heat by electromagnetic induction. The susceptor is constituted by a conductive material such as metal. In one example, the susceptor is a metal piece. The susceptor is disposed close to the aerosol source. For example, the susceptor is included in the substrate 151 of the stick substrate 150.

[0056] The inhaler device 100 includes an electromagnetic induction source, instead of the heater 40A. The electromagnetic induction source is constituted by, for example, a coiled conductive wire and is disposed to be wound around the outer circumference of the chamber 50. When receiving alternating current from the power supply 111, the electromagnetic induction source generates a magnetic field. The electromagnetic induction source is disposed at a position where the internal space 80 of the chamber 50 overlaps the generated magnetic field. Therefore, when a magnetic field is generated in a state in which the stick substrate 150 is received by the chamber 50, eddy current is generated in the susceptor, and Joule heat is generated. Then, the aerosol source

included in the stick substrate 150 is heated and atomized by the Joule heat, and aerosol is generated.

[0057] In another example, the heater 40A may be formed in a blade shape and disposed so as to project from the bottom 54 of the chamber 50 into the internal space 80. In this case, the blade-shaped heater 40A is inserted into the substrate 151 of the stick substrate 150 and heats the substrate 151 of the stick substrate 150 from the inside. In another example, the heater 40A may be disposed so as to cover the bottom 54 of the chamber 50. The heater 40A may be configured as a combination of two or more of a heater that covers the outer circumference of the chamber 50, a blade-shaped heater, and a heater that covers the bottom 54 of the chamber 50.

[0058] In another example, the chamber 50 may include an opening/closing mechanism, such as a hinge, that opens and closes a portion of the outer shell that forms the internal space 80. The chamber 50 may hold the stick substrate 150 inserted into the internal space 80 by opening and closing the outer shell. In this case, the heater 40A may be provided at the portion of the chamber 50 at which the stick substrate 150 is held and may heat the stick substrate 150 while pressing the stick substrate 150.

[0059] The means for generating aerosol is not limited to heating. For example, the means for generating aerosol may be vibration atomization or induction heating.

- Supplementary Note -

[0060] The heater 40A is one example of the first generator that generates aerosol by using the first substrate. The stick substrate 150 is one example of the first substrate containing an aerosol source. Hereinafter, the heater 40A is also referred to as the stick-side heater 40A. The heater 40B is one example of the second generator that generates aerosol by using the second substrate. The cartridge 120 is one example of the second substrate containing an aerosol source that is liquid. Hereinafter, the heater 40B is also referred to as the cartridge-side heater 40B.

[0061] The aerosol generated by the stick-side heater 40A is also referred to as the stick-side aerosol. Meanwhile, the aerosol generated by the cartridge-side heater 40B is also referred to as the cartridge-side aerosol. The stick-side aerosol and the cartridge-side aerosol are also simply collectively referred to as the aerosol when not required to be particularly distinguished from each other.

«2. Technical Problems»

[0062] As described above with reference to FIG. 1, the inhaler device 100 uses the two substrates of the cartridge 120 and the stick substrate 150 together. Therefore, the user can inhale and taste mixture aerosol in which the stick-side aerosol and the cartridge-side aerosol are mixed. The inhaler device 100 that generates mixture aerosol by, as described above, using two types of substrates together is also referred to as a hybrid-type inhaler device.

[0063] Here, it is considered that the user may feel like tasting only the stick-side aerosol, feel like tasting only the cartridge-side aerosol, or feel like tasting the mixture aerosol. Thus, there is provided in the present embodiment a mechanism capable of switching the operation of the inhaler device 100 in accordance with these demands. That is, the inhaler device 100 according to the present embodiment is capable of selectively generating the stick-side aerosol and the cartridge-side aerosol.

«3. Technical Features»

(1) Detailed Configuration Example of Inhaler Device 100

[0064] Hereinafter, a detailed configuration example of the inhaler device 100 will be described with reference to FIG. 2 to FIG. 7.

[0065] FIG. 2 illustrates one example of the exterior configuration of the inhaler device 100 according to the present embodiment. As illustrated in FIG. 2, the inhaler device 100 may be formed in a columnar shape. A top surface 102 of the inhaler device 100 is provided with the first opening 52, a first air inlet hole 181A, and a second air inlet hole 181B. A slider 184 is disposed to be slidable on the top surface 102 of the inhaler device 100. Depending on the position of the slider 184, the first opening 52, the first air inlet hole 181A, and the second air inlet hole 181B are opened and closed. Here, closing the holes of the first opening 52 and the like means that the holes are covered by the slider 184 and make inflow and outflow of air through the holes difficult. Meanwhile, opening the holes of the first opening 52 and the like means that the holes are exposed and enable inflow and outflow of air through the holes. Such a configuration makes it possible to easily control inflow and outflow of air with respect to the inhaler device 100.

[0066] FIG. 3 is a top view of the inhaler device 100 with the first opening 52 closed by the slider 184. Meanwhile, the first air inlet hole 181A and the second air inlet hole 181B are open. FIG. 4 is a top view of the inhaler device 100 with the second air inlet hole 181B closed by the slider 184. Meanwhile, the first opening 52 and the first air inlet hole 181A are open. FIG. 5 is a top view of the inhaler device 100 with the first air inlet hole 181A closed by the slider 184. Meanwhile, the first opening 52 and the second air inlet hole 181B are open. FIG. 6 roughly illustrates one example of the internal configuration of the inhaler device 100 in which the stick substrate 150 is received in the state illustrated in FIG. 4. FIG. 7 roughly illustrates one example of the internal configuration of the inhaler device 100 in which the stick substrate 150 is received in the state illustrated in FIG. 5.

[0067] As illustrated in FIG. 3 to FIG. 5, the slider 184 rotates on the top surface 102 of the inhaler device 100 with the rotational axis at the center of the top surface 102 of the inhaler device 100. The user can open and

close the first opening 52, the first air inlet hole 181A, and the second air inlet hole 181B by sliding the slider 184.

[0068] As illustrated in FIG. 6 and FIG. 7, the chamber 50 receives the stick substrate 150. In this state, the stick-side heater 40A heats the stick substrate 150 to generate the stick-side aerosol. The second opening 56 is disposed at a position where the second opening 56 is in communication with an end surface (that is, an end surface of the substrate 151) of the stick substrate 150 inside the chamber 50 in a state in which the chamber 50 receives the stick substrate 150. Therefore, when the user holds the stick substrate 150 in the mouth and inhales, the air that has flowed into the chamber 50 through the second opening 56 flows into the inside of the stick substrate 150 from the end portion of the stick substrate 150 inside the chamber 50. The air that has flowed into the inside of the stick substrate 150 is then mixed with the stick-side aerosol in the process of being conveyed via the inside of the stick substrate 150, and reaches the inside of the mouth of the user from an end surface (that is, an end surface of the inhalation port 152) of the stick substrate 150 outside the chamber 50.

[0069] As illustrated in FIG. 6, a first airflow path 180A through which the first air inlet hole 181A and the second opening 56 are in air-communication with each other is formed as one airflow path 180 in the inhaler device 100. The air that has flowed in through the first air inlet hole 181A is conveyed through the first airflow path 180A and flows into the internal space 80 of the chamber 50 through the second opening 56. Therefore, when the user adds the stick substrate 150 and inhales, air is conveyed along an airflow 190A and reaches, together with the stick-side aerosol, the inside of the mouth of the user

[0070] As illustrated in FIG. 7, a second airflow path 180B through which the second air inlet hole 181B and the second opening 56 are in air-communication with each other is formed as one airflow path 180 in the inhaler device 100. The cartridge-side heater 40B is disposed at an intermediate position in the second airflow path 180B. When the cartridge-side heater 40B heats the aerosol source introduced to the liquid guide 122 from the liquid storage 123, the cartridge-side aerosol is generated. The air that has flowed in through the second air inlet hole 181B is mixed with the cartridge-side aerosol in the middle of being conveyed through the second airflow path 180B, flows into the internal space 80 of the chamber 50 through the second opening 56, and is further mixed with the stick-side aerosol. Therefore, when the user holds the stick substrate 150 in the mouth and inhales, air is conveyed along an airflow 190B and reaches, together with the mixture aerosol, the inside of the mouth of the user

[0071] Here, as illustrated in FIG. 6 and FIG. 7, a portion of the first airflow path 180A near the second opening 56 and a portion of the second airflow path 180B near the second opening 56 overlap each other. The cartridge-side heater 40B is disposed, in the second airflow path 180B, at a position that does not overlap the first airflow path 180A. In addition, the liquid guide 122 is also disposed, in the second airflow path 180B, at a position that does not overlap the first airflow path 180A. In other words, the cartridge-side heater 40B and the liquid guide 122 are not disposed in the first airflow path 180A. Such a configuration prevents a flavor of the aerosol source guided by the liquid guide 122 from being added to the air conveyed along the airflow 190A. Consequently, when inhaling with the first airflow path 180A open and the second airflow path 180B closed, the user can taste the pure flavor of the stick-side aerosol whose flavor is not deteriorated due to the cartridge-side aerosol.

