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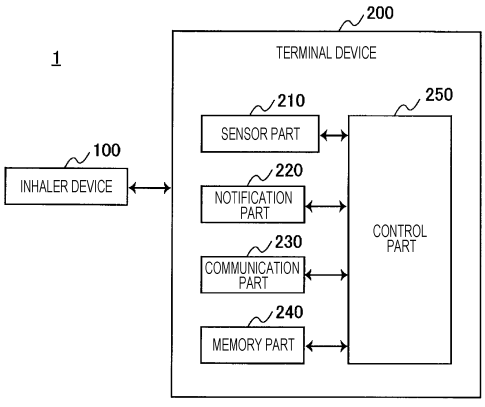
(54) SUCTION DEVICE, INFORMATION PROCESSING METHOD, AND PROGRAM

(57) [Problem] To provide a mechanism with which it is possible to improve usability of a suction device.

[Solution] A suction device comprising: a wireless communication unit that transmits and receives information wirelessly; a reporting unit that reports the information to a user; and a control unit that controls the wireless communication unit so as to transmit reporting information, which is information reported to the user, to another device when the suction device and the other device are connected wirelessly, and controls the reporting unit so as to report to the user when the suction device and the other device are not connected wirelessly.

FIG. 11



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Description

Technical Field

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

Background Art

[0002] An inhaler device for generating material to be inhaled by a user, such as an electronic cigarette or a nebulizer, is now widely spread. For example, by using a substrate including an aerosol source for generating an aerosol, a flavor source for adding a flavor component to a generated aerosol, or the like, the inhaler device generates an aerosol to which the flavor component is added. The user can taste the flavor by inhaling (hereinafter also referred to as "puffing") the aerosol to which the flavor component is added, which is generated by the inhaler device.

[0003] Aerosol generation may make the substrate brittle, and part of the substrate may remain and be deposited inside the inhaler device. The inhaler device is therefore desirably cleaned as appropriate. However, in order to determine the necessity of cleaning by him/herself, the user may be bothered, for example, to open the cover of the inhaler device and to check the amount of deposit remaining therein. Thus, as an example of a technique to reduce the bother, Patent Literature 1 below discloses a technique by which an inhaler device displays information for recommending cleaning in accordance with the number of times the inhaler device is used and makes the inhaler device unavailable unless cleaned.

Citation List

Patent Literature

[0004] Patent Literature 1: International Publication No. 1998/023171

Summary of Invention

Technical Problem

[0005] The inhaler device has various restrictions for improving portability or the like. One of the restricted functions is an expressive power of information. For example, only a simple output device, such as a light-emitting device, may be mounted on the inhaler device as a device for notifying information to the user. Considering that information to be notified to the user may be various including information regarding cleaning, restrictions on the expressive power of information may be a bottleneck in improving usability.

[0006] The present invention has been made in view of the above issue, and an object of the present invention is to provide a mechanism with which it is possible to improve usability of the inhaler device.

Solution to Problem

[0007] In order to solve the above problem, an aspect of the present invention provides an inhaler device including: a wireless communication part that transmits/receives information wirelessly; a notification part that notifies information to a user; and a control part that controls the wireless communication part to transmit, to another device, notification information that is the information to be notified to the user in a case where the inhaler device and the other device are wirelessly connected to each other, and that controls the notification part to notify the notification information to the user in a case where the inhaler device and the other device are not wirelessly connected to each other.

[0008] The control part may acquire information regarding the inhaler device and may determine, on the basis of the acquired information regarding the inhaler device, whether the notification information is to be notified to the user.

[0009] The control part may not notify the notification information by using the notification part in a case where the inhaler device and the other device are wirelessly connected to each other.

[0010] A timing at which the control part determines whether the notification information is to be notified to the user may be after a timing at which the control part determines whether the inhaler device and the other device are wirelessly connected to each other.

[0011] A timing at which the control part determines whether the notification information is to be notified to the user may be before a timing at which the control part determines whether the inhaler device and the other device are wirelessly connected to each other.

[0012] The notification information may include information indicating necessity of cleaning the inhaler device.

[0013] The information regarding the inhaler device may include a number of times of preheating executed by the inhaler device to enable the user to inhale by using the inhaler device, and the control part may determine that first information is to be notified to the user as the information indicating necessity of cleaning the inhaler device in a case where the number of times of preheating reaches a first threshold.

[0014] The number of times of preheating may be initialized in a case where a predetermined user operation is performed.

[0015] The control part may count the number of times of preheating in a case where it is determined that the preheating is executed for a substrate that contributes, when being heated, to generation of material to be inhaled by the user.

[0016] The inhaler device may further include a memory part. The memory part may store the number of times of preheating.

[0017] The control part may determine that second information is to be notified to the user as the information indicating necessity of cleaning the inhaler device in a case where the number of times of preheating reaches a second threshold that is lower than the first threshold.

[0018] The information regarding the inhaler device may include a time taken for a temperature of a heating target or a temperature of a heater part that executes preheating to reach a predetermined temperature when the inhaler device executes the preheating to enable a user to inhale by using the inhaler device, and the control part may determine that first information is to be notified to the user as the information indicating necessity of cleaning the inhaler device in a case where the time taken for the temperature of the heating target or the temperature of the heater part to reach the predetermined temperature reaches a third threshold.

[0019] The control part may set the third threshold on the basis of an environment temperature that is an ambient temperature of the inhaler device.

[0020] The control part may determine that second information is to be notified to the user as the information indicating necessity of cleaning the inhaler device in a case where the time taken for the temperature of the heating target or the temperature of the heater part to reach the predetermined temperature reaches a fourth threshold that is lower than the third threshold.

[0021] The information regarding the inhaler device may include an electric power used for a temperature of a heating target or a temperature of a heater part that executes preheating to reach a predetermined temperature when the inhaler device executes the preheating to enable a user to inhale by using the inhaler device, and the control part may determine that first information is to be notified to the user as the information indicating necessity of cleaning the inhaler device in a case where the electric power used for the temperature of the heating target or the temperature of the heater part to reach the predetermined temperature reaches a fifth threshold.

[0022] The control part may set the fifth threshold on the basis of an environment temperature that is an ambient temperature of the inhaler device.

[0023] The control part may determine that second information is to be notified to the user as the information indicating necessity of cleaning the inhaler device in a case where the electric power used for the temperature of the heating target or the temperature of the heater part to reach the predetermined temperature reaches a sixth threshold that is lower than the fifth threshold.

[0024] The notification information may include information indicating a method for cleaning the inhaler device.

[0025] The information indicating necessity of cleaning the inhaler device may include information regarding a timing for cleaning the inhaler device.

[0026] The notification information may include information indicating necessity of replacing a substrate that contributes, by a content of the substrate being consumed, to generation of material to be inhaled by the user, the substrate being used by the inhaler device to generate the material to be inhaled by the user.

[0027] The information regarding the inhaler device may include a number of times of inhalation performed by the user by using the inhaler device, and the control part may determine that third information is to be notified to the user as the information indicating necessity of replacing the substrate in a case where the number of times of inhalation reaches a seventh threshold.

[0028] The number of times of inhalation may be initialized in a case where the substrate is replaced.

[0029] The inhaler device may further include a memory part. The memory part may store the number of times of inhalation.

[0030] The control part may determine that fourth information is to be notified to the user as the information indicating necessity of replacing the substrate in a case where the number of times of inhalation reaches an eighth threshold that is lower than the seventh threshold.

[0031] The information regarding the inhaler device may include a change rate of a resistance value of a heater part that heats the substrate, and the control part may determine whether the information indicating necessity of replacing the substrate is to be notified on the basis of the change rate of the resistance value of the heater part.

[0032] The information indicating necessity of replacing the substrate may include information regarding a timing for replacing the substrate.

[0033] The notification information may include information indicating that the inhaler device is in an abnormal state.

[0034] The notification part may include at least any of a display device, a light-emitting device, a vibration device, or a sound output device.

[0035] In order to solve the above problem, another aspect of the present invention provides an information processing method to be executed by an inhaler device, the information processing method including: wirelessly transmitting, to another device, notification information that is the information to be notified to a user in a case where the inhaler device and the other device are wirelessly connected to each other; and notifying the notification information to the user in a case where the inhaler device and the other device are not wirelessly connected to each other.

[0036] In order to solve the above problem, another aspect of the present invention provides a program for causing a computer that controls an inhaler device to function as: a wireless communication part that transmits/receives information wirelessly; a notification part that notifies information to a user; and a control part that controls the wireless communication part to transmit, to another device, notification information that is the information to be notified to the user in a case where the inhaler device and the other device are wirelessly connected to each other, and that controls the notification

part to notify the notification information to the user in a case where the inhaler device and the other device are not wirelessly connected to each other.

Advantageous Effects of Invention

[0037] As described above, according to the present invention, a mechanism with which it is possible to improve usability of the inhaler device is provided.

Brief Description of Drawings

[0038]

[FIG. 1] FIG. 1 is a schematic diagram schematically illustrating a first configuration example of an inhaler device.
[FIG. 2] FIG. 2 is a schematic diagram schematically illustrating a second configuration example of the inhaler device.
[FIG. 3] FIG. 3 is a schematic diagram schematically illustrating a third configuration example of the inhaler device.
[FIG. 4] FIG. 4 is a schematic diagram schematically illustrating a fourth configuration example of the inhaler device.
[FIG. 5] FIG. 5 is a schematic diagram schematically illustrating a fifth configuration example of the inhaler device.
[FIG. 6] FIG. 6 is a schematic diagram schematically illustrating a sixth configuration example of the inhaler device.
[FIG. 7] FIG. 7 is a schematic diagram schematically illustrating a seventh configuration example of an inhaler device.
[FIG. 8] FIG. 8 is a schematic diagram schematically illustrating an eighth configuration example of the inhaler device.
[FIG. 9] FIG. 9 is a schematic diagram schematically illustrating a ninth configuration example of the inhaler device.
[FIG. 10] FIG. 10 is a schematic diagram schematically illustrating a tenth configuration example of the inhaler device.
[FIG. 11] FIG. 11 is a block diagram illustrating a configuration example of a system according to an embodiment of the present invention.
[FIG. 12] FIG. 12 is a sequence chart illustrating an example of a process flow of notifying information executed by the system according to the present embodiment.

Description of Embodiments

[0039] Hereinafter, a preferred embodiment of the present invention will be described in detail with reference to the accompanying drawings. Note that structural elements having substantially the same functional configuration will be denoted by the same reference signs in the specification and the drawings, thereby omitting redundant descriptions.

<<1. Configuration example of inhaler device>>

[0040] An inhaler device is a device for generating material to be inhaled by a user. Hereinafter, descriptions will be given in a scenario where the material generated by the inhaler device is an aerosol. Alternatively, the material generated by the inhaler device may be gas. Hereinafter, the user's inhalation of the material generated by the inhaler device will be simply referred to as "inhalation" or "puff".

[0041] Among a plurality of configuration examples to be described below, sometimes a plurality of elements having functional configurations corresponding to each other will be denoted with reference signs including a same numeral to specify their correspondence relation, and the respective elements will be distinguished from each other by different alphabetical letters attached after the numeral, the alphabetical letters corresponding to respective configuration examples. For example, respective inhaler devices according to the plurality of configuration examples are referred to as an inhaler device 100A according to a first configuration example, an inhaler device 100B according to a second configuration example, and an inhaler device 100D according to a third configuration example, and thereby the inhaler devices are distinguished from each other while their correspondence relation is specified. On the other hand, in a case where there is no need in particular to distinguish the plurality of elements having functional configurations corresponding to each other among the plurality of configuration examples, sometimes a reference sign including a same numeral alone may be attached. For example, in a case where there is no need in particular to distinguish among the inhaler device 100A according to the first configuration example, the inhaler device 100B according to the second configuration example, and the inhaler device 100D according to the third configuration example, they are also simply referred to as an inhaler device 100.

[0042] In addition, with regard to the plurality of elements having functional configurations corresponding to each other among the plurality of configuration examples, sometimes one of the elements according to a certain configuration example will be described first in detail, and then descriptions of the other elements according to the other configuration examples will be omitted with reference to the previous description. In this case, the omitted descriptions can be understood by appropriately replacing an alphabetical letter included in reference signs attached to the respective elements previously described with regard to a configuration example, with an alphabetical letter corresponding to a configuration example to be subsequently described. For example, in a case where the inhaler device 100A according to the first configuration example is described in detail but descriptions of the

inhaler device 100B according to the second configuration example are omitted, the omitted descriptions can be understood by replacing 100A with 100B with regard to the detailed descriptions of the first configuration example.

[0043] Hereinafter, respective configuration examples of the inhaler device will be described with reference to FIG. 1 to FIG. 10.

<1.1. Substrate-integrated inhaler device>

[0044] A substrate-integrated inhaler device is an inhaler device integrated with a substrate including an aerosol source. First to third configuration examples, which will be described below, are configuration examples of the substrate-integrated inhaler device.

(1) First configuration example

[0045] An inhaler device according to the present configuration example generates an aerosol by heating a liquid aerosol source. The inhaler device according to the present configuration example is comprised of two parts, which are a power supply unit and a cartridge. Next, the present configuration example will be described with reference to FIG. 1.

[0046] FIG. 1 is a schematic diagram schematically illustrating the first configuration example of the inhaler device. As illustrated in FIG. T1, the inhaler device 100A according to the present configuration example includes a power supply unit 110A and a cartridge 120A. The power supply unit 110A and the cartridge 120A are configured to be detachably attached to each other. The user inhales in a state where the cartridge 120A is attached to the power supply unit 110A.

[0047] As illustrated in FIG. 1, the power supply unit 110A includes a power supply part 111A, a sensor part 112A, a notification part 113A, a memory part 114A, a communication part 115A, and a control part 116A. In addition, the cartridge 120A includes a heater part 121A, a liquid guide part 122A, a liquid storage part 123A, and a mouthpiece 124A. In the cartridge 120A, an airflow path 180A is formed. Next, the respective structural elements will be described sequentially.

[0048] The power supply part 111A stores electric power. The power supply part 111A then supplies the electric power to the respective structural elements of the inhaler device 100A. The power supply part 111A may be comprised of, for example, a rechargeable battery such as a lithium ion secondary battery. The power supply part 111A may be charged by being connected to an external power supply via a Universal Serial Bus (USB) cable or the like. Alternatively, the power supply part 111A may be charged through a wireless power transmission technology in a state where the power supply part 111A is not physically connected to an electric power transmission device. In addition, the power supply part 111A may be configured in such a manner that the power supply part 111A is only part that is detachable from the inhaler device 100A and the power supply part 111A is replaceable with a new power supply part 111A.

[0049] The sensor part 112A detects various kinds of information regarding the inhaler device 100A. The sensor part 112A then outputs the detected information to the control part 116A. As an example, the sensor part 112A may be comprised of a pressure sensor such as a condenser microphone or the like. Next, in a case where the sensor part 112A detects a negative pressure generated by the user's inhalation, the sensor part 112A outputs, to the control part 116A, information indicating that the user has inhaled. As another example, the sensor part 112A may be comprised of an input device that receives information input by the user such as a button or a switch. In particular, the sensor part 112A may include a button that commands start/stop of generation of an aerosol. The sensor part 112A then outputs the information input by the user to the control part 116A.

[0050] The notification part 113A notifies information to the user. As an example, the notification part 113A may be comprised of a light-emitting device such as a light-emitting diode (LED). In this case, the notification part 113A emits different patterns of light depending on its situations such as a situation where the power supply part 111A needs to be charged, a situation where the power supply part 111A is on charge, and a situation where the inhaler device 100A has an abnormality. Here, the patterns of light are concepts including color of the light, a timing of turning on the light-emitting device, a timing of turning off the light-emitting device, and the like. In addition to or instead of the light-emitting device, the notification part 113A may include a display device that displays an image, a sound output device that outputs sound, a vibration device that vibrates, or the like.

[0051] The memory part 114A stores various kinds of information for operation of the inhaler device 100A. The memory part 114A may be comprised of, for example, a non-volatile storage medium such as flash memory. An example of the information stored in the memory part 114A includes information regarding an operating system (OS) of the inhaler device 100A such as details of control performed by the control part 116A over the respective structural elements. Another example of the information stored in the memory part 114A includes information regarding the user's inhalation such as the number of times of inhalation, inhalation time, and an accumulated inhalation time period.

[0052] The communication part 115A is a communication interface for allowing transmission/reception of information between the inhaler device 100A and another device. The communication part 115A performs communication in conformity with any wired or wireless communication standard. As such a communication standard, for example, a wireless local area network (LAN), a wired LAN, Wi-Fi (registered trademark), Bluetooth (registered trademark), or the like may be adopted. As an example, the communication part 115A transmits the information

regarding the user's inhalation to a smartphone so that the smartphone can display the information regarding the user's inhalation. As another example, the communication part 115A receives new OS information from a server to update information regarding the OS stored in the memory part 114A.

[0053] The control part 116A functions as an arithmetic processing unit and a control device, and controls overall operations inside the inhaler device 100A in accordance with various programs. The control part 116A is implemented as an electronic circuit such as a central processing unit (CPU) or a microprocessor, for example. In addition, the control part 116A may include read-only memory (ROM) that stores a program, an arithmetic parameter, and the like to be used, and random-access memory (RAM) that temporarily stores a parameter or the like that varies appropriately. The inhaler device 100A performs various processes under the control of the control part 116A. Examples of the processes controlled by the control part 116A include supply of electric power from the power supply part 111A to the other structural elements, charging of the power supply part 111A, detection of information by the sensor part 112A, notification of information by the notification part 113A, storing/readout of information by the memory part 114A, and transmission/reception of the information by the communication part 115A. The control part 116A also controls other processes to be performed by the inhaler device 100A such as inputting information to the respective structural elements and a process based on information output from the respective structural elements.

[0054] The liquid storage part 123A stores an aerosol source. The aerosol source is atomized through heating, thereby generating an aerosol. The aerosol source is liquid such as polyhydric alcohol or water. Examples of the polyhydric alcohol include glycerin, propylene glycol, and the like. The aerosol source may also include tobacco raw material or an extract derived from the tobacco raw material, that emit a flavor component through heating. In a case where the inhaler device 100A is a medical inhaler such as a nebulizer, the aerosol source may include medicine to be inhaled by a patient.