[0072] The slider 184 is one example of an opening/closing part that opens and closes each of the first airflow path 180A and the second airflow path 180B. As illustrated in FIG. 6, the slider 184 can open the first airflow path 180A and close the second airflow path 180B by closing the second air inlet hole 181B. As illustrated in FIG. 7, the slider 184 can open the second airflow path 180B and close the first airflow path 180A by closing the first air inlet hole 181A.

[0073] The sensor 112 further includes a hall sensor that detects the position of the slider 184. The hall sensor is a contactless magnetic sensor that changes a magnetic field into an electric signal by utilizing a hall effect. In one example, a magnet is incorporated in the slider 184, and the top surface 102 of the inhaler device 100 is provided with a hall element. The hall sensor can detect the position of the slider 184 on the basis of an output from the hall element by previously storing the correspondence between the position of the slider 184 and an electric signal output from the hall element. On the basis of the position of the slider 184 detected by the hall sensor, the controller 116 determines the open/close state of each of the first airflow path 180A and the second airflow path 180B. For example, when the position of the slider 184 is the position illustrated in FIG. 4, the controller 116 determines that the first airflow path 180A is open and the second airflow path 180B is closed. When the position of the slider 184 is the position illustrated in FIG. 5, the controller 116 determines that the first airflow path 180A is closed and the second airflow path 180B is open.

[0074] As illustrated in FIG. 6 and FIG. 7, the second airflow path 180B is shorter than the first airflow path 180A. Such a configuration can suppress the temperature of the cartridge-side aerosol generated by the cartridge-side heater 40B from decreasing during convey to the chamber 50. Therefore, it is possible to prevent the cartridge-side aerosol from condensing before conveyed to the chamber 50. In addition, since the cartridge-side aerosol is conveyed to the chamber 50 while maintaining the high temperature of the cartridge-side aerosol, it is possible to suppress the temperature of the stick substrate 150 from decreasing.

[0075] As illustrated in FIG. 6 and FIG. 7, a liquid reservoir 186 is provided at a position where the liquid reservoir 186 is in air-communication with the first airflow

path 180A and the second airflow path 180B. In the liquid reservoir 186, liquid generated as a result of aerosol condensing in the inhaler device 100 can be accumulated. The liquid reservoir 186 is provided at a position facing the first opening 52 with the second opening 56 interposed therebetween in the insertion direction of the stick substrate 150. It is thus possible to cause the liquid generated as a result of aerosol condensing in the chamber 50 to flow down to the liquid reservoir 186 through the second opening 56. It is also possible to cause liquid generated as a result of the cartridge-side aerosol condensing before reaching the chamber 50 to flow down to the liquid reservoir 186 by following the second airflow path 180B.

[0076] A draining mechanism 160 is a mechanism for draining the liquid accumulated in the liquid reservoir 186 to the outside of the inhaler device 100. The draining mechanism 160 includes a drain hole 162 provided in the inhaler device 100, an opening/closing valve 164 that opens and closes the drain hole 162, and a drain path 166 through which the drain hole 162 and the liquid reservoir 186 are in communication with each other. The aerosol as liquid accumulated in the liquid reservoir 186 can be drained to the outside of the inhaler device 100 through the drain hole 162 via the drain path 166 by tilting the inhaler device 100 such that the drain hole 162 is placed on the lower side in a state in which the drain hole 162 is opened by the opening/closing valve 164. Such a configuration can prevent the condensed liquid from remaining in the airflow path 180. It is thus possible to improve heating efficiency while reducing risk of malfunctions.

(2) Switching Between Stick Heating Type and Hybrid Type

[0077] The controller 116 controls the operation of the stick-side heater 40A and the cartridge-side heater 40B on the basis of the open/close state of each of the first airflow path 180A and the second airflow path 180B. As described below in detail, such a configuration enables the inhaler device 100 to selectively generate each of the stick-side aerosol and the cartridge-side aerosol.

[0078] In detail, the controller 116 controls permission/prohibition of electric power supply to each of the stick-side heater 40A and the cartridge-side heater 40B on the basis of the open/close state of each of the first airflow path 180A and the second airflow path 180B. When a predetermined condition is satisfied, the controller 116 executes electric power supply to the heater 40 for which electric power supply is permitted. Meanwhile, the controller 116 does not execute electric power supply to the heater 40 for which electric power supply is prohibited. Such a configuration makes it possible to selectively execute heating by each of the stick-side heater 40A and heating by the cartridge-side heater 40B.

[0079] When electric power supply to the stick-side heater 40A is permitted, the controller 116 controls continuous electric power supply to the stick-side heater 40A to be started from a timing when a predetermined input is detected. One example of the predetermined input is a user operation, such as pressing down of a button, instructing a start of heating of the stick substrate 150. Meanwhile, when electric power supply to the stick-side heater 40A is prohibited, the controller 116 controls electric power supply to the stick-side heater 40A not to be started even when a predetermined input is detected. The stick substrate 150 can continuously generate a sufficient amount of aerosol by being continuously heated by the stick-side heater 40A to increase the temperature of the stick substrate 150. Therefore, such a configuration makes is possible to control whether to generate the stick-side aerosol in accordance with permission/prohibition of electric power supply to the stick-side heater 40A.

[0080] When electric power supply to the cartridge-side heater 40B is permitted, the controller 116 controls electric power to be supplied to the cartridge-side heater 40B at a timing when inhalation performed by the user is detected. Meanwhile, when electric power supply to the cartridge-side heater 40B is prohibited, the controller 116 controls electric power not to be supplied to the cartridge-side heater 40B even when inhalation performed by the user is detected. The aerosol source introduced to the liquid guide 122 from the liquid storage 123 can generate the cartridge-side aerosol by being instantaneously heated by the cartridge-side heater 40B to thereby sufficiently increase the temperature of the aerosol source. Such a configuration thus makes it possible to control whether to generate the cartridge-side aerosol in accordance with permission/prohibition of electric power supply to the cartridge-side heater 40B.

[0081] As illustrated in FIG. 6, when the first airflow path 180A is open while the second airflow path 180B is closed, the controller 116 permits electric power supply to the stick-side heater 40A and prohibits electric power supply to the cartridge-side heater 40B. In such a configuration, the cartridge-side aerosol is not generated. Thus, the user can inhale only the stick-side aerosol together with the air conveyed along the airflow 190A. That is, the inhaler device 100 can operate as the inhaler device 100 of a stick heating type that generates only the stick-side aerosol.

[0082] As illustrated in FIG. 7, when the second airflow path 180B is open while the first airflow path 180A is closed, the controller 116 permits electric power supply to both the stick-side heater 40A and the cartridge-side heater 40B. In such a configuration, both the cartridge-side aerosol and the stick-side aerosol are generated. Thus, the user can inhale mixture aerosol together with the air conveyed along the airflow 190B. That is, the inhaler device 100 can operate as the inhaler device 100 of a hybrid type that generates mixture aerosol.

[0083] Depending on the position of the slider 184, there is a likelihood of at least part of both the first airflow path 180A and the second airflow path 180B being open.

In such a case, the controller 116 prohibits electric power supply to both the stick-side heater 40A and the cartridge-side heater 40B. Such a configuration can prevent erroneous operation.

[0084] The controller 116 permits electric power supply to the stick-side heater 40A when the stick substrate 150 is received by the chamber 50 and prohibits electric power supply to the stick-side heater 40A when the stick substrate 150 is not received by the chamber 50. Such a configuration can prevent accidental heating. The sensor 112 further includes a sensor for detecting whether the stick substrate 150 is received by the chamber 50.

[0085] As described above, the inhaler device 100 according to the present embodiment can operate in accordance with the open/close state of the airflow path 180 by switching to one of the stick heating type and the hybrid type. Therefore, the user can easily taste the stick-side aerosol or the mixture aerosol. Thus, it is possible to improve the quality of experience using the inhaler device 100.

(3) Switching to Cartridge Type

[0086] The inhaler device 100 may operate as the inhaler device 100 of a cartridge heating type that generates only the cartridge-side aerosol. This point will be described in detail with reference to FIG. 8 to FIG. 10.

[0087] FIG. 8 roughly illustrates one example of the internal configuration of the inhaler device 100 in which the stick substrate 150 is not received in the state illustrated in FIG. 5. As in the example illustrated in FIG. 8, when the second airflow path 180B is open with the stick substrate 150 not received by the chamber 50, the controller 116 prohibits electric power supply to the stick-side heater 40A and permits electric power supply to the cartridge-side heater 40B. The controller 116 controls electric power to be supplied to the cartridge-side heater 40B at a timing when inhalation performed by the user is detected. Consequently, the cartridge-side aerosol is generated. The user can taste only the cartridge-side aerosol by, for example, inhaling while touching the first opening 52 with the mouth of the user. That is, the inhaler device 100 can operate as the cartridge heating type.

[0088] A mouthpiece may be attached to the inhaler device 100 optionally when the inhaler device 100 operates as the cartridge heating type. FIG. 9 roughly illustrates one example of the internal configuration of the inhaler device 100 to which a mouthpiece is attached in the state illustrated in FIG. 5. In the example illustrated in FIG. 9, the first air inlet hole 181A is closed by the slider 184, and the second airflow path 180B is open. In addition, a mouthpiece 168 is attached in the vicinity of the first opening 52.

[0089] When the second airflow path 180B is open while the stick substrate 150 is not received by the chamber 50 with the mouthpiece 168 attached, the controller 116 prohibits electric power supply to the stick-side heater 40A and permits electric power supply to the cartridge-side heater 40B. The controller 116 controls electric power to be supplied to the cartridge-side heater 40B at a timing when inhalation performed by the user is detected. Consequently, the cartridge-side aerosol is generated. The user can taste only the cartridge-side aerosol by inhaling while holding the mouthpiece 168 in the mouth. Such a configuration enables the user to comfortably inhale the aerosol compared with when inhaling while touching the first opening 52 with the mouth.

[0090] When the second airflow path 180B is open while the stick substrate 150 is not received by the chamber 50 with the mouthpiece 168 not attached, the controller 116 may prohibit electric power supply to the stick-side heater 40A and the cartridge-side heater 40B. In such a configuration, the inhaler device 100 can be limited to operate as the cartridge heating type when the mouthpiece 168 is attached.

[0091] FIG. 10 illustrates one example of the configuration of the chamber 50. As illustrated in FIG. 10, the chamber 50 has a holder 60 and a non-holder 62. The holder 60 holds the stick substrate 150 inserted through the first opening 52. In one example, the holder 60 is configured such that the inside diameter of at least a portion thereof is shorter than the outside diameter of the stick substrate 150, and holds the stick substrate 150 by pressing the stick substrate 150 from the outer circumference. The non-holder 62 is disposed closer than the holder 60 to the first opening 52. In one example, the non-holder 62 is configured such that the inside diameter thereof is longer than the outside diameter of the stick substrate 150, and is not in contact with the stick substrate 150 even in a state in which the stick substrate 150 is held by the holder 60. As illustrated in FIG. 10, the mouthpiece 168 inserted through the first opening 52 is attached to the inner side of the non-holder 62. In detail, the mouthpiece 168 is attached such that the outer surface of a lower end portion of the mouthpiece 168 is in close contact with the inner surface of the non-holder 62. The inside diameter of the non-holder 62 is larger than the inside diameter of the holder 60. Due to such a configuration, a step 64 formed by a difference in inside diameter is formed at a boundary part between the holder 60 and the non-holder 62. Consequently, it is possible to position the mouthpiece 168 properly by using the step 64.

[0092] A sensor 170 for detecting whether the mouthpiece 168 is attached is disposed at the non-holder 62. In one example, the sensor 170 may be a proximity sensor that detects an object in proximity. Such a configuration makes it possible to perform switching to the cartridge heating type automatically. The sensor 170 may also serve as a sensor for detecting whether the stick substrate 150 is received by the chamber 50. In one example, the sensor 170 configured as a proximity sensor may detect attachment of the mouthpiece 168 or reception of the stick substrate 150 on the basis of the distance to an object in proximity.

[0093] As illustrated in FIG. 10, the stick-side heater

40A is disposed at the outer surface of the holder 60. For example, the stick-side heater 40A is disposed over the entire surface of the outer circumference of the holder 60 so as to surround the outer circumference of the holder 60. Such a configuration makes it possible to efficiently heat the stick substrate 150 held by the holder 60. In addition, with the stick-side heater 40A being not disposed at the non-holder 62, it is possible to prevent the mouthpiece 168 from deteriorating due to residual heat of the stick-side heater 40A when the mouthpiece 168 is attached to the non-holder 62.

[0094] As described above, the inhaler device 100 according to the present embodiment is capable of operating by switching to one of the cartridge heating type, the stick heating type, and the hybrid type. Therefore, the user can easily taste one of the cartridge-side aerosol, the stick-side aerosol, and the mixture aerosol. It is thus possible to further improve the quality of experience using the inhaler device 100.

(4) Flow of Processes

[0095] FIG. 11 is a flow chart illustrating one example of the flow of processes executed by the inhaler device 100 according to the present embodiment.

[0096] As illustrated in FIG. 11, the inhaler device 100 determines whether the first airflow path 180A is open (step S102).

[0097] When it is determined that the first airflow path 180A is open (S102: YES), the inhaler device 100 determines whether the stick substrate 150 is received (step S104). When it is determined that the stick substrate 150 is received (S104: YES), the inhaler device 100 permits electric power supply to the stick-side heater 40A and prohibits electric power supply to the cartridge-side heater 40B (step S106). When it is determined that the stick substrate 150 is not received (S104: NO), the inhaler device 100 prohibits electric power supply to the stick-side heater 40A and the cartridge-side heater 40B (step S108).

[0098] When it is determined that the first airflow path 180A is not open (S102: NO), the inhaler device 100 determines whether the second airflow path 180B is open (step S110).

[0099] When it is determined that the second airflow path 180B is open (S110: YES), the inhaler device 100 determines whether the stick substrate 150 is received (step S112). When it is determined that the stick substrate 150 is received (S112: YES), the inhaler device 100 permits electric power supply to the stick-side heater 40A and the cartridge-side heater 40B (step S 114).

[0100] When it is determined that the stick substrate 150 is not received (step S112: NO), the inhaler device 100 determines whether the mouthpiece 168 is attached (step S116). When it is determined that the mouthpiece 168 is attached (S116: YES), the inhaler device 100 prohibits electric power supply to the stick-side heater 40A and permits electric power supply to the cartridge-side heater 40B (step S118). When it is determined that the mouthpiece 168 is not attached (S116: NO), the inhaler device 100 prohibits electric power supply to the stick-side heater 40A and the cartridge-side heater 40B (step S120). When it is determined that the second airflow path 180B is not open (S110: NO), the inhaler device 100 similarly prohibits electric power supply to the stick-side heater 40A and the cartridge-side heater 40B (step S120).

«4. Supplementary Note»

[0101] A suitable embodiment of the present invention has been described above in detail with reference to the attached drawings. The present invention is, however, not limited to such an example. It is clear that those having common knowledge in the technical field to which the present invention belongs can conceive of various modifications or corrections within the scope of the technical concept described in the claims. It should be naturally understood that these modifications and corrections also belong to the technical scope of the present invention.

[0102] The inhaler device 100 may be realized as a single device, and some or all of components of the inhaler device 100 may be realized as separate devices. For example, the function as the controller 116 may be included in a control circuit such as a smartphone connected to the inhaler device 100 via a network or the like. Alternatively, a control circuit that functions as the controller 116 may be detachably mounted on the inhaler device 100.

[0103] The series of processes performed by each device described in the present specification may be performed by using any of software, hardware, and a combination of software and hardware. Programs that constitute software are previously stored in, for example, recording media (non-transitory media) provided inside or outside of devices. For example, each program is read into a RAM when to be executed by a computer and is executed by a processor such as a CPU. The recording media are, for example, a magnetic disk, an optical disk, a magneto-optical disk, a flash memory, and the like. The computer program may be distributed, for example, via a network without using recording media.

[0104] The processes described using a flow chart in the present specification may be not necessarily executed in the illustrated order. Some of the processing steps may be executed in parallel. Additional processing steps may be employed, and part of the processing steps may be omitted.

[0105] The following configurations also belong to the technical scope of the present invention.

(1) An inhaler device including:

a chamber that has a first opening and a second opening;
a first generator that generates aerosol by using a first substrate inserted through the first open-

ing and received by the chamber;
a first airflow path through which a first air inlet hole and the second opening are in air-communication with each other;
a second airflow path through which a second air inlet hole and the second opening are in air-communication with each other and in which a second generator that generates aerosol by using a second substrate is disposed at an intermediate position;
an opening/closing part that opens and closes each of the first airflow path and the second airflow path; and
a controller that controls operation of the first generator and the second generator based on an open/close state of each of the first airflow path and the second airflow path.

(2) The inhaler device described in (1) above,
in which the controller controls permission/prohibition of electric power supply to each of the first generator and the second generator based on the open/close state of each of the first airflow path and the second airflow path.
(3) The inhaler device described in (2) above,
in which the controller permits electric power supply to the first generator and prohibits electric power supply to the second generator when the first airflow path is open and the second airflow path is closed.
(4) The inhaler device described in (2) or (3) above,
in which the controller permits electric power supply to both the first generator and the second generator when the second airflow path is open and the first airflow path is closed.
(5) The inhaler device described in (2) or (3) above,
in which the controller prohibits electric power supply to the first generator and permits electric power supply to the second generator when the second airflow path is open and the first substrate is not received by the chamber
(6) The inhaler device described in (2) or (3) above,
in which the controller prohibits electric power supply to the first generator and permits electric power supply to the second generator when the second airflow path is open, the first substrate is not received by the chamber, and a mouthpiece is attached.
(7) The inhaler device described in any one of (2) to (6) above,
in which, when electric power supply to the first generator is permitted, the controller controls continuous electric power supply to the first generator to be started from a timing when a predetermined input is detected.
(8) The inhaler device described in any one of (2) to (7) above,
in which, when electric power supply to the second generator is permitted, the controller controls electric power to be supplied to the second generator at a timing when inhalation performed by a user is detected.
(9) The inhaler device described in (6) above,

in which the chamber has a holder that holds the first substrate inserted through the first opening, and a non-holder that is disposed closer than the holder to the first opening,
in which the inside diameter of the non-holder is larger than the inside diameter of the holder, and
in which the mouthpiece is attached to the inner side of the non-holder

(10) The inhaler device described in (9) above,
in which a sensor for detecting whether the mouthpiece is attached is disposed at the non-holder.
(11) The inhaler device described in (9) or (10) above,
in which the first generator is disposed at the outer surface of the holder.
(12) The inhaler device described in any one of (1) to (11) above,

in which the opening/closing part is a slider disposed to be slidable on a surface provided with the first air inlet hole and the second air inlet hole, and
in which the first air inlet hole and the second air inlet hole are opened and closed depending on the position of the slider.