[0055] The liquid guide part 122A guides, from the liquid storage part 123A, the aerosol source that is the liquid stored in the liquid storage part 123A, and the liquid guide part 122A holds the aerosol source. The liquid guide part 122A is, for example, a wick formed by twining fiber material such as glass fiber or porous material such as porous ceramic. The liquid guide part 122A is communicated with the liquid storage part 123A so that the liquid can be communicated from the liquid storage part 123A to the liquid guide part 122A. Therefore, the aerosol source stored in the liquid storage part 123A spreads into the whole liquid guide part 122A through capillary action of the wick.

[0056] The heater part 121A heats the aerosol source to atomize the aerosol source and generate the aerosol. The heater part 121A is comprised of any material such as metal or polyimide in any shape such as a coil-like shape, a film-like shape, or a blade-like shape. The heater part 121A is disposed near the liquid guide part 122A. In the example illustrated in FIG. 1, the heater part 121A is comprised of a metal coil and is wound around the liquid guide part 122A. This makes it possible to heat and atomize the aerosol source held by the liquid guide part 122A when the heater part 121A produces heat, thereby generating the aerosol. The heater part 121A produces heat when the power supply part 111A supplies electric power. As an example, the electric power may be supplied and the aerosol may be generated during a period in which the sensor part 112A is detecting the user's inhalation. As another example, the electric power may be supplied and the aerosol may be generated in a case where the sensor part 112A has detected predetermined user input (for example, press of the button that commands start or stop of generation of the aerosol). Subsequently, the supply of the electric power may be stopped in a case where the sensor part 112A has detected predetermined user input (for example, re-press of the button that commands start or stop of generation of the aerosol).

[0057] The airflow path 180A is a flow path of air to be inhaled by the user. The airflow path 180A has a tube-like structure having an air inlet hole 181A and an air outlet hole 182A at both ends of the airflow path 180A. The air inlet hole 181A is an inlet of air into the airflow path 180A, and the air outlet hole 182A is an outlet of the air from the airflow path 180A. When the user inhales, the air flows into the airflow path 180A through the air inlet hole 181A and the air flows out to the outside of the airflow path 180A through the air outlet hole 182A. As an example, the air inlet hole 181A may be a gap between the power supply unit 110A and the cartridge 120A in a state where the cartridge 120A is attached to the power supply unit 110A. The air outlet hole 182A is made in the mouthpiece 124A.

[0058] The liquid guide part 122A is interposed in the airflow path 180A. The aerosol generated by the heater part 121A is mixed with the air flowed in through the air inlet hole 181A. Subsequently, as indicated by an arrow 190A, the mixed fluid including the aerosol and the air is conveyed to the air outlet hole 182A when the user inhales.

[0059] The mouthpiece 124A is a member to be held in a mouth of the user during inhalation. The mouthpiece 124A has the air outlet hole 182A of the airflow path 180A. When the user inhales with the mouthpiece 124A in his/her mouth, the user can let the mixed fluid including the aerosol and the air conveyed through the airflow path 180A in his/her oral cavity.

(2) Second configuration example

[0060] An inhaler device according to the present configuration example generates an aerosol by heating a liquid aerosol source. The inhaler device according to

the present configuration example is comprised of three parts, which are a power supply unit, a cartridge, and a flavor imparting cartridge. Next, the present configuration example will be described with reference to FIG. 2.

[0061] FIG. 2 is a schematic diagram schematically illustrating the second configuration example of the inhaler device. As illustrated in FIG. 2, the inhaler device 100B according to the present configuration example includes a power supply unit 110B, a cartridge 120B, and a flavor imparting cartridge 130. The power supply unit 110B and the cartridge 120B are configured to be detachably attached to each other. In addition, the cartridge 120B and the flavor imparting cartridge 130 are configured to be detachably attached to each other. The user inhales in a state where the flavor imparting cartridge 130 and the power supply unit 110B are attached to the cartridge 120B.

[0062] As illustrated in FIG. 2, the power supply unit 110B includes a power supply part 111B, a sensor part 112B, a notification part 113B, a memory part 114B, a communication part 115B, and a control part 116B. The cartridge 120B includes a heaterpart 121B, a liquid guide part 122B, and a liquid storage part 123B. The flavor imparting cartridge 130 includes a flavor source 131 and a mouthpiece 124B. In the cartridge 120B and the flavor imparting cartridge 130, an airflow path 180B is formed. Next, the respective structural elements will be described sequentially.

[0063] The respective structural elements of the power supply unit 110B are substantially the same as the corresponding structural elements included in the inhaler device 100A according to the first configuration example. In addition, the heater part 121B, the liquid guide part 122B, the liquid storage part 123B, and the mouthpiece 124B are substantially the same as the respective corresponding structural elements included in the inhaler device 100A according to the first configuration example.

[0064] The flavor source 131 is a structural element for imparting a flavor component to an aerosol. The flavor source 131 may be derived from tobacco. For example, the flavor source 131 may be shredded tobacco, or processed material obtained by forming tobacco raw material in a granular form, a sheet form, or a powder form. Also, the flavor source 131 may include material that is not derived from tobacco, such as a product made by use of a plant other than tobacco (for example, mint, an herb, or the like). As an example, the flavor source 131 may include a flavor component such as menthol. Note that, the flavor source 131 may be contained in a container such as a capsule.

[0065] The airflow path 180B has a structure similar to that of the airflow path 180A according to the first configuration example. However, in addition to the liquid guide part 122B, the flavor source 131 is also interposed in the airflow path 180B at a downstream side from the liquid guide part 122B (that is, a side closer to an air outlet hole 182B). The aerosol generated by the heater part 121B is mixed with air flowed in through an air inlet hole 181B. Subsequently, as indicated by an arrow 190B, the mixed fluid including the aerosol and the air passes through the flavor source 131 and is conveyed to the air outlet hole 182B when the user inhales. In addition, when the mixed fluid including the aerosol and the air passes through the flavor source 131, the flavor component included in the flavor source 131 is imparted to the aerosol.

(3) Third configuration example

[0066] An inhaler device according to the present configuration example generates an aerosol by applying vibration to a liquid aerosol source. Next, the present configuration example will be described with reference to FIG. 3.

[0067] FIG. 3 is a schematic diagram schematically illustrating the third configuration example of the inhaler device. As illustrated in FIG. 3, the inhaler device 100D according to the present configuration example includes a power supply unit 110D and a cartridge 120D. The power supply unit 110D and the cartridge 120D are configured to be detachably attached to each other. The user inhales in a state where the cartridge 120D is attached to the power supply unit 110D.

[0068] As illustrated in FIG. 3, the power supply unit 110D includes a power supply part 111D, a sensor part 112D, a notification part 113D, a memory part 114D, a communication part 115D, and a control part 116D. The cartridge 120D includes a heater part 121D, a liquid guide part 122D, a liquid storage part 123D, a vibrator part 127, and a mouthpiece 124D. In addition, in the cartridge 120D, an airflow path 180D is formed. Next, the respective structural elements will be described sequentially.

[0069] The respective structural elements of the power supply unit 110D are substantially the same as the corresponding structural elements included in the inhaler device 100A according to the first configuration example. In addition, the liquid storage part 123D and the mouthpiece 124D are substantially the same as the corresponding structural elements included in the inhaler device 100A according to the first configuration example.

[0070] The liquid guide part 122D guides the aerosol source that is the liquid stored in the liquid storage part 123D from the liquid storage part 123D to the vibrator part 127, and holds the aerosol source. As an example, the liquid guide part 122D may be a wick formed by twining fiber material such as glass fiber or porous material such as porous ceramic. As another example, the liquid guide part 122D may be a plate that is capable of absorbing the liquid aerosol source and guiding the absorbed liquid aerosol source to the vibrator part 127. The liquid guide part 122D is communicated with the liquid storage part 123D so that the liquid can be communicated from the liquid storage part 123D to the liquid guide part 122D. Therefore, as indicated by an arrow 191, the aerosol source stored in the liquid storage part 123D is guided to a surface of the vibrator part 127 through the liquid guide part 122D.

[0071] The vibrator part 127 applies vibration to the aerosol source to atomize the aerosol source and generate an aerosol. For example, the vibrator part 127 is comprised of a plate-like member including piezoceramic that functions as an ultrasonic vibrator. When the vibrator part 127 vibrates, the aerosol source guided to the surface of the vibrator part 127 through the liquid guide part 122D is then atomized by ultrasound generated with vibration generated by the vibrator part 127, thereby generating the aerosol. The vibrator part 127 vibrates when the power supply part 111D supplies electric power. As an example, the electric power may be supplied and the aerosol may be generated during a period in which the sensor part 112D is detecting the user's inhalation. As another example, the electric power may be supplied and the aerosol may be generated in a case where the sensor part 112D has detected predetermined user input. Subsequently, the supply of the electric power may be stopped in a case where the sensor part 112D has detected predetermined user input.

[0072] The airflow path 180D has a structure similar to that of the airflow path 180A according to the first configuration example. However, the liquid guide part 122D is interposed in the airflow path 180D. The aerosol generated by the vibrator part 127 is mixed with air flowed in through an air inlet hole 181D. Subsequently, as indicated by an arrow 190D, the mixed fluid including the aerosol and the air is conveyed to an air outlet hole 182D when the user inhales.

[0073] Note that, as in the inhaler device 100B according to the second configuration example, the inhaler device 100D according to the present configuration example may be provided with the flavor imparting cartridge 130 at a downstream side from the cartridge 120D. In other words, the inhaler device 100D according to the present configuration example may be comprised of three parts, which are the power supply unit 110D, the cartridge 120D, and the flavor imparting cartridge 130.

<1.2. Inhaler device with external substrate>

[0074] An inhaler device with an external substrate is an inhaler device with an externally attached substrate including an aerosol source. Fourth to seventh configuration examples, which will be described below, are configuration examples of the inhaler device with the external substrate.

(1) Fourth configuration example

[0075] An inhaler device according to the present configuration example generates an aerosol by heating a substrate including an aerosol source from the inside of the substrate. Next, the present configuration example will be described with reference to FIG. 4.

[0076] FIG. 4 is a schematic diagram schematically illustrating the fourth configuration example of the inhaler device. As illustrated in FIG. 4, an inhaler device 100E according to the present configuration example includes a power supply part 111E, a sensor part 112E, a notification part 113E, a memory part 114E, a communication part 115E, a control part 116E, a heater part 121E, and a holder part 140E. The user inhales in a state where a stick-type substrate 150E is held by the holder part 140E. Next, the respective structural elements will be described sequentially.

[0077] The power supply part 111E, the sensor part 112E, the memory part 114E, the communication part 115E, and the control part 116E are substantially the same as the respective corresponding structural elements included in the inhaler device 100A according to the first configuration example.

[0078] The holder part 140E has an internal space 141E, and holds the stick-type substrate 150E in a state where a portion of the stick-type substrate 150E is accommodated in the internal space 141E. The holder part 140E has an opening 142E that allows the internal space 141E to communicate with an outside. The holder part 140E holds the stick-type substrate 150E that is inserted into the internal space 141E through the opening 142E. For example, the holder part 140E may have a tubular body in which the opening 142E and a bottom part 143E serve as its bases. Such a tubular body demarcates the pillar-shaped internal space 141E. The holder part 140E may be configured in such a manner that its inside diameter is smaller than an outside diameter of the stick-type substrate 150E in at least part of a height direction of the tubular body. This may allow the holder part 140E to hold the stick-type substrate 150E in such a manner that the stick-type substrate 150E inserted into the internal space 141E is pressed from an outer circumference side. The holder part 140E also has a function of demarcating a flow path of air supplied through the stick-type substrate 150E. For example, the bottom part 143E has an air inlet hole that is an inlet of air into such a flow path. Meanwhile, the opening 142E serves as an air outlet hole that is an outlet of the air from such a flow path.

[0079] The stick-type substrate 150E is a stick-type member. The stick-type substrate 150E includes a substrate part 151E and an inhalation port part 152E. The substrate part 151E includes an aerosol source. The aerosol source is as described above with reference to the first configuration example. Note that, the aerosol source according to the present configuration example is not limited to liquid. The aerosol source according to the present configuration example may be a solid. At least a portion of the substrate part 151E is accommodated in the internal space 141E of the holder part 140E in a state where the stick-type substrate 150E is held by the holder part 140E. The inhalation port part 152E is a member to be held in the mouth of the user during inhalation. At least a portion of the inhalation port part 152E protrudes from the opening 142E in a state where the stick-type substrate 150E is held by the holder part 140E. When the user inhales with the inhalation port part 152E protruding from the opening 142E in his/her mouth, air flows into

the inside of the holder part 140E through an air inlet hole (not illustrated). The flowing air passes through the internal space 141E of the holder part 140E. This allows the flowing air and the aerosol generated by the substrate part 151E to reach the inside of the mouth of the user.

[0080] The heater part 121E heats the aerosol source to atomize the aerosol source and generate the aerosol. The heater part 121E is comprised of any material such as metal or polyimide. For example, the heater part 121E has a blade-like shape, and the heater part 121E is disposed so that the heater part 121E protrudes from the bottom part 143E of the holder part 140E toward the internal space 141E of the holder part 140E. Therefore, when the stick-type substrate 150E is inserted into the holder part 140E, the blade-shaped heater part 121E is inserted into the inside of the stick-type substrate 150E so that the heater part 121E is stuck into the substrate part 151E of the stick-type substrate 150E. Subsequently, when the heater part 121E produces heat, the aerosol source included in the stick-type substrate 150E is heated and atomized from the inside of the stick-type substrate 150E, thereby generating the aerosol. The heater part 121E produces heat when the power supply part 111E supplies electric power. As an example, the electric power may be supplied and the aerosol may be generated in a case where the sensor part 112E has detected predetermined user input. The user is enabled to inhale when the temperature of the stick-type substrate 150E heated by the heater part 121E reaches a predetermined temperature. Subsequently, the supply of the electric power may be stopped in a case where the sensor part 112E has detected predetermined user input. As another example, the electric power may be supplied and the aerosol may be generated during a period in which the sensor part 112E is detecting the user's inhalation.

[0081] The notification part 113E has a function similar to that of the notification part 113A according to the first configuration example. In addition, the notification part 113E notifies that the user is enabled to inhale. The notification that the user is enabled to inhale is issued, for example, when the temperature of the stick-type substrate 150E heated by the heater part 121E reaches the predetermined temperature.

(2) Fifth configuration example

[0082] An inhaler device according to the present configuration example generates an aerosol by heating a substrate including an aerosol source from an outside of the substrate. Next, the present configuration example will be described with reference to FIG. 5.

[0083] FIG. 5 is a schematic diagram schematically illustrating the fifth configuration example of the inhaler device. As illustrated in FIG. 5, an inhaler device 100F according to the present configuration example includes a power supply part 111F, a sensor part 112F, a notification part 113F, a memory part 114F, a communication part 115F, a control part 116F, a heater part 121F, a holder part 140F, and a heat insulation part 144F. The user inhales in a state where a stick-type substrate 150F is held by the holder part 140F. Next, the respective structural elements will be described sequentially.

[0084] The power supply part 111F, the sensor part 112F, the notification part 113F, the memory part 114F, the communication part 115F, the control part 116F, and the holder part 140F are substantially the same as the respective corresponding structural elements included in the inhaler device 100E according to the fourth configuration example. In addition, the stick-type substrate 150F is substantially the same as the stick-type substrate 150E according to the fourth configuration example.

[0085] The heater part 121F heats the aerosol source to atomize the aerosol source and generate the aerosol. The heater part 121F is comprised of any material such as metal or polyimide. For example, the heater part 121F has a film-like shape, and the heater part 121F is disposed so that the heater part 121F surrounds the outer circumference of the holder part 140F. Subsequently, when the heater part 121F produces heat, the aerosol source included in the stick-type substrate 150F is heated and atomized from the outer circumference side of the stick-type substrate 150F, thereby generating the aerosol. The heater part 121F produces heat when the power supply part 111F supplies electric power. As an example, the electric power may be supplied in a case where the sensor part 112F has detected predetermined user input. The user becomes capable of inhalation when the temperature of the stick-type substrate 150F heated by the heater part 121F reaches a predetermined temperature. Subsequently, the supply of the electric power may be stopped in a case where the sensor part 112F has detected predetermined user input. As another example, the electric power may be supplied and the aerosol may be generated during a period in which the sensor part 112F is detecting the user's inhalation.

[0086] The heat insulation part 144F prevents heat from transferring from the heater part 121F to the other structural elements of the inhaler device 100F. The heat insulation part 144F is disposed so that the heat insulation part 144F contacts the heater part 121F and surrounds at least the outer circumference of the heater part 121F For example, the heat insulation part 144F is comprised of a vacuum heat insulator, an aerogel heat insulator, or the like. Note that, the vacuum heat insulator is a heat insulator in which glass wool, silica (silicon powder), or the like is wrapped in a resin film to achieve a high-vacuum state so that gas thermal conductivity becomes as close to zero as possible.

(3) Sixth configuration example

[0087] An inhaler device according to the present configuration example generates an aerosol by heating a substrate including an aerosol source from an inside and an outside of the substrate. Next, the present configuration example will be described with reference to FIG. 6.

[0088] FIG. 6 is a schematic diagram schematically illustrating the sixth configuration example of the inhaler device. As illustrated in FIG. 6, an inhaler device 100G according to the present configuration example includes a power supply part 111G, a sensor part 112G, a notification part 113G, a memory part 114G, a communication part 115G, a control part 116G, a heater part 121G-1, a heater part 121G-2, a holder part 140G, and a heat insulation part 144G. The user inhales in a state where a stick-type substrate 150G is held by the holder part 140G. Next, the respective structural elements will be described sequentially.

[0089] The power supply part 111G, the sensor part 112G, the notification part 113G, the memory part 114G, the communication part 115G, the control part 116G, the holder part 140G, and the heat insulation part 144G are substantially the same as the respective corresponding structural elements included in the inhaler device 100F according to the fifth configuration example. In addition, the stick-type substrate 150G is substantially the same as the stick-type substrate 150E according to the fourth configuration example.