(13) The inhaler device described in (12) above,

in which the inhaler device further includes a hall sensor that detects the position of the slider, and
in which the controller determines the open/close state of each of the first airflow path and the second airflow path based on the position of the slider detected by the hall sensor

(14) The inhaler device described in any one of (1) to (13) above,
in which the second airflow path is shorter than the first airflow path.
(15) The inhaler device described in any one of (1) to (14) above,
in which the inhaler device further includes a liquid reservoir in air-communication with the first airflow path and the second airflow path.
(16) The inhaler device described in (15) above,
in which the inhaler device further includes a draining mechanism that drains liquid accumulated in the liquid reservoir to the outside of the inhaler device.
(17) The inhaler device described in (15) or (16) above,
in which the liquid reservoir is provided at a position facing the first opening with the second opening in-

terposed therebetween in an insertion direction of the first substrate.

(18) The inhaler device described in any one of (1) to (17) above,

in which a portion of the first airflow path near the second opening and a portion of the second airflow path near the second opening overlap each other, and
in which the second generator is disposed, in the second airflow path, at a position not overlapping the first airflow path.

(19) A control circuit that controls an inhaler device,

in which the inhaler device includes

a chamber that has a first opening and a second opening,
a first generator that generates aerosol by using a first substrate inserted through the first opening and received by the chamber,
a first airflow path through which a first air inlet hole and the second opening are in air-communication with each other,
a second airflow path through which a second air inlet hole and the second opening are in air-communication with each other and in which a second generator that generates aerosol by using a second substrate is disposed at an intermediate position, and
an opening/closing part that opens and closes each of the first airflow path and the second airflow path, and

in which the control circuit comprises a controller that controls operation of the first generator and the second generator based on an open/close state of each of the first airflow path and the second airflow path.

(20) A control method of controlling an inhaler device,

in which the inhaler device includes

a chamber that has a first opening and a second opening,

a first generator that generates aerosol by using a first substrate inserted through the first opening and received by the chamber,

a first airflow path through which a first air inlet hole and the second opening are in air-communication with each other,

a second airflow path through which a second air inlet hole and the second opening are in air-communication with each other and in which a second generator that generates aerosol by using a second substrate is disposed at an intermediate position, and

an opening/closing part that opens and closes each of the first airflow path and the second airflow path, and

in which the control method includes controlling operation of the first generator and the second generator based on an open/close state of each of the first airflow path and the second airflow path.

Reference Signs List

[0106]

100	inhaler device
102	top surface
111	power supply
112	sensor
113	notifier
114	memory
115	communicator
116	controller
120	cartridge
122	liquid guide
123	liquid storage
150	stick substrate
151	substrate
152	inhalation port
160	draining mechanism
162	drain hole
164	opening/closing valve
166	drain path
168	mouthpiece
170	sensor
180	airflow path
180A	first airflow path
180B	second airflow path
181	air inlet hole
181A	first air inlet hole
181B	second air inlet hole
184	slider
186	liquid reservoir
190, 190A, 190B	airflow
40	heater
40A	stick-side heater
40B	cartridge-side heater
50	chamber
52	first opening
54	bottom
56	second opening
60	holder
62	non-holder

64 step
70 heat insulator
80 internal space

Claims

1. An inhaler device comprising:

   a chamber that has a first opening and a second opening;
   a first generator that generates aerosol by using a first substrate inserted through the first opening and received by the chamber;
   a first airflow path through which a first air inlet hole and the second opening are in air-communication with each other;
   a second airflow path through which a second air inlet hole and the second opening are in air-communication with each other and in which a second generator that generates aerosol by using a second substrate is disposed at an intermediate position;
   an opening/closing part that opens and closes each of the first airflow path and the second airflow path; and
   a controller that controls operation of the first generator and the second generator based on an open/close state of each of the first airflow path and the second airflow path.

2. The inhaler device according to claim 1,
   wherein the controller controls permission/prohibition of electric power supply to each of the first generator and the second generator based on the open/close state of each of the first airflow path and the second airflow path.

3. The inhaler device according to claim 2,
   wherein the controller permits electric power supply to the first generator and prohibits electric power supply to the second generator when the first airflow path is open and the second airflow path is closed.

4. The inhaler device according to claim 2 or claim 3,
   wherein the controller permits electric power supply to both the first generator and the second generator when the second airflow path is open and the first airflow path is closed.

5. The inhaler device according to claim 2 or claim 3,
   wherein the controller prohibits electric power supply to the first generator and permits electric power supply to the second generator when the second airflow path is open and the first substrate is not received by the chamber.

6. The inhaler device according to claim 2 or claim 3,
   wherein the controller prohibits electric power supply to the first generator and permits electric power supply to the second generator when the second airflow path is open, the first substrate is not received by the chamber, and a mouthpiece is attached.

7. The inhaler device according to any one of claims 2 to 6,
   wherein, when electric power supply to the first generator is permitted, the controller controls continuous electric power supply to the first generator to be started from a timing when a predetermined input is detected.

8. The inhaler device according to any one of claims 2 to 7,
   wherein, when electric power supply to the second generator is permitted, the controller controls electric power to be supplied to the second generator at a timing when inhalation performed by a user is detected.

9. The inhaler device according to claim 6,

   wherein the chamber has a holder that holds the first substrate inserted through the first opening, and a non-holder that is disposed closer than the holder to the first opening,
   wherein an inside diameter of the non-holder is larger than an inside diameter of the holder, and
   wherein the mouthpiece is attached to an inner side of the non-holder.

10. The inhaler device according to claim 9,
    wherein a sensor for detecting whether the mouthpiece is attached is disposed at the non-holder.

11. The inhaler device according to claim 9 or claim 10,
    wherein the first generator is disposed at an outer surface of the holder.

12. The inhaler device according to any one of claims 1 to 11,

    wherein the opening/closing part is a slider disposed to be slidable on a surface provided with the first air inlet hole and the second air inlet hole, and
    wherein the first air inlet hole and the second air inlet hole are opened and closed depending on a position of the slider.

13. The inhaler device according to claim 12,

    wherein the inhaler device further comprises a hall sensor that detects the position of the slider, and
    wherein the controller determines the

open/close state of each of the first airflow path and the second airflow path based on the position of the slider detected by the hall sensor.

14. The inhaler device according to any one of claims 1 to 13,
wherein the second airflow path is shorter than the first airflow path.

15. The inhaler device according to any one of claims 1 to 14,
wherein the inhaler device further comprises a liquid reservoir in air-communication with the first airflow path and the second airflow path.

16. The inhaler device according to claim 15,
wherein the inhaler device further comprises a draining mechanism that drains liquid accumulated in the liquid reservoir to an outside of the inhaler device.

17. The inhaler device according to claim 15 or claim 16,
wherein the liquid reservoir is provided at a position facing the first opening with the second opening interposed therebetween in an insertion direction of the first substrate.

18. The inhaler device according to any one of claims 1 to 17,

wherein a portion of the first airflow path near the second opening and a portion of the second airflow path near the second opening overlap each other, and
wherein the second generator is disposed, in the second airflow path, at a position not overlapping the first airflow path.

19. A control circuit that controls an inhaler device,

wherein the inhaler device includes

a chamber that has a first opening and a second opening,
a first generator that generates aerosol by using a first substrate inserted through the first opening and received by the chamber,
a first airflow path through which a first air inlet hole and the second opening are in air-communication with each other,
a second airflow path through which a second air inlet hole and the second opening are in air-communication with each other and in which a second generator that generates aerosol by using a second substrate is disposed at an intermediate position, and
an opening/closing part that opens and closes each of the first airflow path and the second airflow path, and

wherein the control circuit comprises a controller that controls operation of the first generator and the second generator based on an open/close state of each of the first airflow path and the second airflow path.

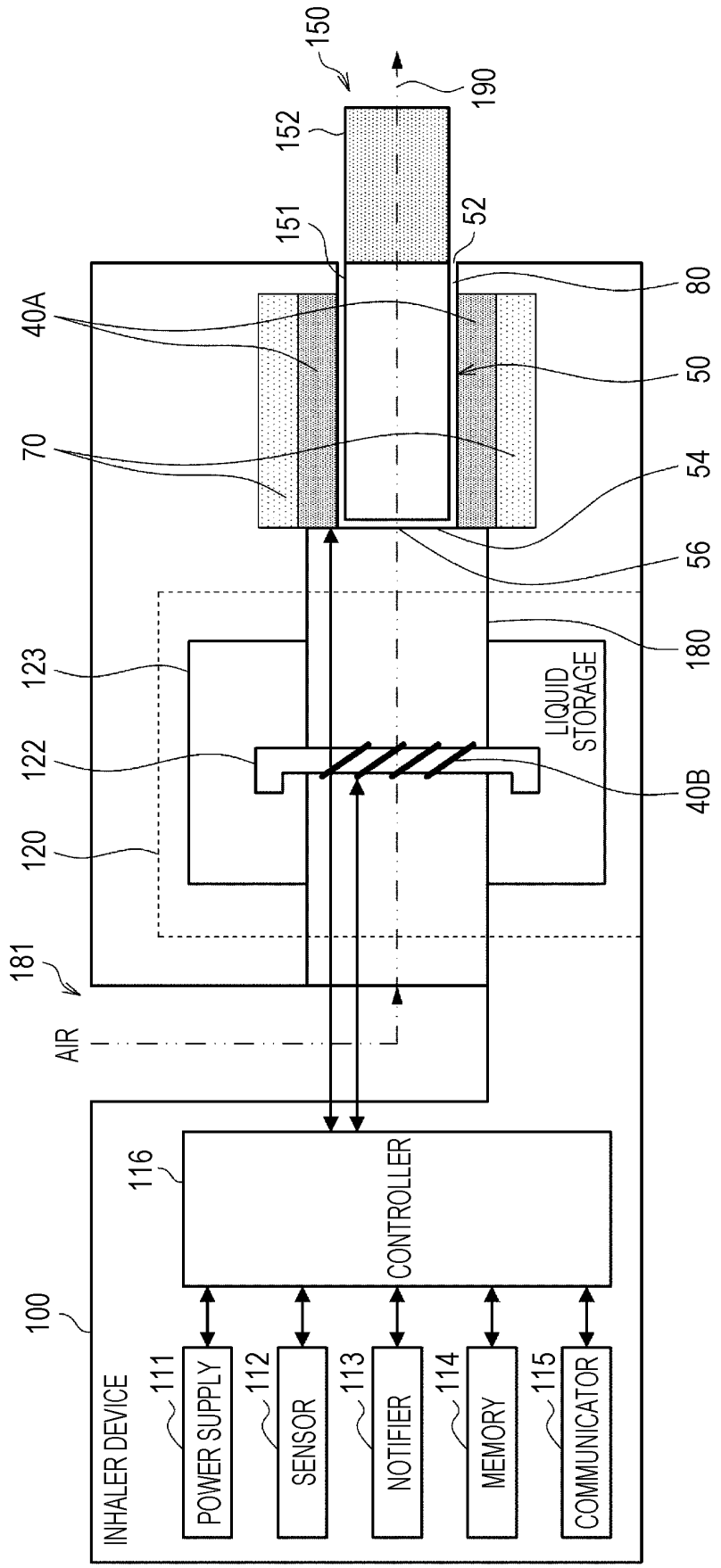
20. A control method of controlling an inhaler device,

wherein the inhaler device includes

a chamber that has a first opening and a second opening,
a first generator that generates aerosol by using a first substrate inserted through the first opening and received by the chamber,
a first airflow path through which a first air inlet hole and the second opening are in air-communication with each other,
a second airflow path through which a second air inlet hole and the second opening are in air-communication with each other and in which a second generator that generates aerosol by using a second substrate is disposed at an intermediate position, and
an opening/closing part that opens and closes each of the first airflow path and the second airflow path, and

wherein the control method comprises controlling operation of the first generator and the second generator based on an open/close state of each of the first airflow path and the second airflow path.

FIG. 1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122
40B
120
181
AIR
116
CONTROLLER
100
INHALER DEVICE
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POWER SUPPLY
112
SENSOR
113
NOTIFIER
114
MEMORY
115
COMMUNICATOR