[0090] The heater part 121G-1 is substantially the same as the heater part 121E according to the fourth configuration example. The heater part 121G-2 is substantially the same as the heater part 121F according to the fifth configuration example. However, the heater parts 121G-1 and 121G-2 are typically controlled so that the temperature of the heater part 121G-2 becomes lower than the heater part 121G-1. This is because heat emitted by the heater part 121G-2 transfers to the other structural elements of the inhaler device 100G more easily than heat emitted by the heater part 121G-1.

[0091] Note that, FIG. 6 illustrates the example in which the heater part 121G-2 is disposed around the outer circumference of the holder part 140G. However, the present configuration example is not limited to this example. For example, the heater part 121G-2 may be disposed so that the heater part 121G-2 covers a bottom part 143G of the holder part 140G.

(4) Seventh configuration example

[0092] An inhaler device according to the present configuration example includes a mechanism that sandwiches and holds a substrate including an aerosol source. Next, the present configuration example will be described with reference to FIG. 7.

[0093] FIG. 7 is a schematic diagram schematically illustrating the seventh configuration example of the inhaler device. As illustrated in FIG.7, an inhaler device 100H according to the present configuration example includes a power supply part 111H, a sensor part 112H, a notification part 113H, a memory part 114H, a communication part 115H, a control part 116H, a heater part 121H-1, a heater part 121H-2, a holder part 140H, a heat insulation part 144H-1, a heat insulation part 144H-2, and an opening/closing mechanism 147. The user inhales in a state where a stick-type substrate 150H is held by the holder part 140H. Next, the respective structural elements will be described sequentially.

[0094] The power supply part 111H, the sensor part 112H, the notification part 113H, the memory part 114H, the communication part 115H, and the control part 116H are substantially the same as the respective corresponding structural elements included in the inhaler device 100E according to the fourth configuration example. In addition, the stick-type substrate 150H is substantially the same as the stick-type substrate 150E according to the fourth configuration example.

[0095] The holder part 140H has a structure similar to that of the holder part 140E according to the fourth configuration example. However, an internal space 141H of the holder part 140H is implemented as a space sandwiched between a first housing 145 and a second housing 146. The holder part 140H further includes the opening/closing mechanism 147 that is a mechanism for opening/closing the first housing 145 and the second housing 146 in directions indicated by an arrow 193. For example, the opening/closing mechanism 147 may be a hinge and causes the first housing 145 to rotate in the directions indicated by the arrow 193. The holder part 140H holds the stick-type substrate 150H in such a manner that the stick-type substrate 150H is sandwiched and held between the first housing 145 and the second housing 146 by opening/closing the first housing 145 and the second housing 146 through the opening/closing mechanism 147.

[0096] The heater part 121H-1 and the heater part 121H-2 are substantially the same as the heater part 121F according to the fifth configuration example. However, the heater part 121H-1 is disposed in the first housing 145, and the heater part 121H-2 is disposed in the second housing 146.

[0097] The heat insulation part 144H-1 and the heat insulation part 144H-2 are substantially the same as the heat insulation part 144F according to the fifth configuration example. However, the heat insulation part 144H-1 is disposed in the first housing 145, and the heat insulation part 144H-2 is disposed in the second housing 146.

<1.3. Induction heating inhaler device>

[0098] An induction heating (IH) inhaler device is an inhaler device that generates an aerosol through induction heating. Eighth and ninth configuration examples, which will be described below, are configuration examples of the induction heating inhaler device.

(1) Eighth configuration example

[0099] An inhaler device according to the present configuration example is a substrate-integrated inhaler device that generates an aerosol through induction heating. Next, the present configuration example will be described with reference to FIG. 8.

[0100] FIG. 8 is a schematic diagram schematically illustrating the eighth configuration example of the inhaler device. As illustrated in FIG. 8, an inhaler device 100I according to the present configuration example includes a power supply unit 1101 and a cartridge 1201. The power supply unit 1101 and the cartridge 1201 are configured to be detachably attached to each other. The user inhales in a state where the cartridge 1201 is attached to the power supply unit 1101.

[0101] As illustrated in FIG. 8, the power supply unit 1101 includes a power supply part 111I, a sensor part 1121, a notification part 1131, a memory part 1141, a communication part 1151, and a control part 1161. In addition, the cartridge 1201 includes a susceptor 1611, an electromagnetic induction source 1621, a liquid guide part 1221, a liquid storage part 1231, and a mouthpiece 1241. In addition, in the cartridge 1201, an airflow path 180I is formed. Next, the respective structural elements will be described sequentially.

[0102] The structural elements of the power supply unit 1101, the liquid guide part 1221, the liquid storage part 1231, the airflow path 1801, and the mouthpiece 124I are substantially the same as the respective corresponding structural elements included in the inhaler device 100A according to the first configuration example.

[0103] The susceptor 161I produces heat through electromagnetic induction. The susceptor 161I is comprised of conductive material such as metal. The susceptor 161I is disposed near the liquid guide part 1221. In the example illustrated in FIG. 8, the susceptor 161I is comprised of a metal conductive wire and is wound around the liquid guide part 1221.

[0104] The electromagnetic induction source 162I causes the susceptor 161I to produce heat through electromagnetic induction. The electromagnetic induction source 162I is comprised of, for example, a coil-shaped conductive wire. The electromagnetic induction source 162I generates a magnetic field when the power supply part 111I supplies alternating current. The electromagnetic induction source 162I is disposed at a position that allows the susceptor 161I to overlap the generated magnetic field. Accordingly, eddy currents are generated in the susceptor 161I and Joule heat is produced when the magnetic field is generated. Subsequently, such Joule heat makes it possible to heat and atomize the aerosol source held by the liquid guide part 1221, thereby generating the aerosol. As an example, the electric power may be supplied and the aerosol may be generated in a case where the sensor part 112I has detected the user's inhalation. As another example, the electric power may be supplied and the aerosol may be generated in a case where the sensor part 112I has detected predetermined user input. Subsequently, the supply of the electric power may be stopped in a case where the sensor part 112I has detected predetermined user input. As another example, the electric power may be supplied and the aerosol may be generated during a period in which the sensor part 112I is detecting the user's inhalation.

[0105] Note that, as in the inhaler device 100B according to the second configuration example, the inhaler device 100I according to the present configuration example may be provided with the flavor imparting cartridge 130 at a downstream side from the cartridge 1201. In other words, the inhaler device 100I according to the present configuration example may be comprised of three parts, which are the power supply unit 1101, the cartridge 1201, and the flavor imparting cartridge 130.

(2) Ninth configuration example

[0106] An inhaler device according to the present configuration example is an inhaler device with an external substrate that generates an aerosol through induction heating. Next, the present configuration example will be described with reference to FIG. 9.

[0107] FIG. 9 is a schematic diagram schematically illustrating the ninth configuration example of the inhaler device. As illustrated in FIG. 9, an inhaler device 100J according to the present configuration example includes a power supply part 111J, a sensor part 112J, a notification part 113J, a memory part 114J, a communication part 115J, a control part 116J, a susceptor 161J, an electromagnetic induction source 162J, and a holder part 140J. The user inhales in a state where a stick-type substrate 150J is held by the holder part 140J. Next, the respective structural elements will be described sequentially.

[0108] The power supply part 111J, the sensor part 112J, the notification part 113J, the memory part 114J, the communication part 115J, the control part 116J, and the holder part 140J are substantially the same as the respective corresponding structural elements included in the inhaler device 100E according to the fourth configuration example.

[0109] The stick-type substrate 150J has a structure similar to that of the stick-type substrate 150E according to the fourth configuration example. In addition, the stick-type substrate 150J includes the susceptor 161J.

[0110] The susceptor 161J produces heat through electromagnetic induction. The susceptor 161J is comprised of conductive material such as metal. As an example, the susceptor 161J may be pieces of metal. The susceptor 161J is disposed near the aerosol source. In the example illustrated in FIG. 9, the susceptor 161J is included in a substrate part 151J of the stick-type substrate 150J.

[0111] The electromagnetic induction source 162J causes the susceptor 161J to produce heat through electromagnetic induction. The electromagnetic induction source 162J is comprised of, for example, a coil-shaped conductive wire. The electromagnetic induction source 162J is disposed so that the electromagnetic induction source 162J is wound around the outer circumference of the holder part 140J. The electromagnetic induction source 162J generates a magnetic field when the power supply part 111J supplies alternating current. The elec-

tromagnetic induction source 162J is disposed at a position that allows an internal space 141J of the holder part 140J to overlap the generated magnetic field. Accordingly, eddy currents are generated in the susceptor 161J and Joule heat is produced when the magnetic field is generated in a state where the stick-type substrate 150J is held by the holder part 140J. Subsequently, such Joule heat makes it possible to heat and atomize the aerosol source included in the stick-type substrate 150J, thereby generating the aerosol. As an example, the electric power may be supplied and the aerosol may be generated in a case where the sensor part 112J has detected predetermined user input. The user becomes capable of inhalation when the temperature of the stick-type substrate 150J heated by the susceptor 161J and the electromagnetic induction source 162J through induction heating reaches a predetermined temperature. Subsequently, the supply of the electric power may be stopped in a case where the sensor part 112J has detected predetermined user input. As another example, the electric power may be supplied and the aerosol may be generated during a period in which the sensor part 112J is detecting the user's inhalation.

<1.4. Hybrid inhaler device>

[0112] A hybrid inhaler device is an inhaler device that has both features of the substrate-integrated inhaler device and features of the inhaler device with the external substrate. A tenth configuration example, which will be described below, is a configuration example of the hybrid inhaler device. Next, the present configuration example will be described with reference to FIG. 10.

[0113] FIG. 10 is a schematic diagram schematically illustrating the tenth configuration example of the inhaler device. As illustrated in FIG. 10, an inhaler device 100K according to the present configuration example includes a power supply part 111K, a sensor part 112K, a notification part 113K, a memory part 114K, a communication part 115K, a control part 116K, a liquid guide part 122K, a liquid storage part 123K, a heater part 121K-1, a heater part 121K-2, a holder part 140K, and a heat insulation part 144K. In addition, in the inhaler device 100K, an airflow path 180K is formed. The user inhales in a state where a stick-type substrate 150K is held by the holder part 140K. Next, the respective structural elements will be described sequentially.

[0114] The power supply part 111K, the sensor part 112K, the memory part 114K, the communication part 115K, the control part 116K, the heater part 121K-1, the liquid guide part 122K, and the liquid storage part 123K are substantially the same as the respective corresponding structural elements included in the inhaler device 100A according to the first configuration example. The heater part 121K-2 is substantially the same as the heater part 121E according to the fourth configuration example. The stick-type substrate 150K is substantially the same as the stick-type substrate 150E according to the fourth configuration example.

[0115] The holder part 140K has a structure similar to that of the holder part 140E according to the fourth configuration example. In addition, the holder part 140K includes a bottom part 143K that has an air outlet hole 182K of the airflow path 180. The air outlet hole 182K allows an internal space 141K of the holder part 140K to communicate with the airflow path 180K.

[0116] The airflow path 180K is a flow path of air to be inhaled by the user. The airflow path 180K has a tube-like structure having an air inlet hole 181K and the air outlet hole 182K at both ends of the airflow path 180K. The air inlet hole 181K is an inlet of air into the airflow path 180K, and the air outlet hole 182K is an outlet of the air from the airflow path 180K. When the user inhales, the air flows into the inside of the airflow path 180K through the air inlet hole 181K and the air flows out to the internal space 141K of the holder part 140K through the air outlet hole 182K. As an example, the air inlet hole 181K is made at any position in the inhaler device 100K. On the other hand, the air outlet hole 182K is made in the bottom part 143K of the holder part 140K. The liquid guide part 122K is interposed in the airflow path 180K. An aerosol generated by the heater part 121K-1 is mixed with the air flowed in through the air inlet hole 181K. Subsequently, as indicated by an arrow 190K, the mixed fluid including the aerosol and the air is conveyed to the internal space 141K of the holder part 140 through the air outlet hole 182K when the user inhales. Next, the mixed fluid including the aerosol and the air that has been conveyed to the internal space 141K of the holder part 140 reaches the inside of the mouth of the user together with an aerosol generated by the heater part 121K-2.

[0117] Note that, according to the present configuration example, it is also possible to generate the aerosol through the vibration of the vibrator part 127 according to the third configuration example or through the induction heating caused by the susceptor 161I and the electromagnetic induction source 162I according to the eighth configuration example, instead of the heating caused by the heater part 121K-1. In addition, instead of the heating caused by the heater part 121K-2, it is also possible to generate the aerosol through the induction heating caused by the susceptor 161J and the electromagnetic induction source 162K according to the ninth configuration example.

«2. Embodiment»

<2.1. Configuration example>

[0118] FIG. 11 is a block diagram illustrating a configuration example of a system 1 according to an embodiment of the present invention. As illustrated in FIG. 11, the system 1 includes the inhaler device 100 and a terminal device 200.

(1) Inhaler device

[0119] The inhaler device 100 is a device for generating material to be inhaled by a user. In the present embodiment, the inhaler device 100 may employ any given configuration example from among the first to tenth configuration examples described above. That is, the inhaler device 100 according to the present embodiment has a configuration that is similar to that of any of the inhaler device l00A to the inhaler device 100K.

[0120] In the configuration of the inhaler device 100 according to the present embodiment, the following description will mainly illustrate points to be added to or emphasized in the configurations of the inhaler device 100A to the inhaler device 100K described above in the respective configuration examples.

[0121] The notification part 113 according to the present embodiment notifies information to the user. The notification part 113 includes at least any of a display device that displays information, a light-emitting device that emits light, a vibration device that vibrates, or a sound output device that outputs sound. An example of the display device is a display. An example of the light-emitting device is an LED. An example of the vibration device is an eccentric motor. An example of the sound output device is a speaker. The notification part 113 notifies information to the user by outputting information that is input from the control part 116. For example, the notification part 113 displays information to be notified to the user, emits a pattern of light in accordance with the information to be notified to the user, vibrates in a vibration pattern in accordance with the information to be notified to the user, or outputs sound of the information to be notified to the user. The vibration pattern herein is a concept including an amplitude, a frequency, a vibration timing, and the like.

[0122] The communication part 115 according to the present embodiment is an example of a wireless communication part that transmits/receives information wirelessly. The communication part 115 transmits/receives information to/from the terminal device 200 wirelessly.

[0123] The sensor part 112 according to the present embodiment includes a configuration for detecting information to be used for determining whether cleaning necessity information, which will be described later, is to be notified. For example, the sensor part 112 includes a first temperature sensor, a second temperature sensor, an electric power measurement sensor, an image sensor, and a light sensor. The first temperature sensor detects an environment temperature that is an ambient temperature of the inhaler device 100. The first temperature sensor may detect the environment temperature on the basis of an electric resistance of a wire. The second temperature sensor detects the temperature of the heater part 121. The second temperature sensor may detect the temperature of the heater part 121 on the basis of an electric resistance of a conducting track of the heater part 121. The second temperature sensor may detect the temperature of the heater part 121 as the temperature of the stick-type substrate 150 held by the holder part 140. The temperature of the heater part 121 may be detected on the basis of an electric resistance of the heater part 121. The electric power measurement sensor measures electric power to be input to other structural elements from the power supply part 111. The image sensor is a sensor that picks up an image. The image sensor picks up an image of, for example, the internal space 141 of the holder part 140. The light sensor is a sensor that detects light. The light sensor detects, for example, a light amount of the internal space 141 of the holder part 140.

[0124] The sensor part 112 according to the present embodiment includes a configuration for detecting information to be used for determining whether replacement necessity information, which will be described later, is to be notified. For example, the sensor part 112 includes a pressure sensor and a resistance measurement circuit. The pressure sensor detects a user's inhalation by detecting a negative pressure when the user inhales. The resistance measurement circuit detects a resistance value of a measurement target on the basis of a voltage generated across both ends of the measurement target when known current flows in the measurement target, such as the heater part 121 or the like.

[0125] The sensor part 112 according to the present embodiment includes a configuration for detection information to be used for determining whether information indicating that the inhaler device 100 is in an abnormal state, which will be described later, is to be notified. As an example, the sensor part 112 may be configured to detect a state of charge (SOC (e.g., charge state)), a current integrated value, a voltage, a temperature, an output value, or the like of the power supply part 111. As another example, the sensor part 112 may be configured to detect identification information of a substrate attached to the power supply unit 110, such as the cartridge 120, the flavor imparting cartridge 130, or the like. Such identification information may be detected, for example, by an image sensor that reads a two-dimensional code pasted onto the substrate.

[0126] The control part 116 according to the present embodiment controls a process of notifying notification information to the user. This point will be described later in detail.

(2) Terminal device

[0127] The terminal device 200 is an information processing device to be operated by the user. The terminal device 200 transmits/receives information to/from the inhaler device 100 and outputs information based on the communication to the user. For example, the terminal device 200 is comprised of a smartphone, a tablet terminal, a wearable device, or the like.

[0128] As illustrated in FIG. 11, the terminal device 200 includes a sensor part 210, a notification part 220, a communication part 230, a memory part 240, and a control

part 250.

[0129] The sensor part 210 detects various kinds of information regarding the terminal device 200. The sensor part 210 then outputs the detected information to the control part 250. The sensor part 210 includes an input part that accepts information that is input by the user. The input part includes, for example, at least any of a button, a keyboard, a touch panel, or a microphone.

[0130] The notification part 220 notifies information to the user. The notification part 220 includes at least any of a display device that displays information, a light-emitting device that emits light, a vibration device that vibrates, or a sound output device that outputs sound. An example of the display device is a display. An example of the light-emitting device is an LED. An example of the vibration device is an eccentric motor. An example of the sound output device is a speaker. The notification part 220 notifies information to the user by outputting information that is input from the control part 250. For example, the notification part 220 displays information to be notified to the user, emits a pattern of light in accordance with the information to be notified to the user, vibrates in a vibration pattern in accordance with the information to be notified to the user, or outputs sound of the information to be notified to the user.

[0131] Here, the terminal device 200 such as a smartphone has higher performance and may have a large display or a surround speaker mounted thereon. That is, the notification part 220 has a higher expressive power than the notification part 113 in, for example, including a display that is absent in the notification part 113 or that is larger than a display of the notification part 113.