FIG. 2

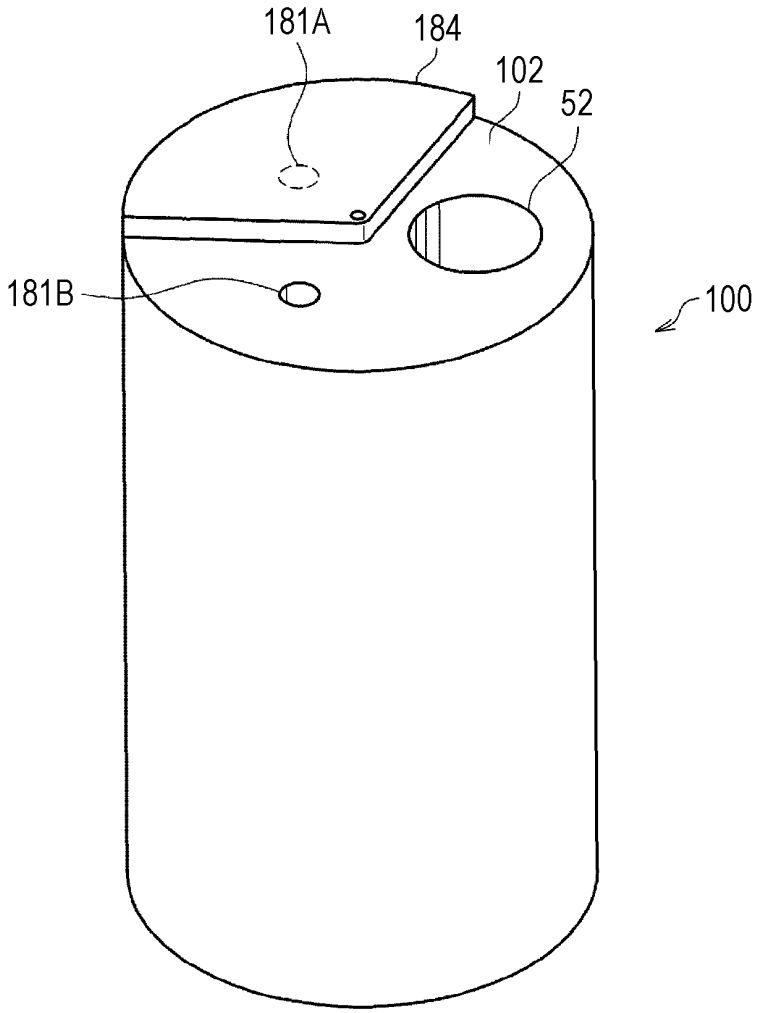


FIG. 3

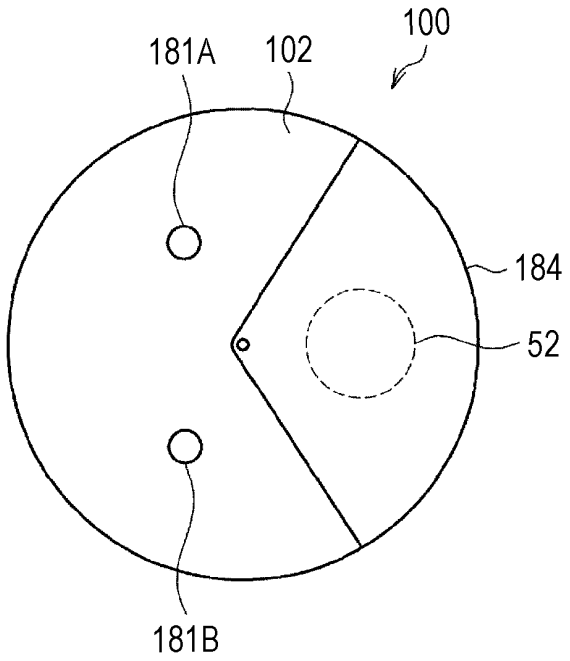


FIG. 4

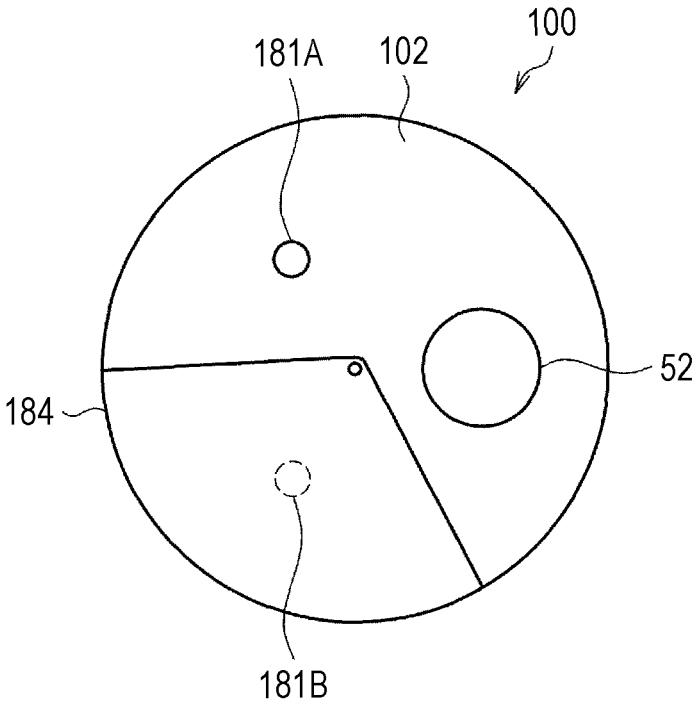


FIG. 5

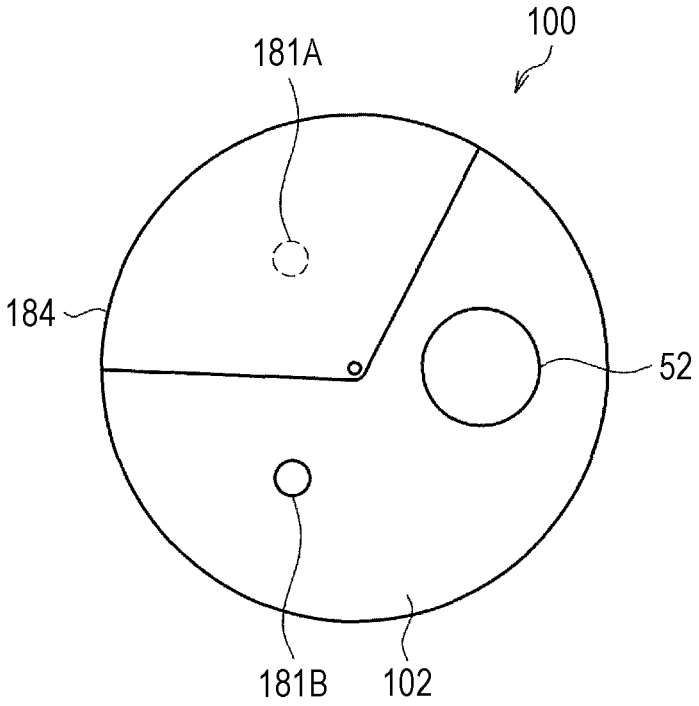
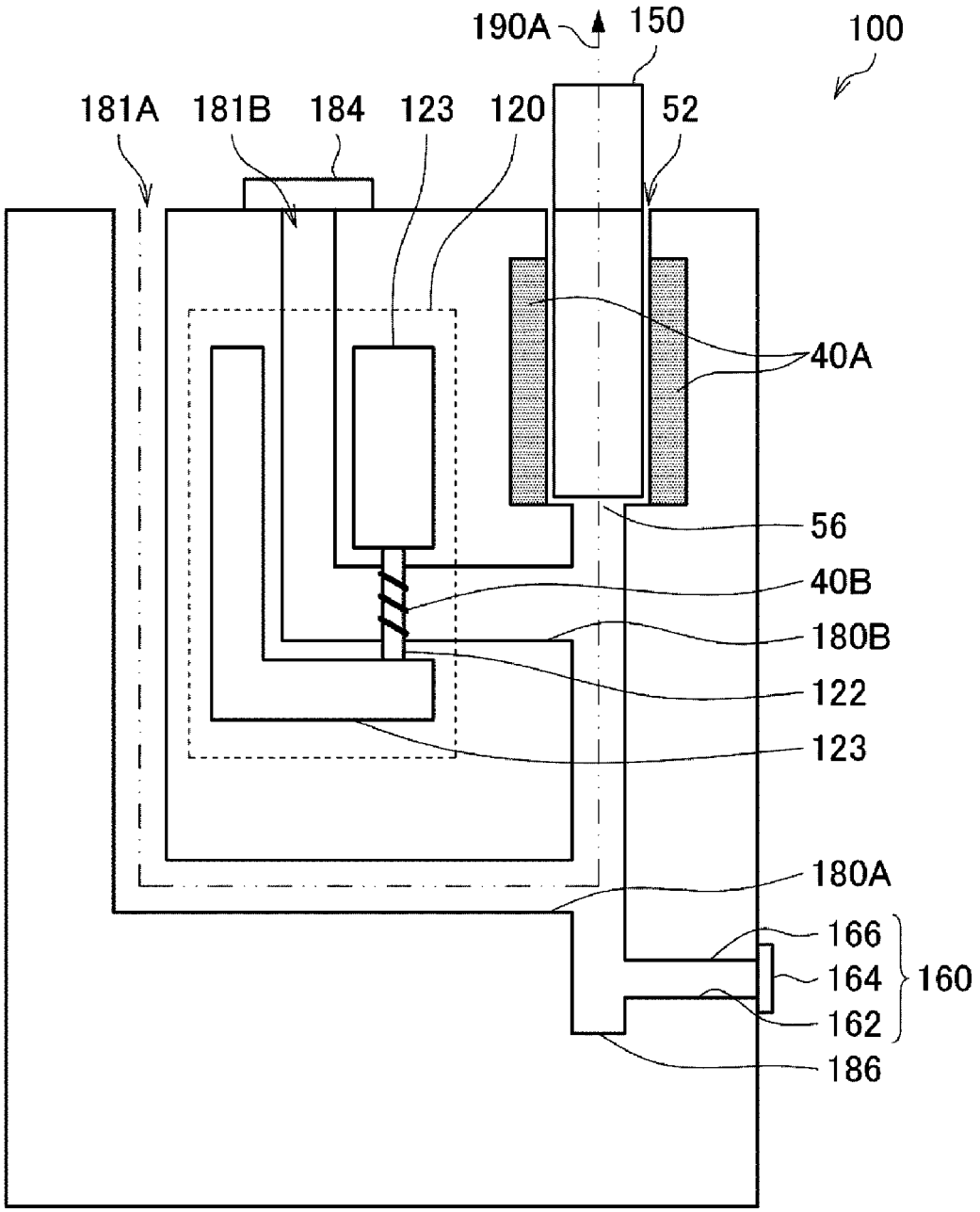


FIG. 6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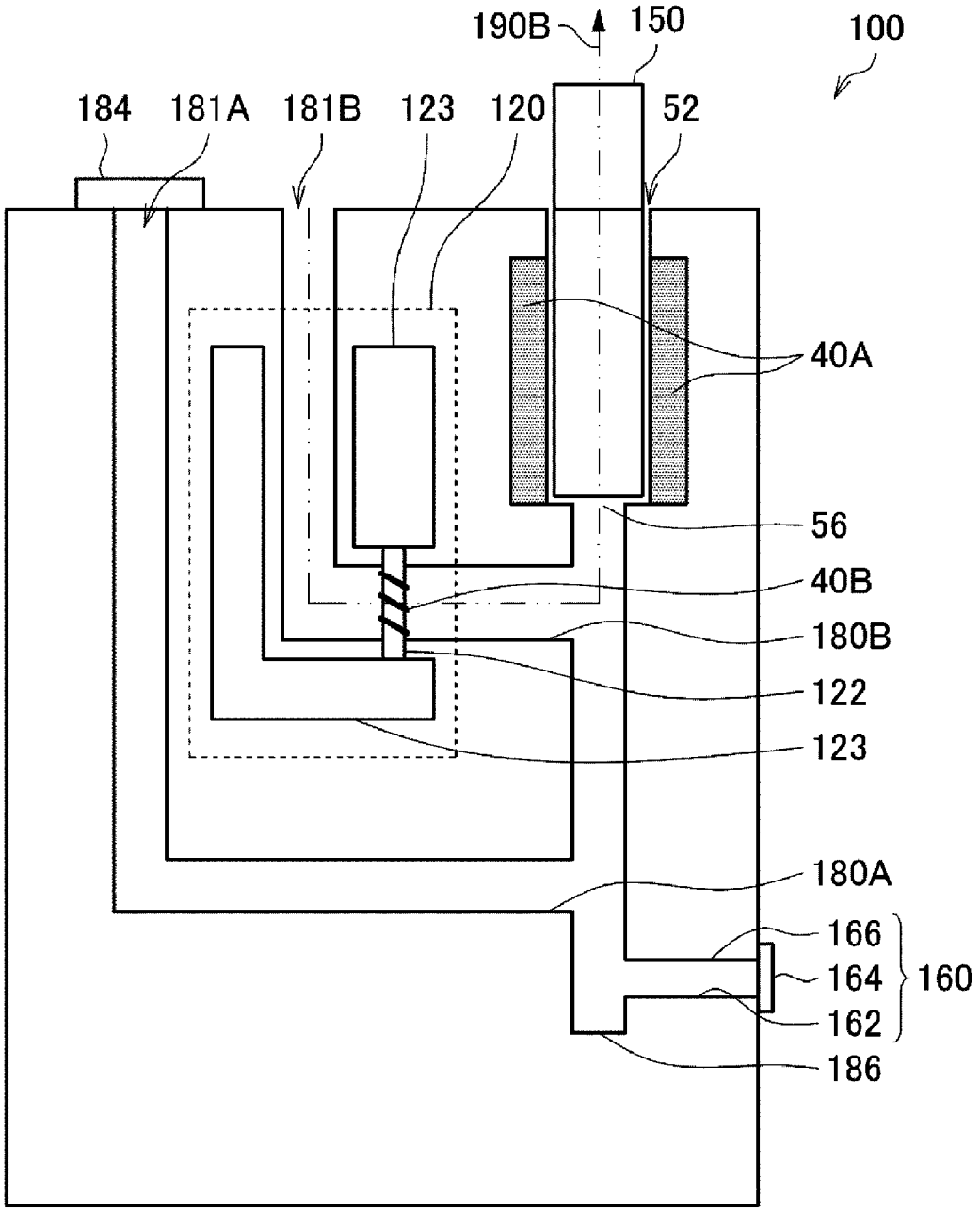
162
186

FIG. 7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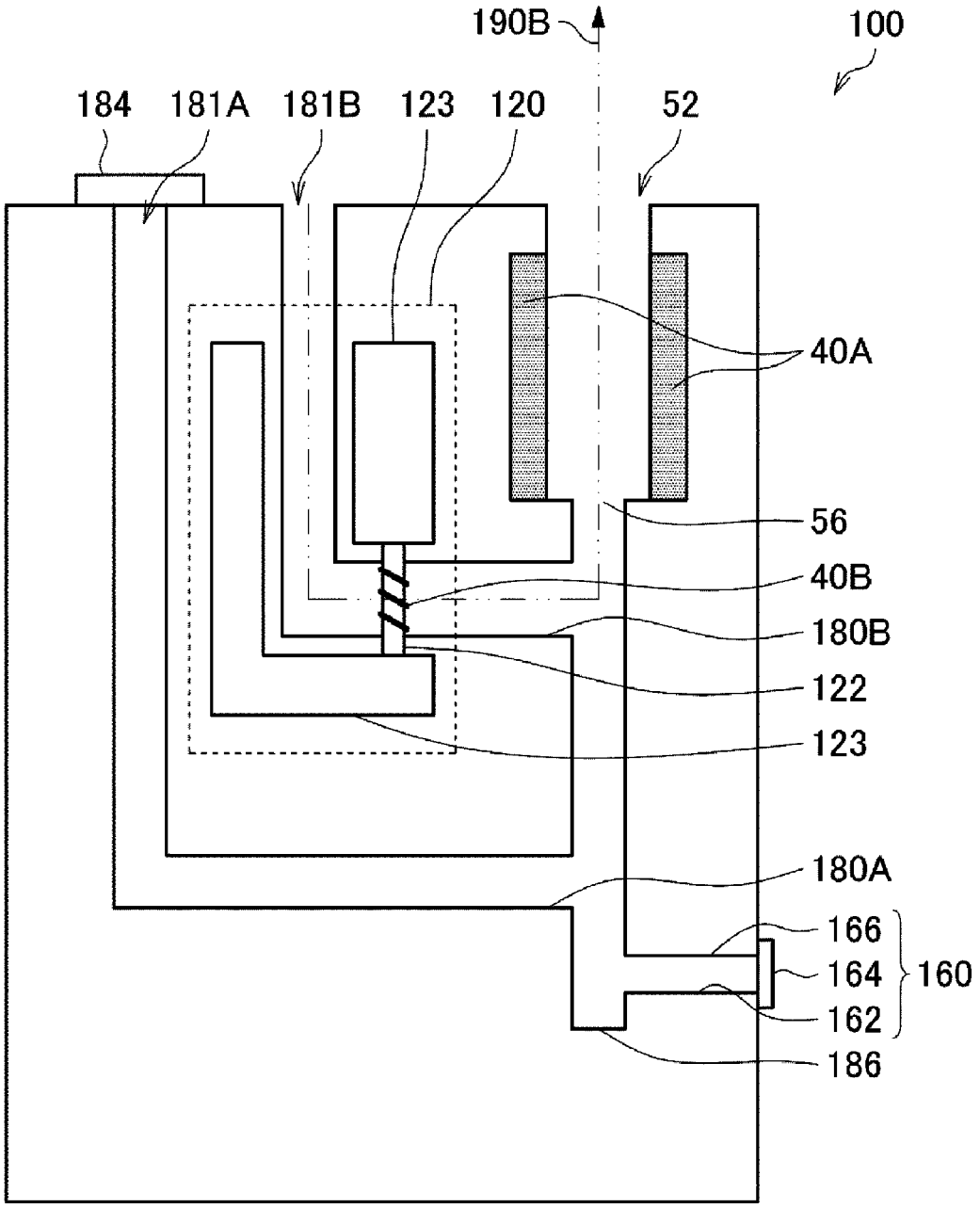
186

FIG. 8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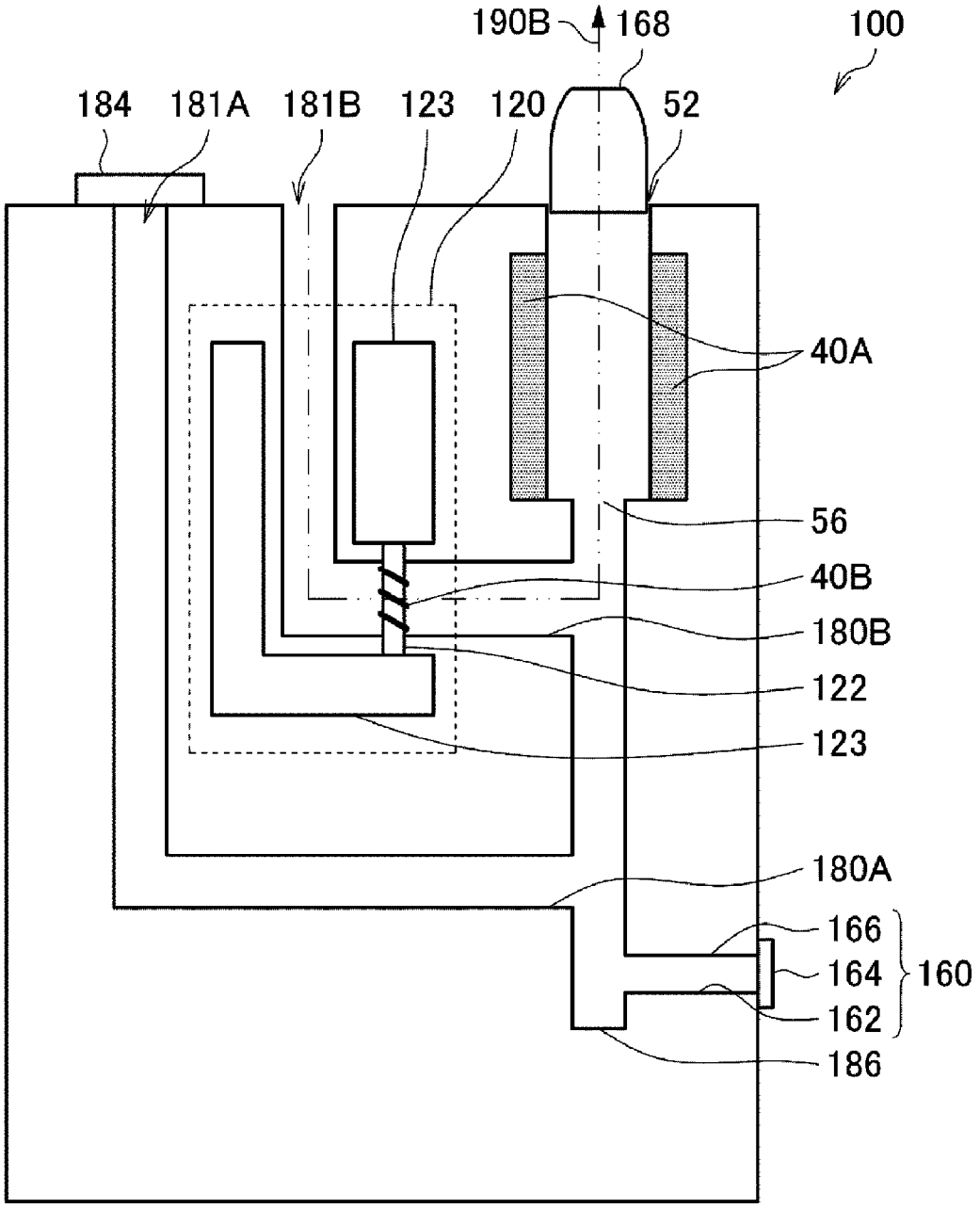
186