[0132] The communication part 230 is a communication interface for allowing transmission/reception of information between the terminal device 200 and another device. The communication part 230 performs communication in conformity with any wired or wireless communication standard. As such a communication standard, for example, a wireless local area network (LAN), a wired LAN, Wi-Fi (registered trademark), Bluetooth (registered trademark), or the like may be adopted. The communication part 230 is an example of a wireless communication part that transmits/receives information wirelessly. The communication part 230 transmits/receives information to/from the inhaler device 100 wirelessly.

[0133] The memory part 240 stores various kinds of information for operation of the terminal device 200. The memory part 240 may be comprised of, for example, a non-volatile storage medium such as flash memory.

[0134] The control part 250 functions as an arithmetic processing unit and a control device, and controls overall operations inside the terminal device 200 in accordance with various programs. The control part 250 is implemented as an electronic circuit such as a central processing unit (CPU) or a microprocessor, for example. In addition, the control part 250 may include read-only memory (ROM) that stores a program, an arithmetic parameter, and the like to be used, and random-access memory (RAM) that temporarily stores a parameter or the like that varies appropriately. The terminal device 200 performs various processes under the control of the control part 250. Examples of the processes controlled by the control part 250 include processing of information detected by the sensor part 210, notification of information by the notification part 220, transmission/reception of information by the communication part 230, and storing/readout of information by the memory part 240. The control part 250 also controls other processes to be performed by the terminal device 200 such as inputting information to the respective structural elements and a process based on information output from the respective structural elements.

<2.2. Technical features>

<2.2.1. Switching of notification means>

[0135] Depending on whether the inhaler device 100 and the terminal device 200 are wirelessly connected to each other, the inhaler device 100 switches a notification means of information to the user. Hereinafter, the information to be notified to the user is also referred to as notification information.

[0136] In a case where the inhaler device 100 and the terminal device 200 are wirelessly connected to each other, the inhaler device 100 transmits the notification information to the terminal device 200 by using the communication part 115. The terminal device 200 notifies the notification information received from the inhaler device 100 to the user by using the notification part 220. With such a configuration, the inhaler device 100 can notify the notification information to the user via the terminal device 200. In addition, the terminal device 200 has a higher expressive power than the inhaler device 100 in, for example, that a display that is absent in the inhaler device 100 or that is larger than a display of the inhaler device 100 is mounted thereon. Thus, by notifying information by using the high expressive power by the terminal device 200, usability can be improved. Hereinafter, the means for notifying information to the user via the terminal device 200 is also referred to as an indirect notification means.

[0137] On the other hand, in a case where the inhaler device 100 and the terminal device 200 are not wirelessly connected to each other, the inhaler device 100 notifies the notification information to the user by using the notification part 113. With such a configuration, the notification information can be notified directly to the user without the terminal device 200. In addition, although the expressive power is lower than that in a case where the terminal device 200 notifies the information, the notification information can be notified to the user at least without delay. Hereinafter, the means for notifying information to the user by the inhaler device 100 is also referred to as a direct notification means.

[0138] In a case where the inhaler device 100 and the

terminal device 200 are wirelessly connected to each other, the inhaler device 100 does not necessarily notify the notification information by using the notification part 113. That is, in a case where the inhaler device 100 and the terminal device 200 are wirelessly connected to each other, instead of the direct notification means, the inhaler device 100 may adopt only the indirect notification means. This makes it possible to suppress power consumption for notification by direct notification means.

[0139] It is needless to say that the inhaler device 100 may notify the notification information by using the notification part 113 even in a case where the inhaler device 100 and the terminal device 200 are wirelessly connected to each other. That is, in a case where the inhaler device 100 and the terminal device 200 are wirelessly connected to each other, the notification information may be notified to the user by using both the direct notification means and the indirect notification means. In this case, it is possible to notify the information to the user more reliably than in a case where either the direct notification means or the indirect notification means is adopted.

[0140] The inhaler device 100 acquires inhaler device information and, on the basis of the acquired inhaler device information, determines whether the notification information is to be notified. Then, in a case where the inhaler device 100 and the terminal device 200 are wirelessly connected to each other, the inhaler device 100 notifies the notification information, which is determined to be notified, to the user by using the indirect notification means; and, in a case where the inhaler device 100 and the terminal device 200 are not wirelessly connected to each other, the inhaler device 100 notifies the notification information to the user by using the direct notification means. With such a configuration, the notification information that is determined to be notified on the basis of the inhaler device information can be notified by using an appropriate notification means. Note that the inhaler device information is information regarding the inhaler device 100. Combinations of the inhaler device information and the notification information that is determined to be notified or not on the basis of the inhaler device information will be described later in detail.

[0141] The timing at which the inhaler device 100 determines whether the notification information is to be notified to the user may be after the timing at which the inhaler device 100 determines whether the inhaler device 100 and the terminal device 200 are wirelessly connected to each other. In this case, it is determined beforehand whether the inhaler device 100 and the terminal device 200 are wirelessly connected to each other, and, in a case where notification information to be notified to the user occurs, the notification information is notified to the user by using the notification means in accordance with the determination result beforehand. Thus, it is unnecessary to determine whether wireless connection is established every time notification information to the notified to the user occurs, and thereby, the processing load can be reduced.

[0142] The timing at which the inhaler device 100 determines whether the notification information is to be notified to the user may be before the timing at which the inhaler device 100 determines whether the inhaler device 100 and the terminal device 200 are wirelessly connected to each other. In this case, it is determined whether the inhaler device 100 and the terminal device 200 are wirelessly connected to each other in a case where notification information to be notified to the user occurs, and the notification information is notified to the user by using the notification means in accordance with the determination result. Thus, it is possible to determine whether wireless connection is established at a timing at which notification information to the notified to the user occurs, and thereby, the notification means can be switched appropriately, for example, even in an unstable communication environment in which wireless connection is frequently cut.

<2.2.2. Notification of information regarding cleaning>

[0143] In this section, a case where the notification information is information regarding cleaning of the inhaler device 100 will be described.

(1) Notification of cleaning necessity information

[0144] The notification information may include the cleaning necessity information that is information indicating necessity of cleaning the inhaler device 100. The cleaning herein mainly refers to cleaning for the internal space 141 of the holder part 140 included in the inhaler device 100 according to the fourth to seventh, ninth, and tenth configuration example including the holder part 140. When the stick-type substrate 150 is heated to generate an aerosol, the stick-type substrate 150, in particular, the substrate part 151, may become brittle, and part of the content of the substrate part 151 may remain and be deposited in the internal space 141 of the holder part 140. Therefore, the inhaler device 100 is desirably cleaned as appropriate. However, in order to determine the necessity of cleaning by him/herself, the user may be bothered, for example, to open the cover of the inhaler device 100 and to check the amount of deposit remaining in the internal space 141. In this respect, the inhaler device 100 can reduce the bother of the user by notifying the cleaning necessity information to the user and can improve usability regarding cleaning.

[0145] The cleaning necessity information may be first cleaning necessity information (corresponding to first information). The first cleaning necessity information is information indicating that it is highly necessary to clean the inhaler device 100. In other words, the first cleaning necessity information is information that recommends cleaning of the inhaler device 100. By being notified of the first cleaning necessity information, the user can do the cleaning at an appropriate timing.

[0146] The cleaning necessity information may be second cleaning necessity information (corresponding to

second information). The second cleaning necessity information is information indicating that it is becoming necessary to clean the inhaler device 100. In other words, the second cleaning necessity information is information that recommends cleaning of the inhaler device 100 in the near future. The second cleaning necessity information may be information that recommends preparation of the cleaning. The preparation of the cleaning is, for example, purchasing or carrying cleaning items to be used during cleaning of the inhaler device 100. By being notified of the second cleaning necessity information, the user can prepare for the cleaning in advance.

[0147] The cleaning necessity information may include information regarding the timing for cleaning the inhaler device 100. For example, the cleaning necessity information may include information indicating the date and time for cleaning the inhaler device 100, information indicating the remaining number of times of inhalation before it is necessary to do the cleaning, and the like. The first cleaning necessity information may also include, for example, information indicating that the timing for cleaning the inhaler device 100 has come. The second cleaning necessity information may include, for example, information indicating that the timing for cleaning the inhaler device 100 will come in the near future. With such a configuration, the user can easily know the timing for cleaning.

[0148] Now, details of the process of determining whether the cleaning necessity information is to be notified will be sequentially described below.

- Control based on number of times of preheating

[0149] The inhaler device information may include the number of times of preheating executed by the inhaler device 100 to enable the user to inhale by using the inhaler device 100. As described above in the fourth configuration example, when the temperature of the stick-type substrate 150 heated by the heater part 121 (more precisely, the temperature of the substrate part 151 that is a heating target of the heater part 121) or the temperature of the heater part 121 that executes preheating reaches (e.g., exceeds) a predetermined temperature (hereinafter also referred to as inhalation enabled temperature), the user is enabled to inhale. The preheating is the heating executed until the temperature of the stick-type substrate 150 or the temperature of the heater part 121 reaches the predetermined temperature. Note that the inhalation enabled temperature of the stick-type substrate 150 and the inhalation enabled temperature of the heater part 121 may be equal to each other or may be different from each other.

[0150] In a case where the number of times of preheating reaches (e.g., exceeds) a first threshold, the inhaler device 100 determines that the first cleaning necessity information is to be notified to the user as the cleaning necessity information. With such a configuration, the first cleaning necessity information can be notified to the user by using at least either the direct notification means or the indirect notification means.

[0151] The preheating is executed every time the stick-type substrate 150 is inserted into the holder part 140 before the user inhales. After the preheating, the stick-type substrate 150 is continuously heated while the user is inhaling. Hereinafter, heating executed after the preheating will be also referred to as main heating. As an aerosol is generated from the stick-type substrate 150 by the preheating and the main heating, the stick-type substrate 150 becomes brittle. Thus, after the user's inhalation, when the stick-type substrate 150 is drawn out of the holder part 140, the remaining content of the stick-type substrate 150 (hereinafter also referred to as butt) drops and is deposited in the holder part 140. In particular, in the fourth and sixth configuration examples, a portion of the stick-type substrate 150, the portion into which the blade-shaped heater part 121 is stuck, is likely to be brittle, and the butt is likely to drop therefrom. The number of times of preheating can be regarded as being equal to the number of times of the user's inhalation and the number of times the stick-type substrate 150 is inserted into and removed from the holder part 140. Thus, as the number of times of preheating is larger, the amount of butt deposited in the holder part 140 can be larger.

[0152] Accordingly, the number of times of preheating at which the amount of deposited butt is assumed to be so large that cleaning is necessary is set as the first threshold. This makes it possible to notify the first cleaning necessity information to the user at an appropriate timing.

[0153] Note that the first threshold may be a fixed value or may vary depending on the type of the inhaler device 100, the type of the stick-type substrate 150 that is preheated, or the like.

[0154] In a case where the number of times of preheating reaches (e.g., exceeds) a second threshold that is lower than the first threshold, the inhaler device 100 may determine that the second cleaning necessity information is to be notified to the user as the cleaning necessity information. With such a configuration, the second cleaning necessity information can be notified to the user by using at least either the direct notification means or the indirect notification means.

[0155] The number of times of preheating at which the amount of deposited butt is assumed to become so large that cleaning will be necessary in the near future is set as the second threshold. This makes it possible to notify the second cleaning necessity information to the user at an appropriate timing.

[0156] Note that the second threshold may be a fixed value or may vary depending on the type of the inhaler device 100, the type of the stick-type substrate 150 that is preheated, or the like. In addition, the second threshold may be set on the basis of the first threshold, such as 70% of the first threshold.

[0157] The number of times of preheating may be initialized in a case where a predetermined user operation

(hereinafter also referred to as reset operation) is performed. The reset operation may be performed on the inhaler device 100 or may be performed on the terminal device 200. The reset operation is an operation of inputting predetermined information to the sensor part 112 or the sensor part 210, such as a press-and-hold operation of a button. To initialize the number of times of preheating means to set the counted number of times of preheating to zero. The reset operation is performed, for example, when the inhaler device 100 is cleaned. With such a configuration, a correlation between the counted number of times of preheating and the amount of butt deposited in the holder part 140 can be maintained, and thus, it is possible to notify the cleaning necessity information based on the number of times of preheating at an appropriate timing.

[0158] The inhaler device 100 may count the number of times of preheating in a case where it is determined that preheating is executed for a substrate that contributes, when being heated, to generation of material to be inhaled by the user. The material is, for example, a member including an aerosol source and corresponds to the stick-type substrate 150. The inhaler device 100 counts the number of times of preheating in a case where the preheating is executed in a state where the stick-type substrate 150 is held by the holder part 140. With such a configuration, for example, in a case where the butt is not assumed to be deposited in the holder part 140, such as a case where heating is executed in the absence of a heating target, that is, heating is executed in a state where the stick-type substrate 150 is not held by the holder part 140, the number of times of preheating is not counted. Accordingly, the correlation between the counted number of times of preheating and the amount of butt deposited in the holder part 140 can be maintained, and thus, it is possible to notify the cleaning necessity information based on the number of times of preheating at an appropriate timing.

[0159] Note that it may be determined whether the preheating is executed in a state where the stick-type substrate 150 is held by the holder part 140 on the basis of an image recognition result of an image of the internal space 141 of the holder part 140 during the preheating, captured by the image sensor included in the sensor part 112.

[0160] Alternatively, it may be determined whether the preheating is executed in a state where the stick-type substrate 150 is held by the holder part 140 by comparing the light amount of the internal space 141 of the holder part 140 during the preheating, detected by the light sensor included in the sensor part 112, with a threshold. The light sensor may detect light emitted when the heater part 121 produces heat. Further alternatively, a light-emitting part and a light sensor may be provided so as to face each other with the internal space 141 of the holder part 140 interposed therebetween, and the light sensor may detect light emitted by the light-emitting part. In a case where the stick-type substrate 150 is held by the holder part 140, light emitted by the heater part 121 or the light-emitting part is blocked by the stick-type substrate 150, and the light amount detected by the light sensor becomes lower than the threshold. On the other hand, in a case where the stick-type substrate 150 is not held by the holder part 140, light emitted by the heater part 121 or the light-emitting part directly reaches the light sensor, and the light amount detected by the light sensor becomes higher than the threshold.

[0161] The inhaler device 100 (e.g., the memory part 114) stores the number of times of preheating. Then, every time the preheating is executed, the inhaler device 100 increments the stored number of times of preheating and updates the stored number. Thus, for example, even when the power is turned on/off between the last-time preheating and the current preheating, the number of times of preheating can be continuously counted.

- Control based on time required for preheating

[0162] The inhaler device information may include the time taken for the temperature of the heating target or the temperature of the heater part 121 that executes preheating to reach a predetermined temperature when the inhaler device 100 executes the preheating to enable the user to inhale by using the inhaler device 100. The predetermined temperature is the above-described inhalation enabled temperature. The time taken for the temperature to reach the inhalation enabled temperature is hereinafter also referred to as a time required for preheating. The heating target is the stick-type substrate 150 (more precisely, the substrate part 151 of the stick-type substrate 150). That is, the time required for preheating is a time taken from the start of the preheating until the temperature of the stick-type substrate 150 or the temperature of the heater part 121 reaches the inhalation enabled temperature. The temperature of the heater part 121 is detected, for example, by the second temperature sensor included in the sensor part 112. On the other hand, the temperature of the stick-type substrate 150 is estimated, for example, on the basis of the temperature of the heater part 121 detected by the second temperature sensor included in the sensor part 112.

[0163] In a case where the time required for preheating reaches (e.g., exceeds) a third threshold, the inhaler device 100 determines that the first cleaning necessity information is to be notified to the user as the cleaning necessity information. With such a configuration, the first cleaning necessity information canbe notified to the user by using at least either the direct notification means or the indirect notification means.

[0164] As the amount of butt deposited in the holder part 140 is larger, the time required for preheating is longer. This is because the heat produced by the heater part 121 propagates not only to the stick-type substrate 150 held by the holder part 140 but also to the butt deposited in the holder part 140.

[0165] Accordingly, the time required for preheating at

which the amount of deposited butt is assumed to be so large that cleaning is necessary is set as the third threshold. This makes it possible to notify the first cleaning necessity information to the user at an appropriate timing.

[0166] Note that the third threshold may be a fixed value or may vary depending on the type of the inhaler device 100, the type of the stick-type substrate 150 that is preheated, or the like. Furthermore, the inhaler device 100 may set the third threshold on the basis of the environment temperature. As an example, the inhaler device 100 sets the third threshold to a smaller value as the environment temperature is higher. This is because the temperature of the stick-type substrate 150 and the temperature of the heater part 121 are likely to increase, shortening the time required for preheating, as the environment temperature is higher. As another example, the inhaler device 100 sets the third threshold to a larger value as the environment temperature is lower. This is because the temperature of the stick-type substrate 150 and the temperature of the heater part 121 are unlikely to increase, prolonging the time required for preheating, as the environment temperature is lower. With such a configuration, the cleaning necessity information can be notified to the user at an appropriate timing in accordance with the environment temperature. Note that the environment temperature is detected by, for example, the first temperature sensor included in the sensor part 112.

[0167] In a case where the time required for preheating reaches (e.g., exceeds) a fourth threshold that is lower than the third threshold, the inhaler device 100 determines that the second cleaning necessity information is to be notified to the user as the cleaning necessity information. With such a configuration, the second cleaning necessity information can be notified to the user by using at least either the direct notification means or the indirect notification means.

[0168] The time required for preheating at which the amount of deposited butt is assumed to become so large that cleaning will be necessary in the near future is set as the fourth threshold. This makes it possible to notify the second cleaning necessity information to the user at an appropriate timing.

[0169] Note that the fourth threshold may be a fixed value or may vary depending on the type of the inhaler device 100, the type of the stick-type substrate 150 that is preheated, or the like. In addition, the fourth threshold may be set on the basis of the third threshold, such as 70% of the third threshold. Furthermore, the inhaler device 100 may set the fourth threshold on the basis of the environment temperature from reasons similar to the reasons described above regarding the third threshold.