FIG. 9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160
162
186

FIG. 10

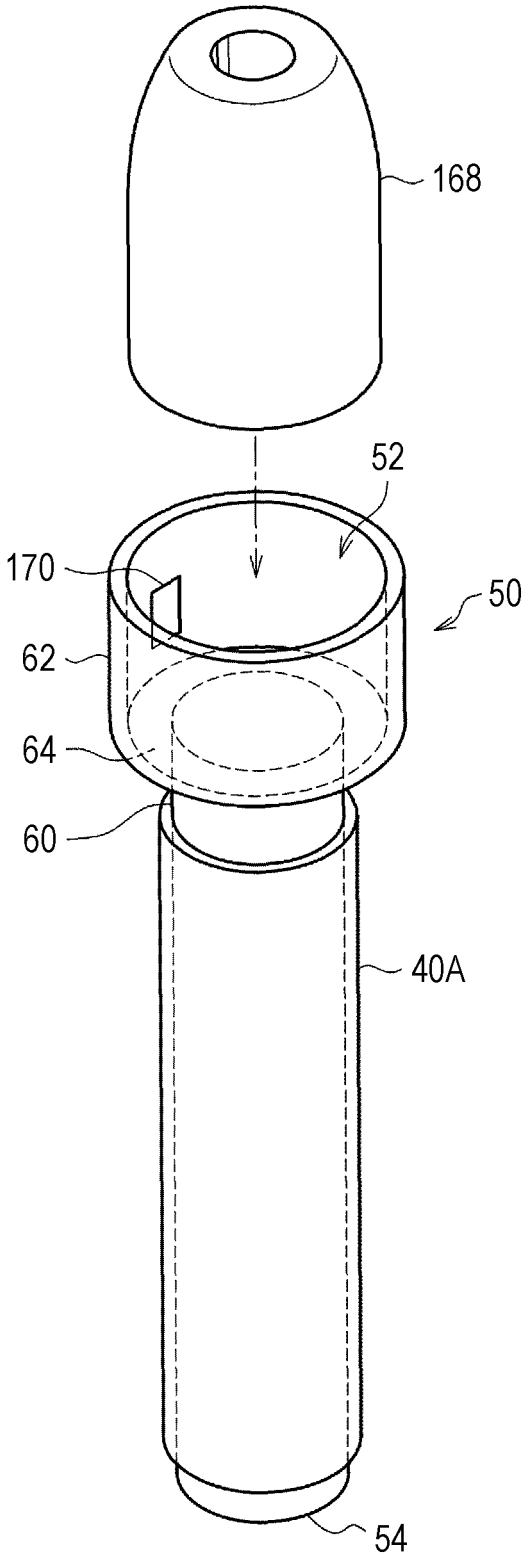
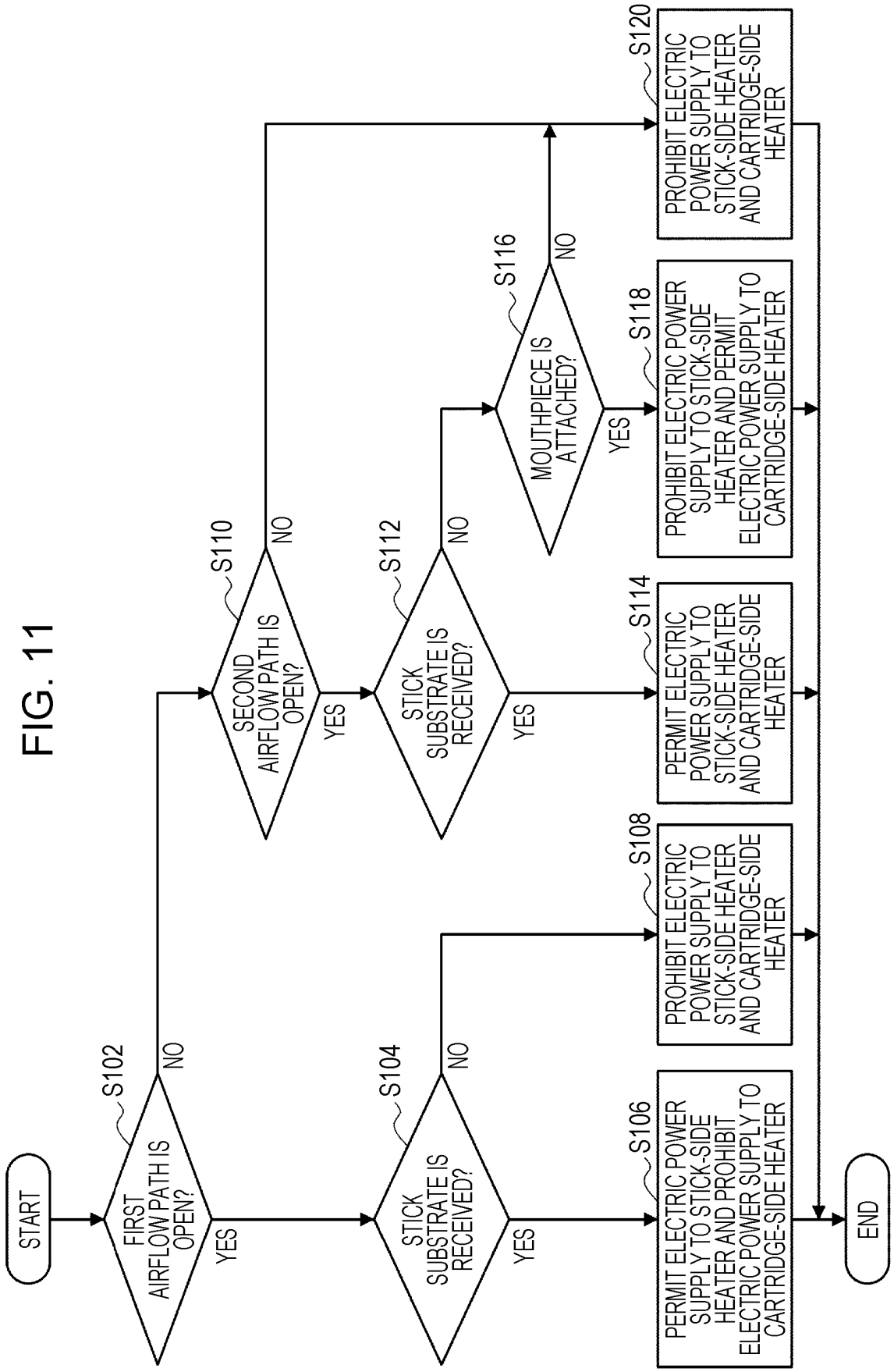


FIG. 11


START
S102
FIRST AIRFLOW PATH IS OPEN?
YES
NO
S104
STICK SUBSTRATE IS RECEIVED?
YES
NO
S106
PERMIT ELECTRIC POWER SUPPLY TO STICK-SIDE HEATER AND PROHIBIT ELECTRIC POWER SUPPLY TO CARTRIDGE-SIDE HEATER
S108
PROHIBIT ELECTRIC POWER SUPPLY TO STICK-SIDE HEATER AND CARTRIDGE-SIDE HEATER
S110
SECOND AIRFLOW PATH IS OPEN?
YES
NO
S112
STICK SUBSTRATE IS RECEIVED?
YES
NO
S114
PERMIT ELECTRIC POWER SUPPLY TO STICK-SIDE HEATER AND CARTRIDGE-SIDE HEATER
S116
MOUTHPIECE IS ATTACHED?
YES
NO
S118
PROHIBIT ELECTRIC POWER SUPPLY TO STICK-SIDE HEATER AND PERMIT ELECTRIC POWER SUPPLY TO CARTRIDGE-SIDE HEATER
S120
PROHIBIT ELECTRIC POWER SUPPLY TO STICK-SIDE HEATER AND CARTRIDGE-SIDE HEATER
END

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2020/035795

A. CLASSIFICATION OF SUBJECT MATTER
Int. Cl. A24F40/40(2020.01)i
FI: A24F40/40

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
Int. Cl. A24F40/40

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

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

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2018/020599 A1 (JAPAN TOBACCO INC.) 01 February 2018 (2018-02-01), entire text, all drawings	1-20
A	US 2018/0184716 A1 (SHENZHEN FIRST UNION TECHNOLOGY CO., LTD.) 05 July 2018 (2018-07-05), entire text, all drawings	1-20
A	JP 2012-135299 A (SHIMIZU, Kazuhiko) 19 July 2012 (2012-07-19), entire text, all drawings	1-20
A	JP 2016-535982 A (JT INTERNATIONAL S.A.) 24 November 2016 (2016-11-24), entire text, all drawings	1-20

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

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"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	Date of mailing of the international search report
10.11.2020	24.11.2020
Name and mailing address of the ISA/ Japan Patent Office 3-4-3, Kasumigaseki, Chiyoda-ku, Tokyo 100-8915, Japan	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2020/035795

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 2989912 A1 (FONTEM HOLDINGS 2 B.V.) 02 March 2016 (2016-03-02), entire text, all drawings	1-20
A	JP 3217944 U (KOPEK JAPAN CORP.) 13 September 2018 (2018-09-13), entire text, all drawings	1-20

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/JP2020/035795

Patent Documents referred to in the Report	Publication Date	Patent Family	Publication Date
WO 2018/020599 A1	01.02.2018	US 2019/0142073 A1 entire text, all drawings EP 3491945 A1 CN 109475182 A KR 10-2019-0032504 A	
US 2018/0184716 A1	05.07.2018	EP 3305107 A2 CN 206403206 U	
JP 2012-135299 A	19.07.2012	US 2013/0333709 A1 entire text, all drawings WO 2012/117578 A1 EP 2682011 A1 CN 103338662 A	
JP 2016-535982 A	24.11.2016	US 2016/0235121 A1 entire text, all drawings WO 2015/052192 A1 EP 3054795 A1 KR 10-2016-0085762 A CN 106231929 A	
EP 2989912 A1	02.03.2016	GB 2529727 A PL 2989912 T3	
JP 3217944 U	13.09.2018	(Family: none)	

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

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2019122403 A **[0004]**