- Control based on electric power required for preheating

[0170] The inhaler device information may include the electric power used for the temperature of the heating target or the temperature of the heater part 121 that executes preheating to reach a predetermined temperature when the inhaler device 100 executes the preheating so as to enable the user to inhale by using the inhaler device 100. The predetermined temperature is the above-described inhalation enabled temperature. The electric power used for the temperature to reach the inhalation enabled temperature is hereinafter also referred to as an electric power required for preheating. The heating target is the stick-type substrate 150 (more precisely, the substrate part 151 of the stick-type substrate 150). That is, the electric power required for preheating is the total amount of electric power that is input to the heater part 121 from the start of the preheating until the temperature of the stick-type substrate 150 or the temperature of the heater part 121 reaches the inhalation enabled temperature. The electric power that is input to the heater part 121 is measured, for example, by an electric power measurement sensor in included in the sensor part 112.

[0171] In a case where the electric power required for preheating reaches (e.g., exceeds) a fifth threshold, the inhaler device 100 determines that the first cleaning necessity information is to be notified to the user as the cleaning necessity information. With such a configuration, the first cleaning necessity information can be notified to the user by using at least either the direct notification means or the indirect notification means.

[0172] As the amount of butt deposited in the holder part 140 is larger, the electric power required for preheating is longer. This is because the heat produced by the heater part 121 propagates not only to the stick-type substrate 150 held by the holder part 140 but also to the butt deposited in the holder part 140.

[0173] Accordingly, the electric power required for preheating at which the amount of deposited butt is assumed to be so large that cleaning is necessary is set as the fifth threshold. This makes it possible to notify the first cleaning necessity information to the user at an appropriate timing.

[0174] Note that the fifth threshold may be a fixed value or may vary depending on the type of the inhaler device 100, the type of the stick-type substrate 150 that is preheated, or the like. Furthermore, the inhaler device 100 may set the fifth threshold on the basis of the environment temperature. As an example, the inhaler device 100 sets the fifth threshold to a smaller value as the environment temperature is higher. This is because the temperature of the stick-type substrate 150 and the temperature of the heater part 121 are likely to increase, decreasing the electric power required for preheating, as the environment temperature is higher. As another example, the inhaler device 100 sets the fifth threshold to a larger value as the environment temperature is lower. This is because the temperature of the stick-type substrate 150 and the temperature of the heater part 121 are unlikely to increase, increasing the electric power required for preheating, as the environment temperature is lower. With such a configuration, the cleaning necessity information can be notified to the user at an appropriate timing in accordance with the environment temperature.

[0175] In a case where the electric power required for preheating reaches (e.g., exceeds) a sixth threshold that is lower than the fifth threshold, the inhaler device 100 may determine that the second cleaning necessity information is to be notified to the user as the cleaning necessity information. With such a configuration, the second cleaning necessity information can be notified to the user by using at least either the direct notification means or the indirect notification means.

[0176] The electric power required for preheating at which the amount of deposited butt is assumed to become so large that cleaning will be necessary in the near future is set as the sixth threshold. This makes it possible to notify the second cleaning necessity information to the user at an appropriate timing.

[0177] Note that the sixth threshold may be a fixed value or may vary depending on the type of the inhaler device 100, the type of the stick-type substrate 150 that is preheated, or the like. In addition, the sixth threshold may be set on the basis of the fifth threshold, such as 70% of the fifth threshold. Furthermore, the inhaler device 100 may set the sixth threshold on the basis of the environment temperature from reasons similar to the reasons described above regarding the fifth threshold.

(2) Notification of cleaning method information

[0178] The notification information may include information indicating a method for cleaning the inhaler device 100. Such information will be hereinafter also referred to as cleaning method information. For example, the cleaning method information may include a method of using cleaning items to be used for cleaning the inhaler device 100, a method of disassembling the inhaler device 100, and the like. For example, the inhaler device 100 notifies the cleaning method information together with the cleaning necessity information to the user by using the indirect notification means or the direct notification means. Thus, the user can know the cleaning method easily at a timing for cleaning the inhaler device 100.

<2.2.3. Notification of information indicating necessity of replacing substrate>

[0179] The notification information may include replacement necessity information that is information indicating necessity of replacing a substrate that contributes, by the content thereof being consumed, to generation of material to be inhaled by the user, the substrate being used by the inhaler device 100 to generate the material to be inhaled by the user. The substrate herein refers to the cartridge 120 included in the inhaler device 100 according to the first to third, eighth, and tenth configuration examples and the flavor imparting cartridge 130 included in the inhaler device 100 according to the second configuration example. The content herein refers to the aerosol source and the flavor source 131. That is, the replacement necessity information is information indicating necessity of replacing the cartridge 120 and/or the flavor imparting cartridge 130 attached to the power supply unit 110 with a new cartridge 120 and/or a new flavor imparting cartridge 130.

[0180] Every time the user inhales, that is, every time an aerosol is generated, the aerosol source held in the liquid storage part 123 isconsumed. When inhalation is performed in a state where the aerosol source held in the liquid storage part 123 is completely consumed, the heater part 121 performs overheating in a state where the liquid guide part 122 is dry, that is, so-called dry puffing occurs. Thus, the cartridge 120 is desirably replaced at or before a timing at which the aerosol source is completely consumed.

[0181] Similarly, every time the user inhales, that is, every time an aerosol is generated, the flavor source 131 is consumed. When inhalation is performed in a state where the flavor source 131 is completely consumed, the user inhales an aerosol to which the flavor component is not imparted, and the quality of inhalation experience is degraded. Thus, the flavor imparting cartridge 130 is also desirably replaced at or before a timing at which the flavor source 131 is completely consumed.

[0182] In this respect, the inhaler device 100 can notify the replacement necessity information to the user to avoid these troubles that occur when the replacement timing is missed, and usability regarding replacement of the substrate can be improved.

[0183] The replacement necessity information may be first replacement necessity information (corresponding to third information). The first replacement necessity information is information indicating that it is highly necessary to replace the substrate. In other words, the first replacement necessity information is information that recommends replacement of the substrate. By being notified of the first replacement necessity information, the user can replace the substrate at an appropriate timing.

[0184] The replacement necessity information may be second replacement necessity information (corresponding to fourth information). The second replacement necessity information is information indicating that it is becoming necessary to replace the substrate. In other words, the second replacement necessity information is information that recommends replacement of the substrate in the near future. The second replacement necessity information may be information that recommends preparation of replacement of the substrate. The preparation of replacement of the substrate is, for example, purchasing or carrying a new substrate for replacement. By being notified of the second replacement necessity information, the user can prepare for replacement of the substrate in advance.

[0185] The replacement necessity information may include information regarding the timing for replacing the substrate. For example, the necessity information may include information indicating the date and time for replacing the substrate, information indicating the remaining number of times of inhalation before it is necessary

to replace the substrate, and the like. The first replacement necessity information may also include, for example, information indicating that the timing for replacing the substrate has come. The second replacement necessity information may include, for example, information indicating that the timing for replacing the substrate will come in the near future. With such a configuration, the user can easily know the timing for replacing the substrate.

[0186] Now, details of a process of determining whether the replacement necessity information is to be notified will be described below.

- Control based on number of times of inhalation

[0187] The inhaler device information may include the number of times of inhalation performed by the user by using the inhaler device 100 (hereinafter also referred to as the number of times of inhalation). Inhalation performed by the user by using the inhaler device 100 is detected, for example, by the pressure sensor included in the sensor part 112. The inhaler device 100 counts the number of times of inhalation in a case where inhalation performed by the user by using the inhaler device 100 is detected.

[0188] In a case where the number of times of inhalation reaches (e.g., exceeds) a seventh threshold, the inhaler device 100 determines that the first replacement necessity information is to be notified to the user as the replacement necessity information. With such a configuration, the first replacement necessity information can be notified to the user by using at least either the direct notification means or the indirect notification means.

[0189] The number of times of inhalation at which the content is assumed to be completely consumed is set as the seventh threshold herein. This makes it possible to notify the first replacement necessity information to the user at an appropriate timing.

[0190] Note that the seventh threshold may be a fixed value or may vary depending on the type of the inhaler device 100, the type of the substrate that is used, or the like.

[0191] In a case where the number of times of inhalation reaches (e.g., exceeds) an eighth threshold that is lower than the seventh threshold, the inhaler device 100 determines that the second replacement necessity information is to be notified to the user as the replacement necessity information. With such a configuration, the second replacement necessity information can be notified to the user by using at least either the direct notification means or the indirect notification means.

[0192] The number of times of inhalation at which the content is assumed to be completely consumed in the near future is set as the eighth threshold herein. This makes it possible to notify the second replacement necessity information to the user at an appropriate timing.

[0193] Note that the eighth threshold may be a fixed value or may vary depending on the type of the inhaler device 100, the type of the substrate that is used, or the like. In addition, the eighth threshold may be set on the basis of the seventh threshold, such as 70% of the seventh threshold.

[0194] The number of times of inhalation may be initialized in a case where the substrate is replaced. Whether the substrate is replaced may be input by the user or may be detected by the sensor part 112. To initialize the number of times of inhalation means to set the counted number of times of inhalation to zero. With such a configuration, a correlation between the number of times of inhalation and the necessity amount of content of the substrate can be maintained, and thus, it is possible to notify the replacement necessity information based on the number of times of inhalation at an appropriate timing.

[0195] The inhaler device 100 (e.g., the memory part 114) stores the number of times of inhalation. Then, every time inhalation is performed, the inhaler device 100 increments the stored number of times of inhalation and updates the stored number. Thus, for example, even when the power is turned on/off between the last-time inhalation and the current inhalation, the number of times of inhalation can be continuously counted.

- Control based on resistance value of heater part

[0196] The inhaler device information may include a change rate of a resistance value of the heater part 121 that heats the substrate. The change rate of the resistance value of the heater part 121 is detected, for example, by a resistance measurement circuit included in the sensor part 112. Typically, the resistance value of metal increases as the temperature increases. That is, the change rate of the resistance value has a correlation with the change rate of the temperature.

[0197] When inhalation is performed in a state where the aerosol source held in the liquid storage part 123 is completely consumed, the heater part 121 performs overheating in a state where the liquid guide part 122 is dry, that is, so-called dry puffing occurs. In a state where dry puffing occurs, the change rate of the temperature becomes excessively high. In other words, in a state where dry puffing occurs, the change rate of the resistance rate of the heater part 121 becomes excessively high.

[0198] Accordingly, the inhaler device 100 determines whether the replacement necessity information is to be notified on the basis of the change rate of the resistance value of the heater part 121. This makes it possible to notify the replacement necessity information to the user at a timing at which dry puffing occurs or may occur in the near future.

[0199] More specifically, in a case where the change rate of the resistance value of the heater part 121 reaches (e.g., exceeds) a ninth threshold, the inhaler device 100 determines that the first replacement necessity information is to be notified to the user as the replacement necessity information. With such a configuration, the first

replacement necessity information can be notified to the user by using at least either the direct notification means or the indirect notification means. The change rate of the resistance value at which the content is assumed to be completely consumed is set as the ninth threshold herein. This makes it possible to notify the first replacement necessity information to the user at an appropriate timing.

[0200] On the other hand, in a case where the change rate of the resistance value of the heater part 121 reaches (e.g., exceeds) a tenth threshold that is lower than the ninth threshold, the inhaler device 100 determines that the second replacement necessity information is to be notified to the user as the replacement necessity information. With such a configuration, the second replacement necessity information can be notified to the user by using at least either the direct notification means or the indirect notification means. The change rate of the resistance value at which the content is assumed to be completely consumed in the near future is set as the eighth threshold herein. This makes it possible to notify the second replacement necessity information to the user at an appropriate timing.

<2.2.4. Notification of information indicating that inhaler device is in abnormal state>

[0201] The notification information may include information indicating that the inhaler device 100 is in an abnormal state.

[0202] An example of the abnormal state is reduction in the electric power stored in the power supply part 111. The inhaler device 100 acquires, as the inhaler device information, information indicating a remaining amount of the electric power stored in the power supply part 111. The information indicating the remaining amount of the electric power stored in the power supply part 111 is detected, for example, by the sensor part 112. Then, in a case where the remaining amount of the electric power stored in the power supply part 111 falls below a predetermined threshold, the inhaler device 100 determines that information indicating an abnormal state is to be notified. As the predetermined threshold, for example, an electric power required for a single time of inhalation may be set, an electric power required for completely consuming a single cartridge 120 may be set, or an electric power required for completely consuming a single flavor imparting cartridge 130 may be set. This can prevent a situation where it is not possible to perform inhalation because of the reduction in the remaining amount of the electric power.

[0203] Another example of the abnormal state is unauthorized use of the cartridge 120 or the flavor imparting cartridge 130. The inhaler device 100 acquires, as the inhaler device information, identification information of the cartridge 120 and identification information of the flavor imparting cartridge 130 attached to the power supply unit 110. The identification information of the cartridge 120 and the identification information of the flavor imparting cartridge 130 are detected, for example, by the sensor part 112. Then, in a case where the identification information of the cartridge 120 and the identification information of the flavor imparting cartridge 130 differ from identification information of an authorized cartridge 120 and identification information of an authorized flavor imparting cartridge 130, the inhaler device 100 determines that the information indicating an abnormal state is to be notified. If an unauthorized cartridge 120 or an unauthorized flavor imparting cartridge 130 is used, the power supply unit 110, for example, may be broken; however, such a situation can be prevented from occurring by this configuration.

[0204] Another example of the abnormal state is a state where a hardware abnormality occurs. An example of the hardware abnormality is a communication abnormality between various hardware components (e.g., integrated circuits (ICs)) included in the inhaler device 100. Another example of the hardware abnormality is an output abnormality from the power supply part 111. Another example of the hardware abnormality is a temperature abnormality of the power supply part 111 when the power supply part 111 is charged or supplies electric power to the heater part 121. Another example of the hardware abnormality is degradation of the power supply part 111. Degradation of the power supply part 111 is detected, for example, on the basis of at least any of a voltage drop at the time of charge, a charging time until full charge, or the number of times of charging. Information indicating whether such a hardware abnormality occurs is detected, for example, by the sensor part 112. The inhaler device 100 acquires, as the inhaler device information, the information indicating whether such a hardware abnormality occurs, and, on the basis of the acquired information, determines whether the information indicating the abnormal state is to be notified. With such a configuration, the user can be notified of occurrence of the hardware abnormality and can be prompted to repair or replace the hardware, for example.

<2.3. Process flow>

[0205] FIG. 12 is a sequence chart illustrating an example of a process flow of notifying information executed by the system 1 according to the present embodiment. As illustrated in FIG. 12, this sequence involves the inhaler device 100 and the terminal device 200.

[0206] As illustrated in FIG. 12, first, the inhaler device 100 acquires the inhaler device information (step S102).

[0207] Subsequently, on the basis of the inhaler device information, the inhaler device 100 determines whether the information is to be notified to a user (step S104). For example, on the basis of at least any of the number of times of preheating, the time required for preheating, or the electric power required for preheating, the inhaler device 100 determines whether the cleaning necessity information is to be notified. In addition, on the basis of at least either the number of times of inhalation or a change

rate of a resistance value of the heater part 121, the inhaler device 100 determines whether the replacement necessity information is to be notified. Furthermore, on the basis of at least any of the information indicating the remaining electric power stored in the power supply part 111, the identification information of the cartridge 120 and the identification information of the flavor imparting cartridge 130 attached to the power supply unit 110, or information indicating whether the hardware abnormality occurs, the inhaler device 100 determines whether information indicating that the inhaler device 100 is in an abnormal state is to be notified.

[0208] In a case where it is determined that the information is not to be notified to the user (step S104/NO), the process returns to step S102 again. On the other hand, in a case where it is determined that the information is to be notified to the user (step S104/YES), the inhaler device 100 determines whether wireless connection with the terminal device 200 is established (step S106).

[0209] In a case where it is determined that the inhaler device 100 and the terminal device 200 are wirelessly connected to each other (step S106/YES), the inhaler device 100 transmits the notification information that is determined to be notified in step S104 to the terminal device 200 (step S108). Upon reception of the notification information, the terminal device 200 notifies the received notification information to the user by using the notification part 220 (step S110).

[0210] If it is determined that the inhaler device 100 and the terminal device 200 are not wirelessly connected to each other (step S106/NO), the inhaler device 100 notifies the notification information that is determined to be notified in step S104 to the user by using the notification part 113 (step S112).

<<3. Supplement>>

[0211] Although the preferred embodiment of the present invention has been described above in detail with reference to the accompanying drawings, the present invention is not limited to such an example. It is obvious for a person of ordinary skill in the technical field relevant to the present invention that various modification examples or alternation examples may be arrived at within the technical thought described in the scope of the claims, and it is understood that these examples naturally fall within the technical scope of the present invention.

[0212] In addition, the processes described herein with reference to the flowchart and the sequence chart are not necessarily executed in the illustrated order. Some of the steps may be executed in parallel. Furthermore, an additional step may be adopted, and some of the steps may be skipped.

[0213] Note that the process executed by the devices described herein may be implemented by using any of software, hardware, and a combination of software and hardware. Programs constituting software are, for example, stored in advance storage media (non-transitory media) provided inside or outside the devices. Then, for example, when being executed by a computer, each program is loaded into a RAM and executed by a processor such as a CPU. Examples of the storage media include a magnetic disk, an optical disk, a magnetooptical disk, a flash memory, and the like. In addition, the above computer programs may be distributed, for example, via a network without using storage media.

Reference Signs List

[0214]

1	system
100	inhaler device
111	power supply part
112	sensor part
113	notification part
114	memory part
115	communication part
116	control part
120	cartridge
121	heater part
122	liquid guide part
123	liquid storage part
130	flavor imparting cartridge
131	flavor source
140	holder part
141	internal space
150	stick-type substrate
151	substrate part
200	terminal device
210	sensor part
220	notification part
230	communication part
240	memory part
250	control part

Claims

1. An inhaler device comprising:

a wireless communication part that transmits/receives information wirelessly;
a notification part that notifies information to a user; and
a control part that controls the wireless communication part to transmit, to another device, notification information that is the information to be notified to the user in a case where the inhaler device and the other device are wirelessly connected to each other, and that controls the notification part to notify the notification information to the user in a case where the inhaler device and the other device are not wirelessly connected to each other.

2. The inhaler device according to claim 1, wherein the control part acquires information regarding the inhaler device and determines, on the basis of the acquired information regarding the inhaler device, whether the notification information is to be notified to the user.

3. The inhaler device according to claim 2, wherein the control part does not notify the notification information by using the notification part in a case where the inhaler device and the other device are wirelessly connected to each other.

4. The inhaler device according to claim 2 or 3, wherein a timing at which the control part determines whether the notification information is to be notified to the user is after a timing at which the control part determines whether the inhaler device and the other device are wirelessly connected to each other.

5. The inhaler device according to claim 2 or 3, wherein a timing at which the control part determines whether the notification information is to be notified to the user is before a timing at which the control part determines whether the inhaler device and the other device are wirelessly connected to each other.

6. The inhaler device according to any one of claims 2 to 5, wherein the notification information includes information indicating necessity of cleaning the inhaler device.

7. The inhaler device according to claim 6, wherein

the information regarding the inhaler device includes a number of times of preheating executed by the inhaler device to enable the user to inhale by using the inhaler device, and
the control part determines that first information is to be notified to the user as the information indicating necessity of cleaning the inhaler device in a case where the number of times of preheating reaches a first threshold.

8. The inhaler device according to claim 7, wherein the number of times of preheating is initialized in a case where a predetermined user operation is performed.

9. The inhaler device according to claim 7 or 8, wherein the control part counts the number of times of preheating in a case where it is determined that the preheating is executed for a substrate that contributes, when being heated, to generation of material to be inhaled by the user.

10. The inhaler device according to any one of claims 7 to 9, further comprising

a memory part, wherein
the memory part stores the number of times of preheating.

11. The inhaler device according to any one of claims 7 to 10, wherein the control part determines that second information is to be notified to the user as the information indicating necessity of cleaning the inhaler device in a case where the number of times of preheating reaches a second threshold that is lower than the first threshold.

12. The inhaler device according to any one of claims 6 to 11, wherein

the information regarding the inhaler device includes a time taken for a temperature of a heating target or a temperature of a heater part that executes preheating to reach a predetermined temperature when the inhaler device executes the preheating to enable a user to inhale by using the inhaler device, and
the control part determines that first information is to be notified to the user as the information indicating necessity of cleaning the inhaler device in a case where the time taken for the temperature of the heating target or the temperature of the heater part to reach the predetermined temperature reaches a third threshold.

13. The inhaler device according to claim 12, wherein the control part sets the third threshold on the basis of an environment temperature that is an ambient temperature of the inhaler device.

14. The inhaler device according to claim 12 or 13, wherein the control part determines that second information is to be notified to the user as the information indicating necessity of cleaning the inhaler device in a case where the time taken for the temperature of the heating target or the temperature of the heater part to reach the predetermined temperature reaches a fourth threshold that is lower than the third threshold.

15. The inhaler device according to any one of claims 6 to 14, wherein

the information regarding the inhaler device includes an electric power used for a temperature of a heating target or a temperature of a heater part that executes preheating to reach a predetermined temperature when the inhaler device executes the preheating to enable a user to inhale by using the inhaler device, and
the control part determines that first information is to be notified to the user as the information indicating necessity of cleaning the inhaler de-

vice in a case where the electric power used for the temperature of the heating target or the temperature of the heater part to reach the predetermined temperature reaches a fifth threshold.

16. The inhaler device according to claim 15, wherein the control part sets the fifth threshold on the basis of an environment temperature that is an ambient temperature of the inhaler device.

17. The inhaler device according to claim 15 or 16, wherein the control part determines that second information is to be notified to the user as the information indicating necessity of cleaning the inhaler device in a case where the electric power used for the temperature of the heating target or the temperature of the heater part to reach the predetermined temperature reaches a sixth threshold that is lower than the fifth threshold.

18. The inhaler device according to any one of claims 6 to 17, wherein the notification information includes information indicating a method for cleaning the inhaler device.

19. The inhaler device according to any one of claims 6 to 18, wherein the information indicating necessity of cleaning the inhaler device includes information regarding a timing for cleaning the inhaler device.

20. The inhaler device according to any one of claims 2 to 19, wherein the notification information includes information indicating necessity of replacing a substrate that contributes, by a content of the substrate being consumed, to generation of material to be inhaled by the user, the substrate being used by the inhaler device to generate the material to be inhaled by the user.

21. The inhaler device according to claim 20, wherein

the information regarding the inhaler device includes a number of times of inhalation performed by the user by using the inhaler device, and
the control part determines that third information is to be notified to the user as the information indicating necessity of replacing the substrate in a case where the number of times of inhalation reaches a seventh threshold.

22. The inhaler device according to claim 21, wherein the number of times of inhalation is initialized in a case where the substrate is replaced.

23. The inhaler device according to claim 21 or 22, further comprising

a memory part, wherein
the memory part stores the number of times of inhalation.

24. The inhaler device according to any one of claims 21 to 23, wherein the control part determines that fourth information is to be notified to the user as the information indicating necessity of replacing the substrate in a case where the number of times of inhalation reaches an eighth threshold that is lower than the seventh threshold.

25. The inhaler device according to any one of claims 20 to 24, wherein

the information regarding the inhaler device includes a change rate of a resistance value of a heater part that heats the substrate, and
the control part determines whether the information indicating necessity of replacing the substrate is to be notified on the basis of the change rate of the resistance value of the heater part.

26. The inhaler device according to any one of claims 20 to 25, wherein the information indicating necessity of replacing the substrate includes information regarding a timing for replacing the substrate.

27. The inhaler device according to any one of claims 1 to 26, wherein the notification information includes information indicating that the inhaler device is in an abnormal state.

28. The inhaler device according to any one of claims 1 to 27, wherein the notification part includes at least any of a display device, a light-emitting device, a vibration device, or a sound output device.

29. An information processing method to be executed by an inhaler device, the information processing method comprising:

wirelessly transmitting, to another device, notification information that is the information to be notified to a user in a case where the inhaler device and the other device are wirelessly connected to each other; and
notifying the notification information to the user in a case where the inhaler device and the other device are not wirelessly connected to each other.

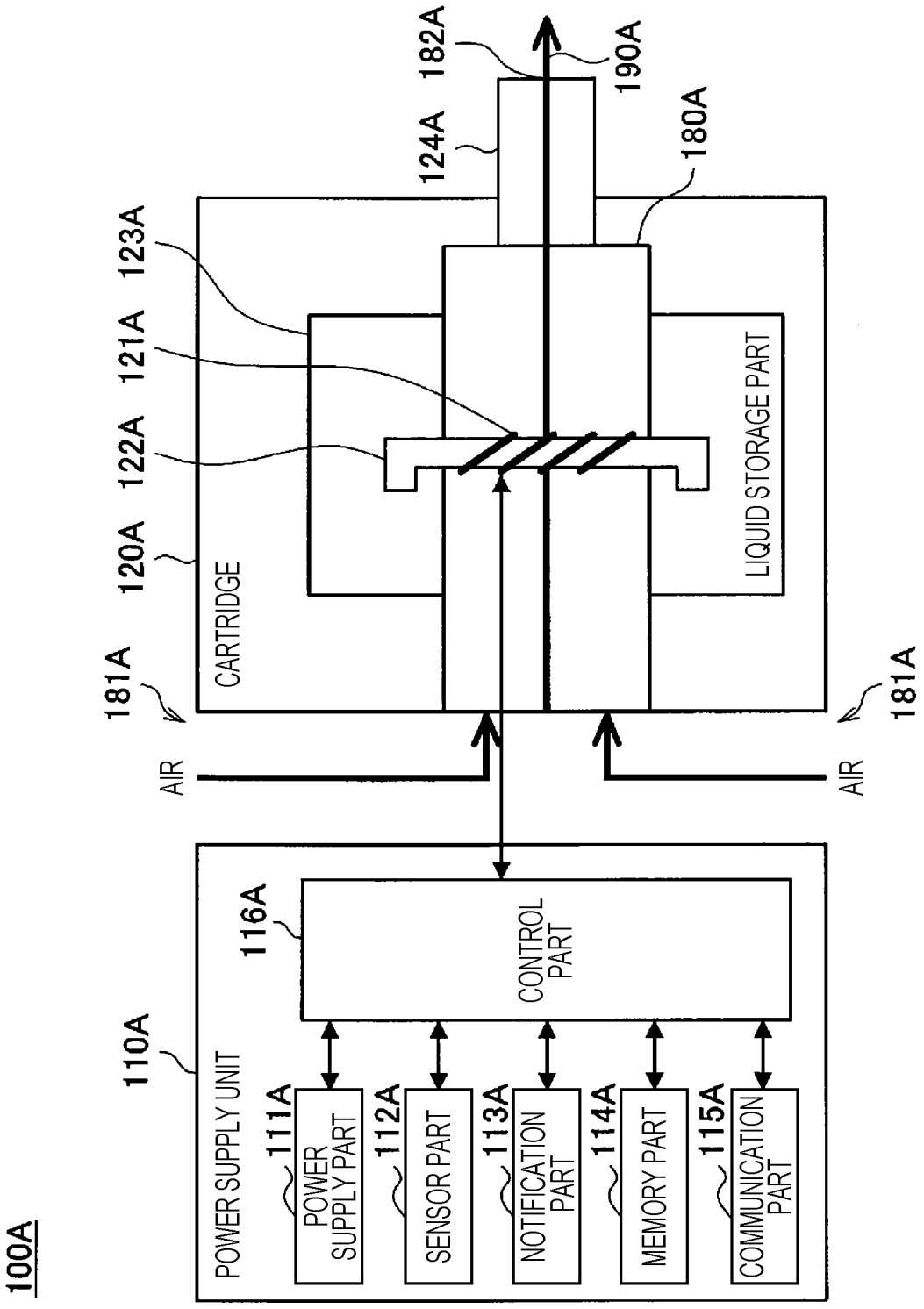
30. A program for causing a computer that controls an inhaler device to function as:

a wireless communication part that transmits/receives information wirelessly;
a notification part that notifies information to a

user; and

a control part that controls the wireless communication part to transmit, to another device, notification information that is the information to be notified to the user in a case where the inhaler device and the other device are wirelessly connected to each other, and that controls the notification part to notify the notification information to the user in a case where the inhaler device and the other device are not wirelessly connected to each other.

FIG. 1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112A
SENSOR PART
113A
NOTIFICATION PART
114A
MEMORY PART
115A
COMMUNICATION PART
AIR
AIR
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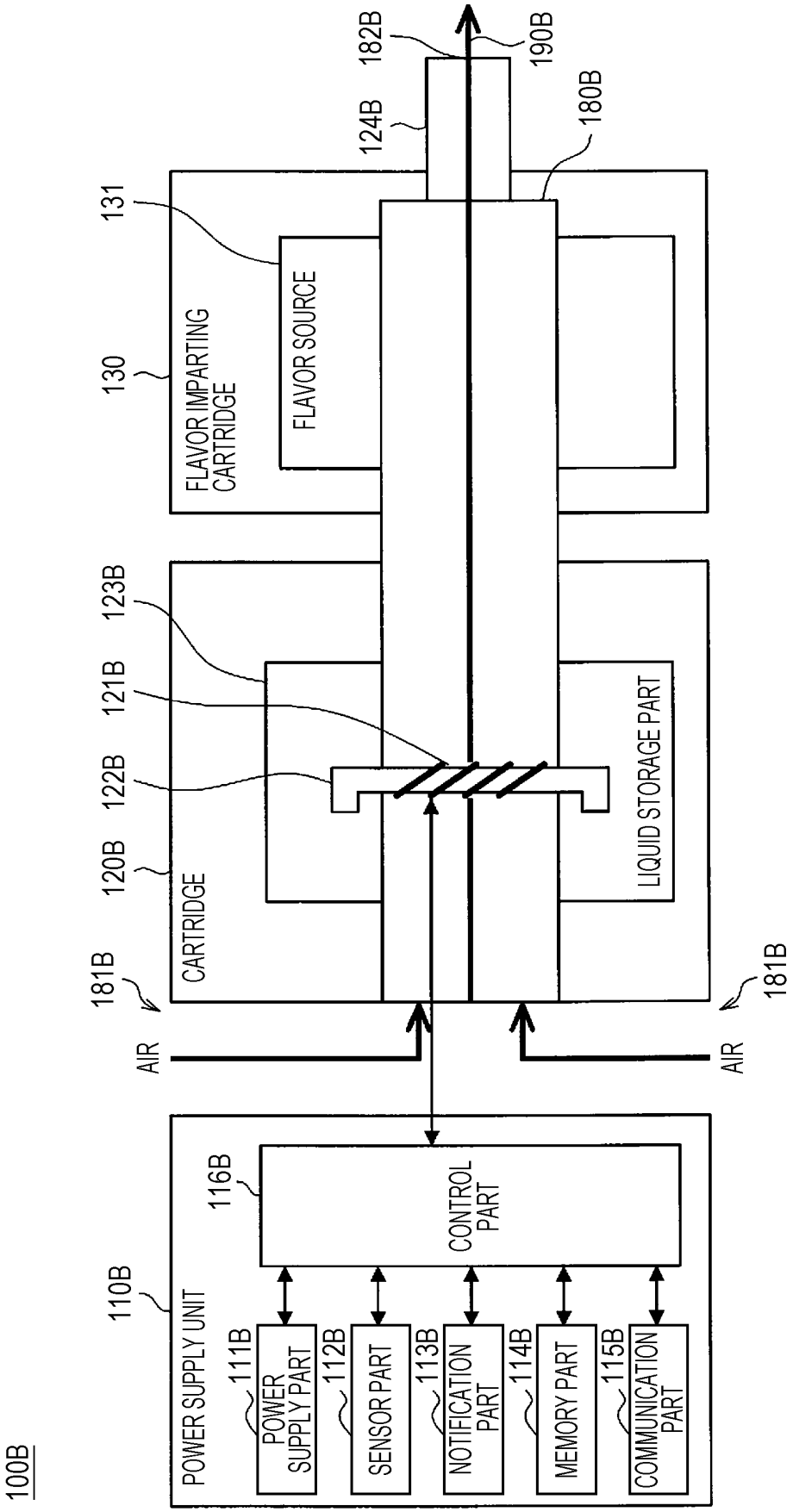
LIQUID STORAGE PART

FIG. 2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CONTROL PART
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MEMORY PART
114B
COMMUNICATION PART
115B
AIR
AIR
181B
181B
CARTRIDGE
120B
LIQUID STORAGE PART
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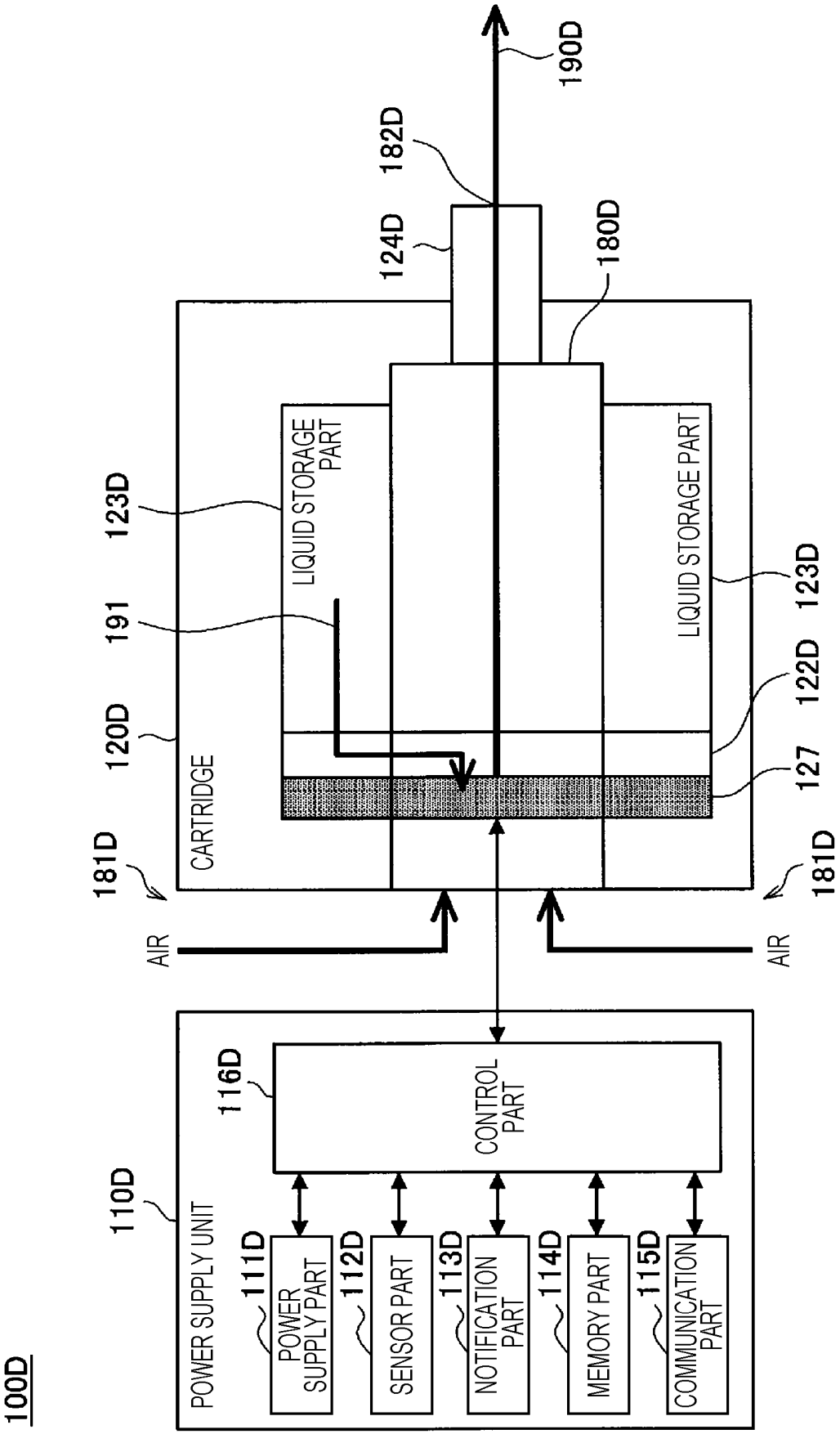
FIG. 3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116D
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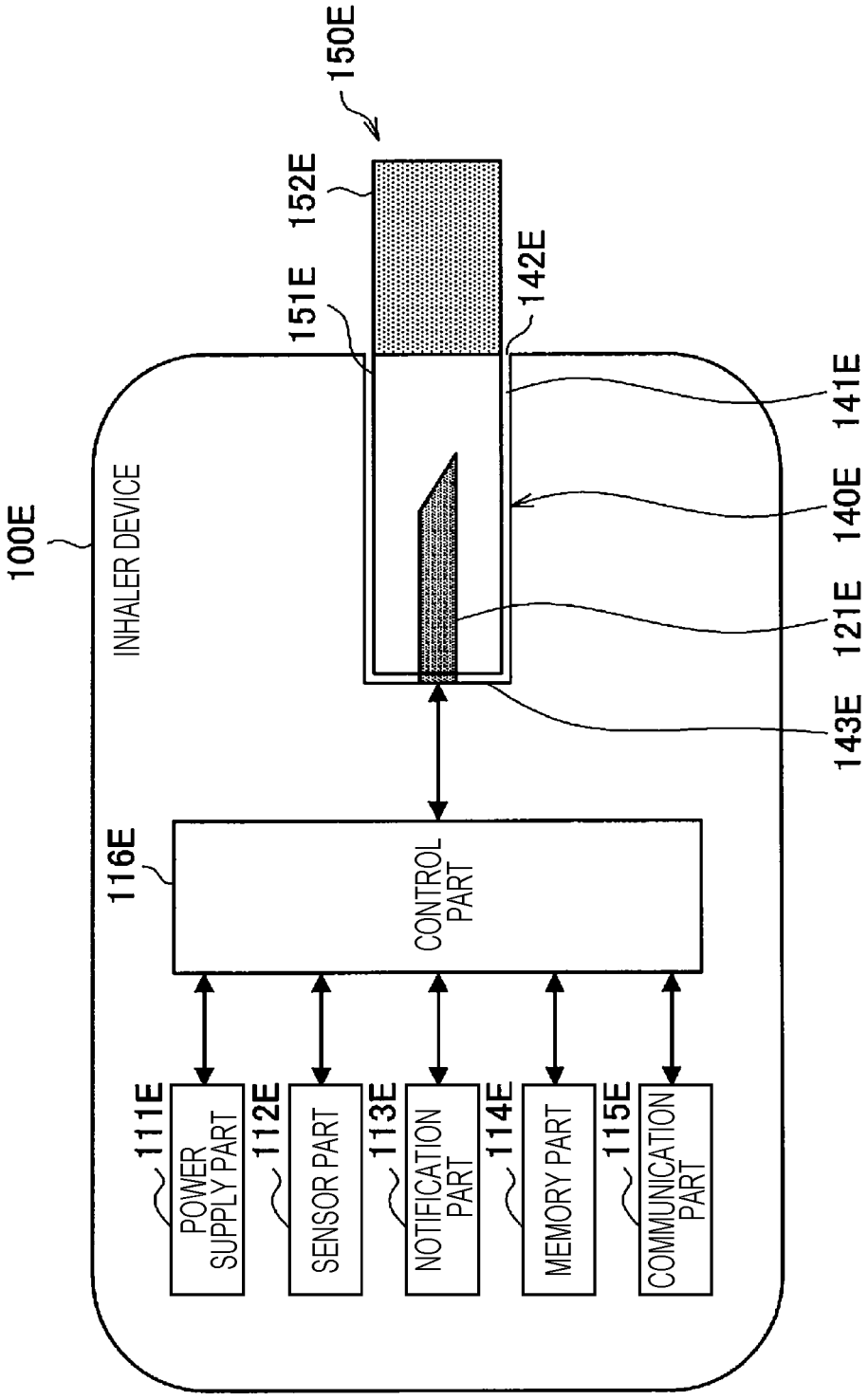
114D
MEMORY PART
115D
COMMUNICATION PART

FIG. 4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140E
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CONTROL PART
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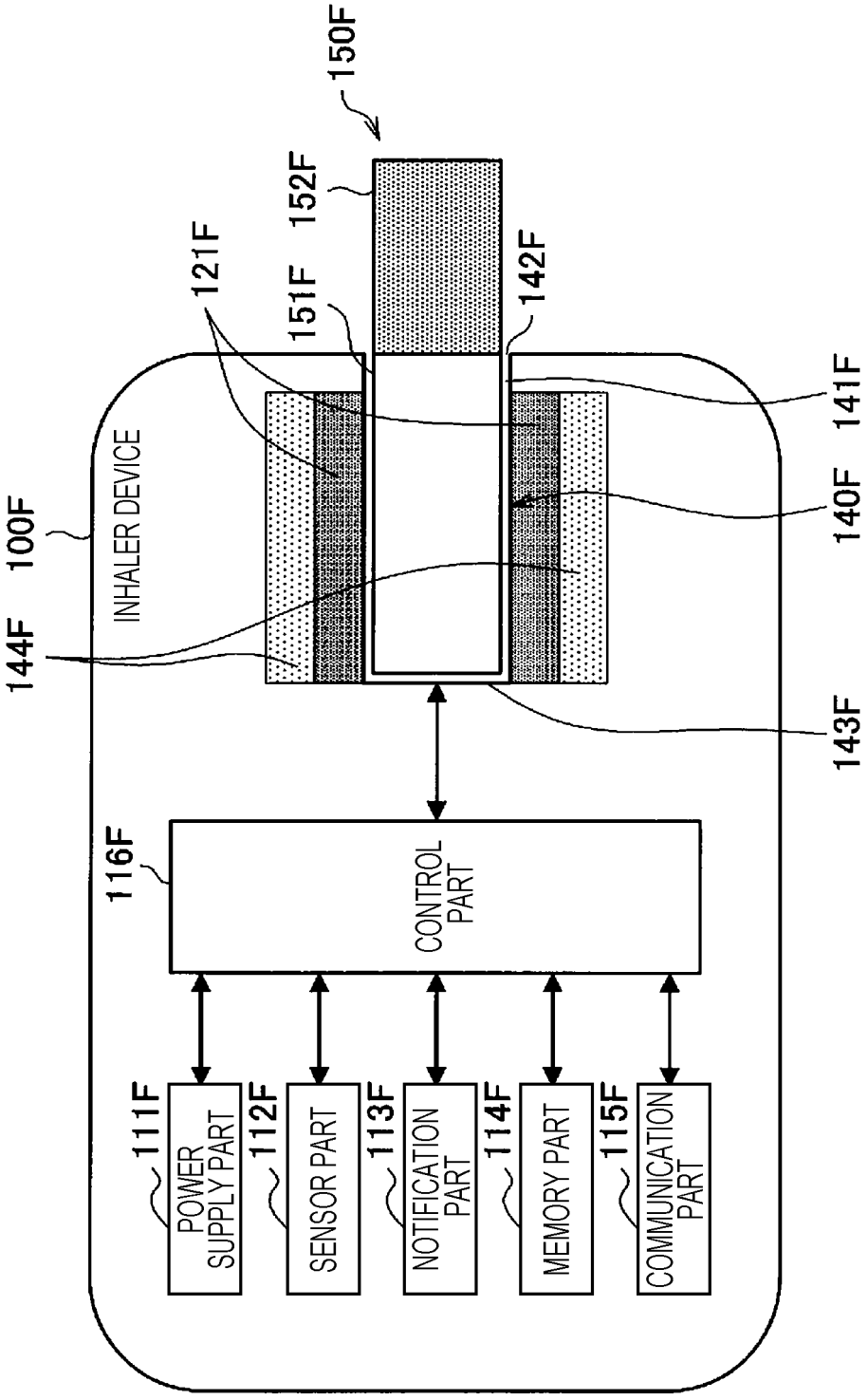
SENSOR PART
113E
NOTIFICATION PART
114E
MEMORY PART
115E
COMMUNICATION PART

FIG. 5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NOTIFICATION PART
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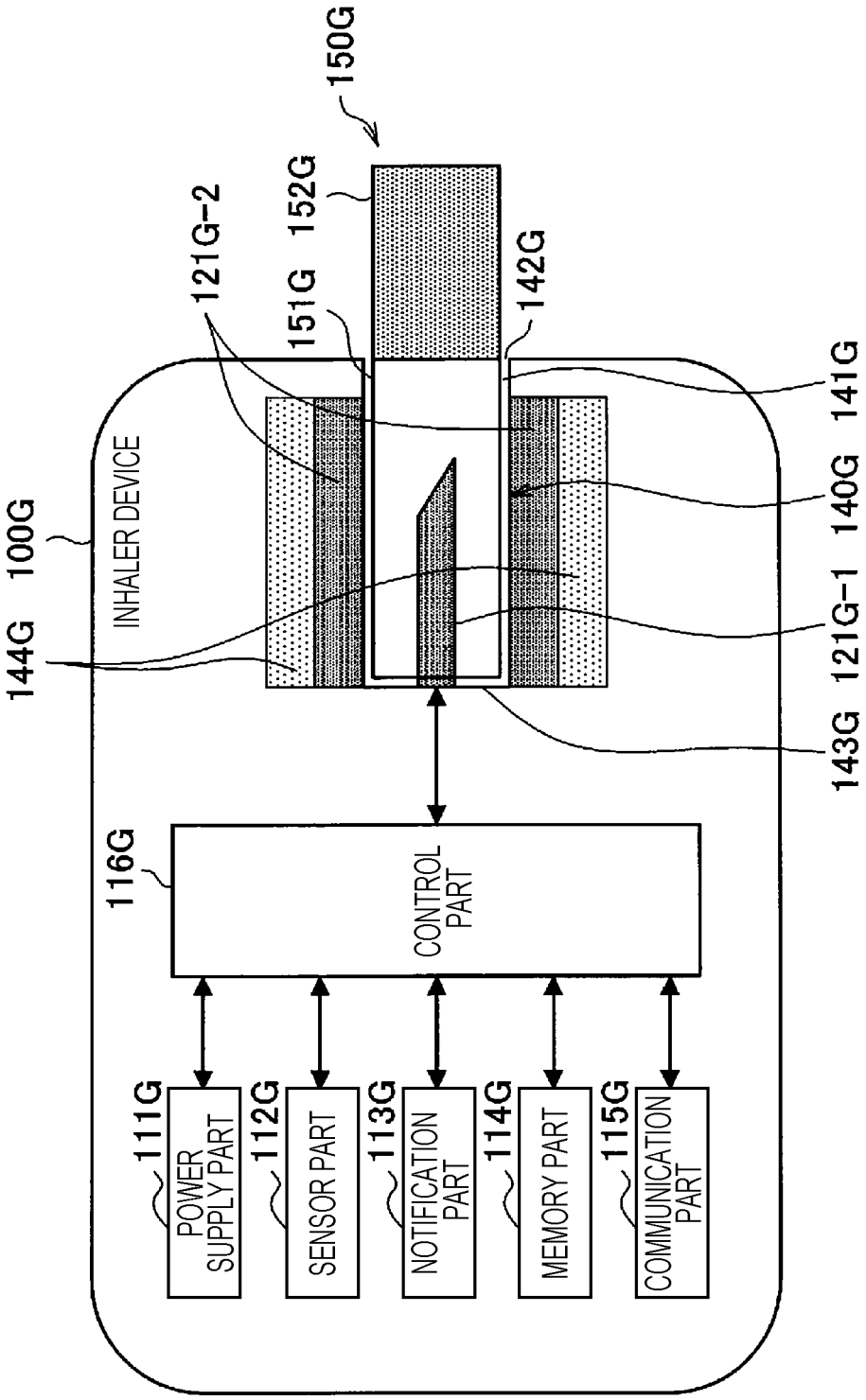
MEMORY PART
115F
COMMUNICATION PART

FIG. 6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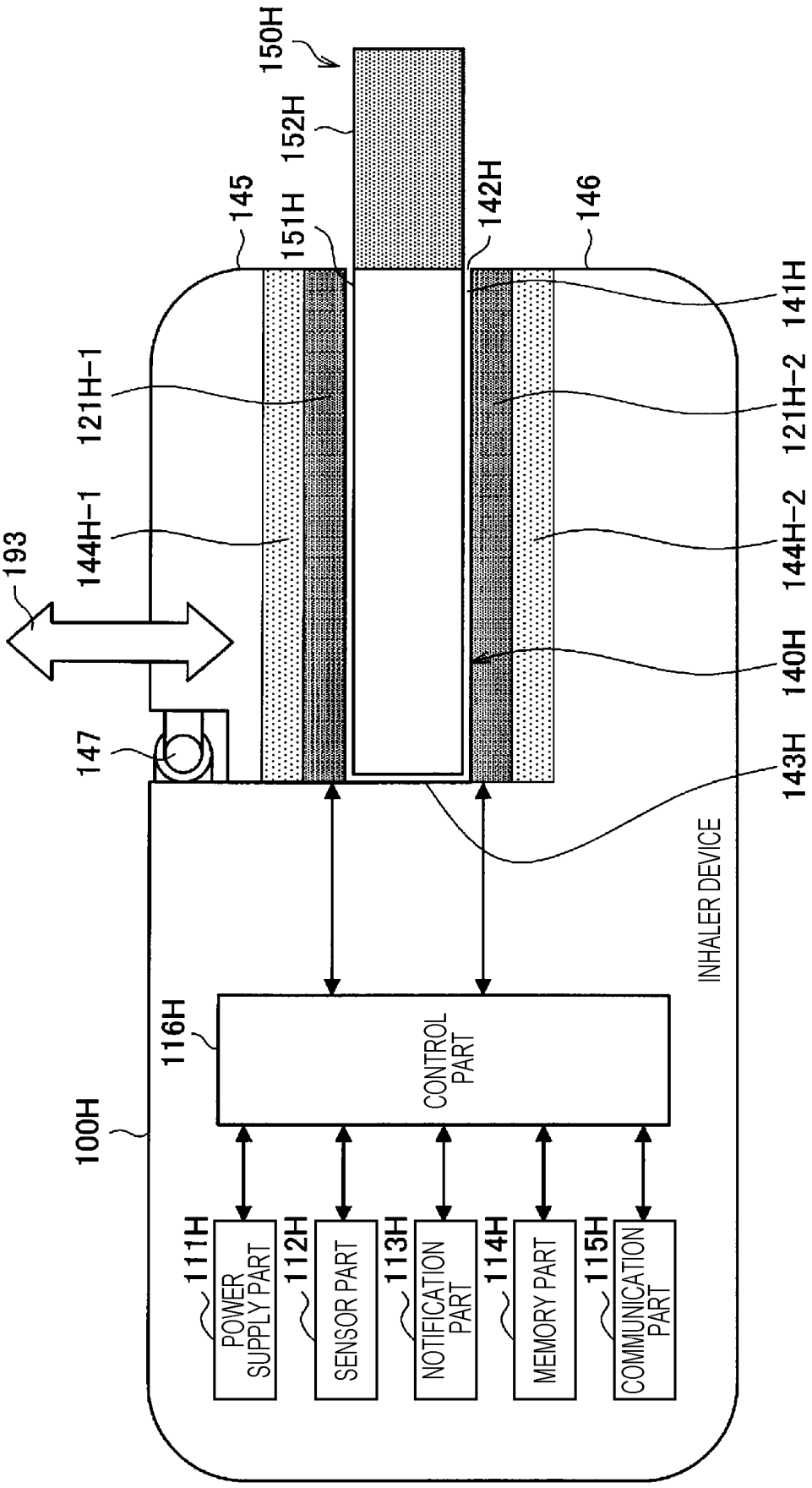
SENSOR PART
113G
NOTIFICATION PART
114G
MEMORY PART
115G
COMMUNICATION PART

FIG. 7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144H-2
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147
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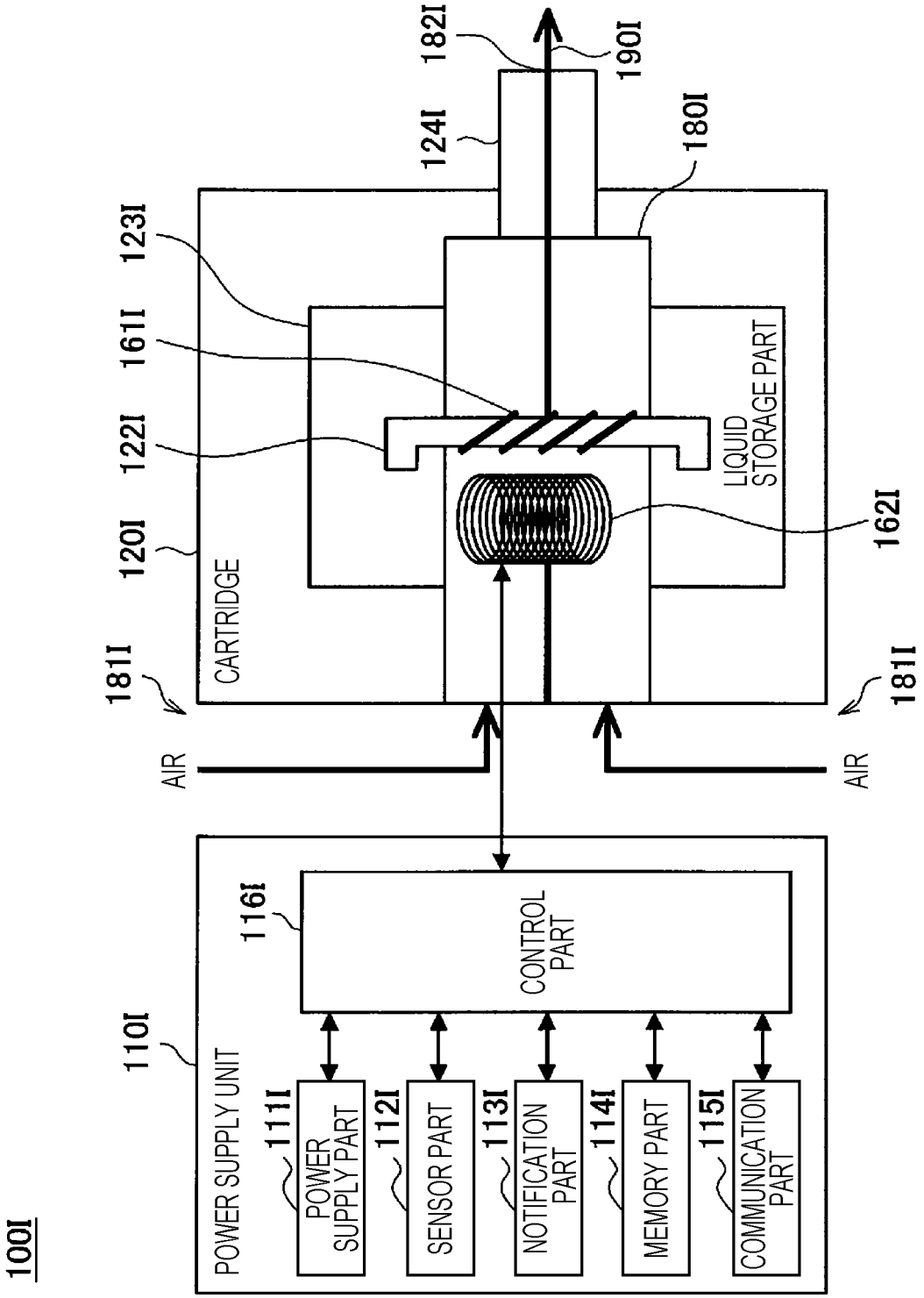
143H
INHALER DEVICE
116H
CONTROL PART
100H
111H
POWER SUPPLY PART
112H
SENSOR PART
113H
NOTIFICATION PART
114H
MEMORY PART
115H
COMMUNICATION PART

FIG. 8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SENSOR PART
113I
NOTIFICATION PART
114I
MEMORY PART
115I
COMMUNICATION PART
116I
CONTROL PART
AIR
AIR
181I
181I
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CARTRIDGE
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123I
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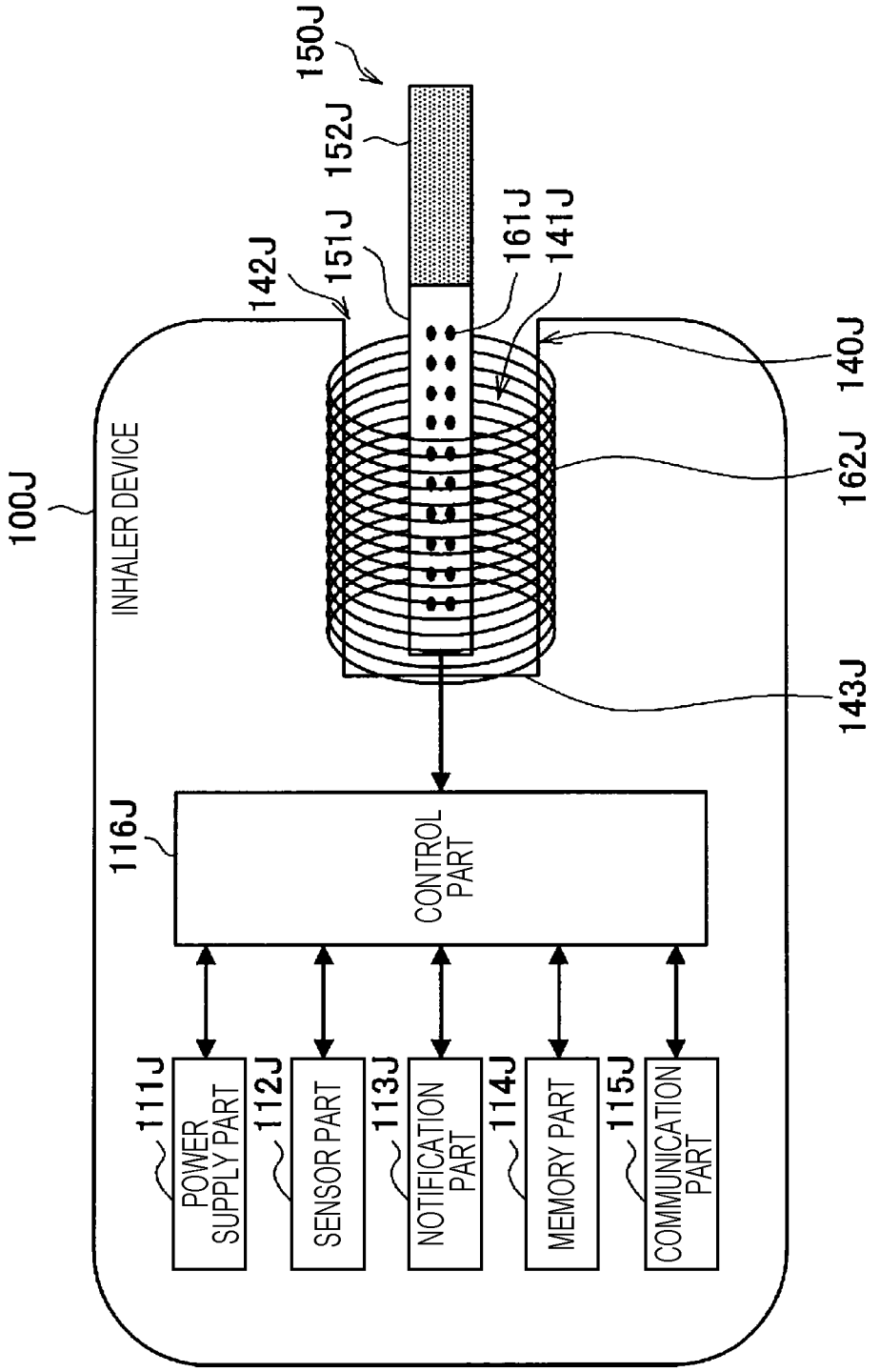
161I
162I
180I
182I
190I
LIQUID STORAGE PART

FIG. 9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143J
116J
CONTROL PART
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SENSOR PART
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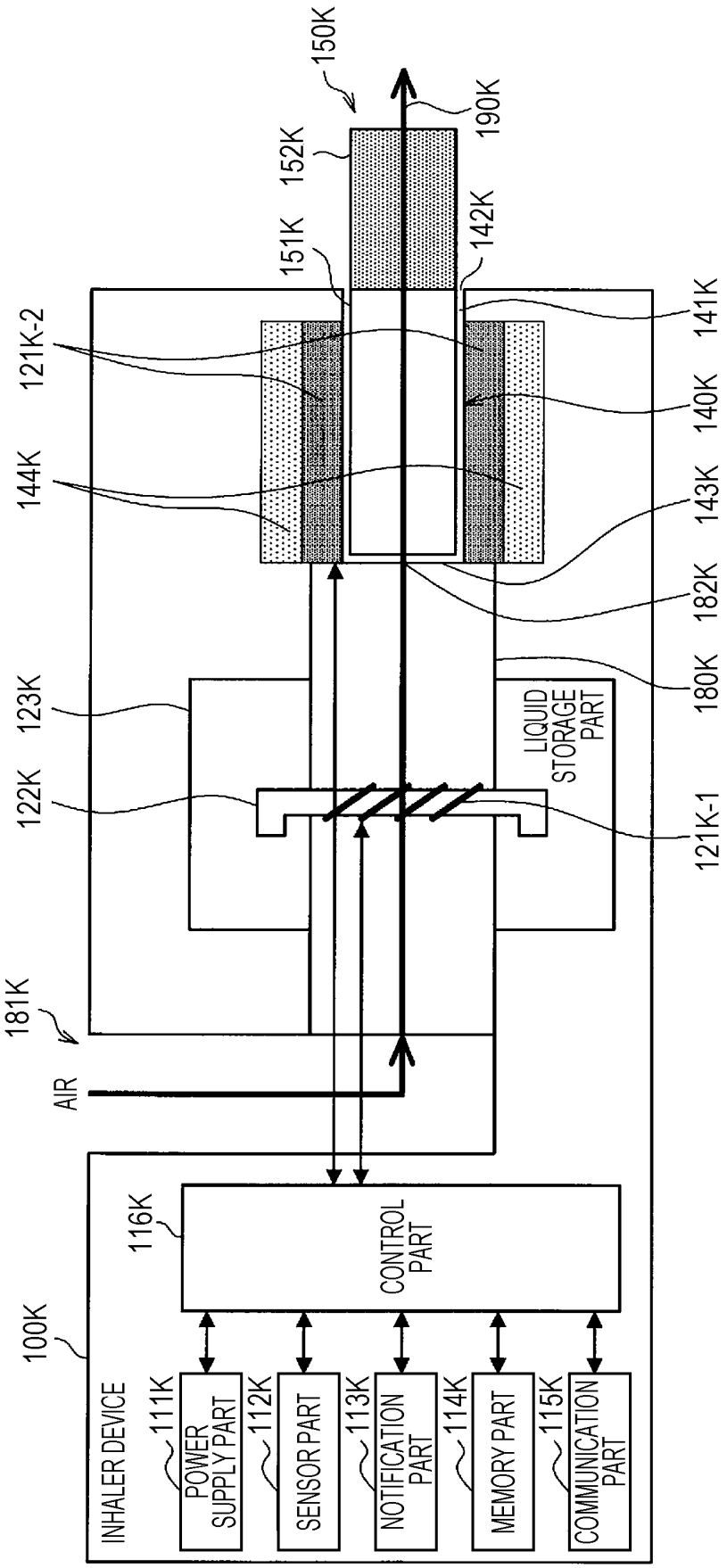
NOTIFICATION PART
114J
MEMORY PART
115J
COMMUNICATION PART

FIG. 10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LIQUID STORAGE PART
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121K-1
181K
AIR
116K
CONTROL PART
100K
INHALER DEVICE
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MEMORY PART
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COMMUNICATION PART

FIG. 11

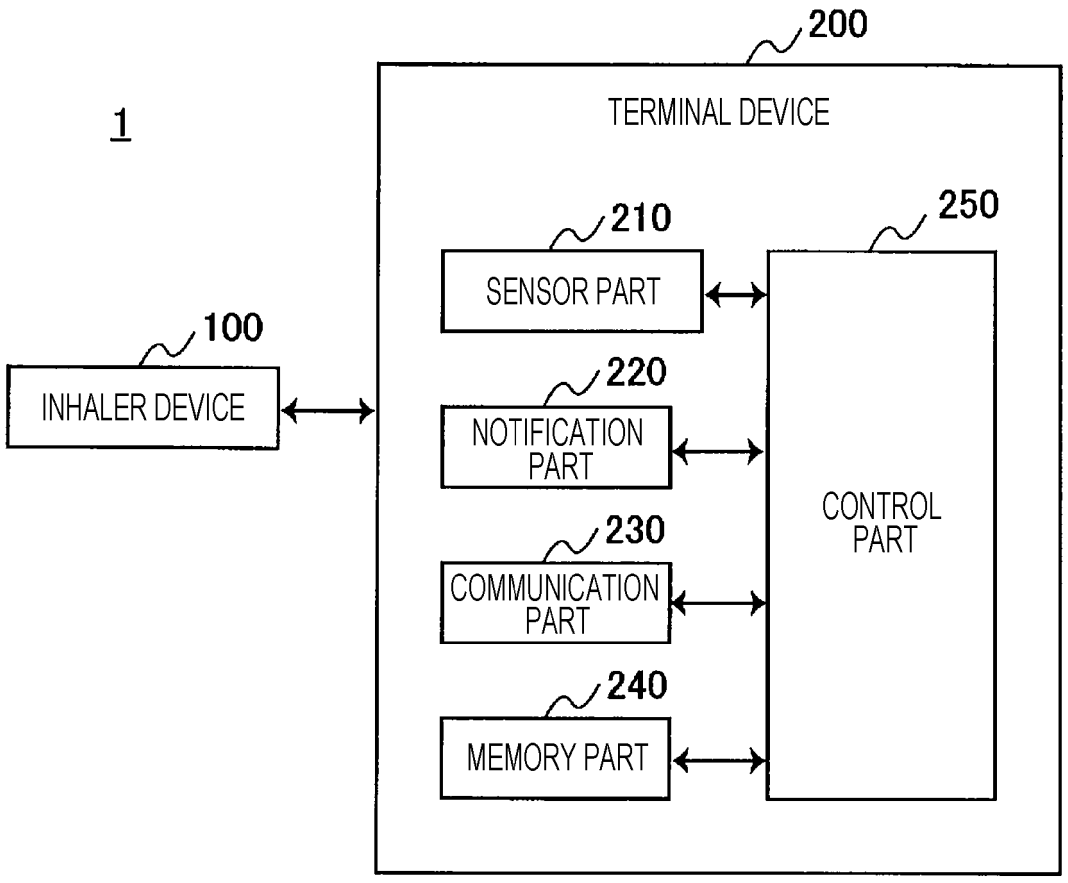
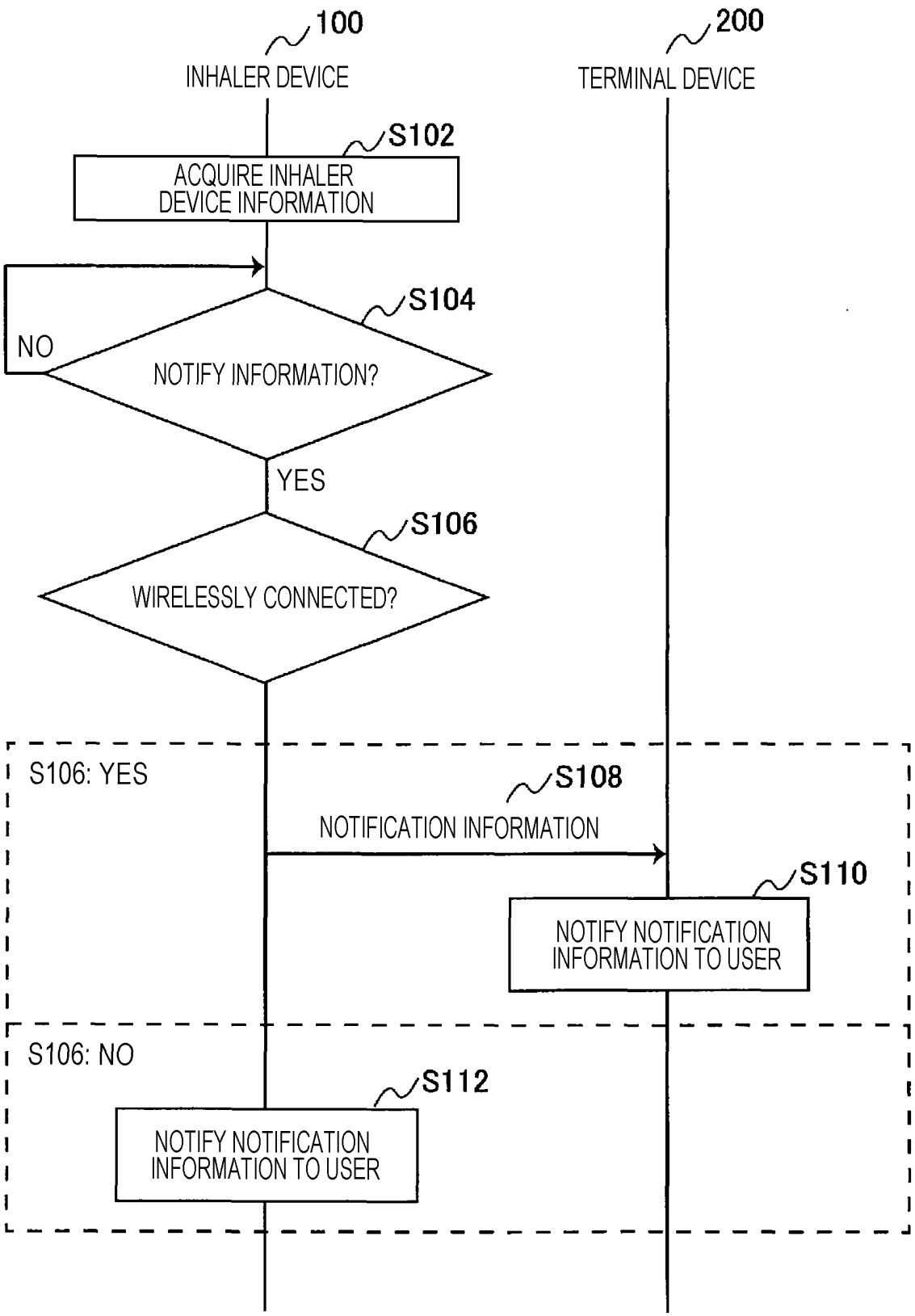

1
200
TERMINAL DEVICE
210
SENSOR PART
250
100
INHALER DEVICE
220
NOTIFICATION PART
CONTROL PART
230
COMMUNICATION PART
240
MEMORY PART

FIG. 12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TERMINAL DEVICE
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S104
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NOTIFY INFORMATION?
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S106
WIRELESSLY CONNECTED?
S106: YES
S108
NOTIFICATION INFORMATION
S110
NOTIFY NOTIFICATION INFORMATION TO USER
S106: NO
S112
NOTIFY NOTIFICATION INFORMATION TO USER

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2019/046816

A. CLASSIFICATION OF SUBJECT MATTER
Int. Cl. A24F40/65(2020.01)i, A24F40/85(2020.01)i, A24F40/53(2020.01)i
FI: A24F47/00

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. A24F40/00-40/95, A24F47/00

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.
X	US 2017/0027229 A1 (LUNATECH, LLC) 02 February 2017, paragraph [0112], fig. 10	1-2, 4-5, 29-30
Y		6, 19-28
A		3, 7-18
Y	JP 2002-514910 A (PHILIP MORRIS PRODUCTS INC.) 21 May 2002, page 15, lines 6-12, page 17, lines 16-20, page 22, line 28, fig. 1, 2	6, 19-28
Y	WO 2018/138749 A1 (JAPAN TOBACCO INC.) 02 August 2018, paragraph [0194]	21-28
Y	JP 6553799 B1 (JAPAN TOBACCO INC.) 31 July 2019, paragraph [0078]	25-28

☒ 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	Date of mailing of the international search report
10.01.2020	10.02.2020
Name and mailing address of the ISA/ Japan Patent Office 3-4-3, Kasumigaseki, Chiyoda-ku, Tokyo 100-8915, Japan	Authorized officer Telephone No.

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

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2019/046816

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2018-533923 A (NICOVENTURES HOLDINGS LTD.) 22 November 2018, paragraphs [0058], [0059], fig. 4	1-30

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/JP2019/046816

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