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(54) **COVER AND AEROSOL GENERATION DEVICE**

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(57) **ABSTRACT**

This cover **10** is mounted in a body having a heating unit that heats a base material containing an aerosol source, the cover comprising: an external sensor **31** that detects external information, which is separate from internal information related to the state of the body and internal information related to the state of the cover; a display unit **80** that displays information; and a display control unit **62** that causes the display unit **80** to display the external information detected by the external sensor **31** and/or information acquired from an external device other than the cover **10**.

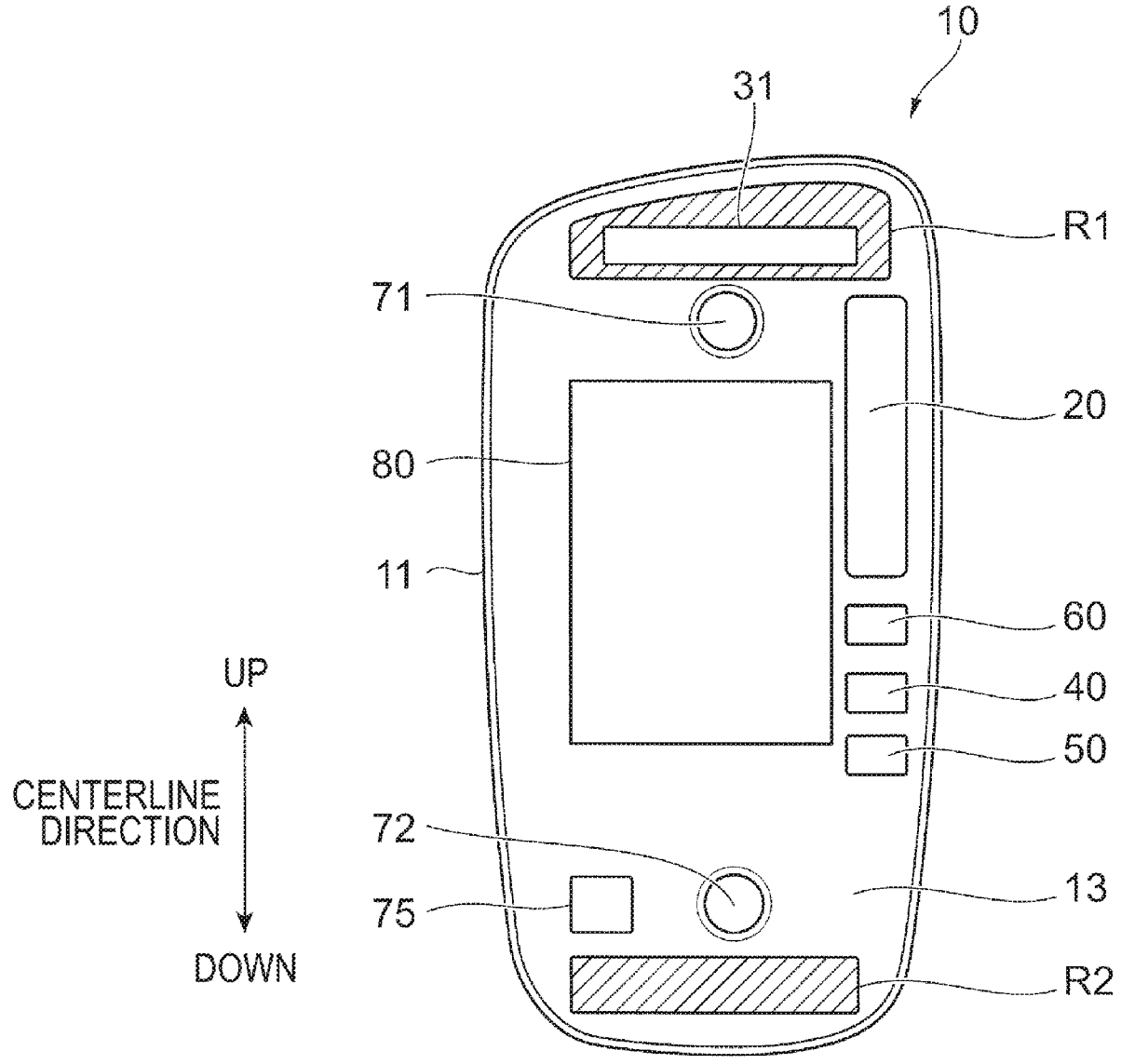

FIG. 1

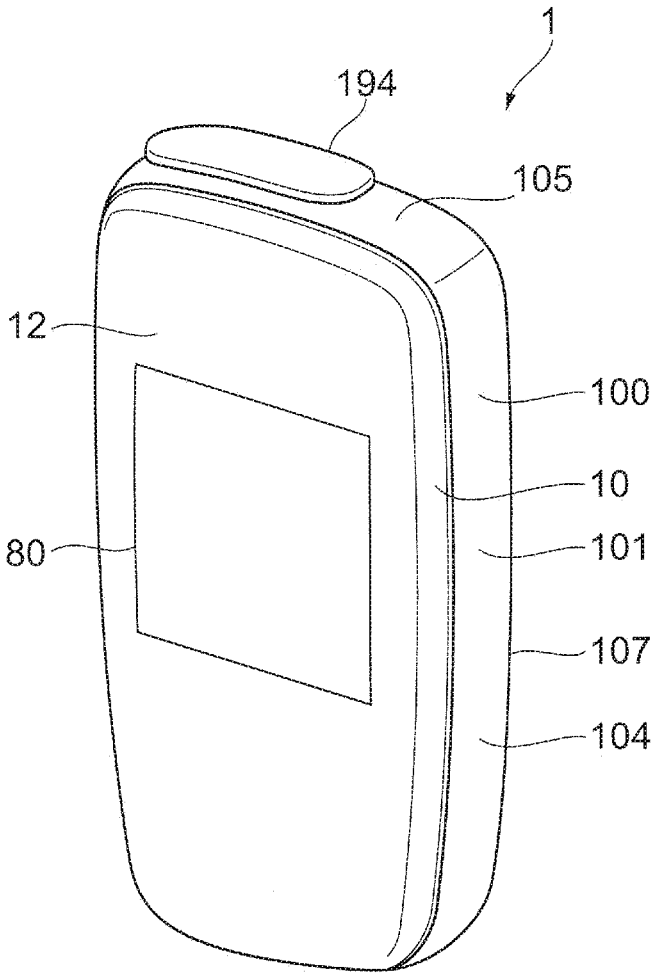

FIG. 2

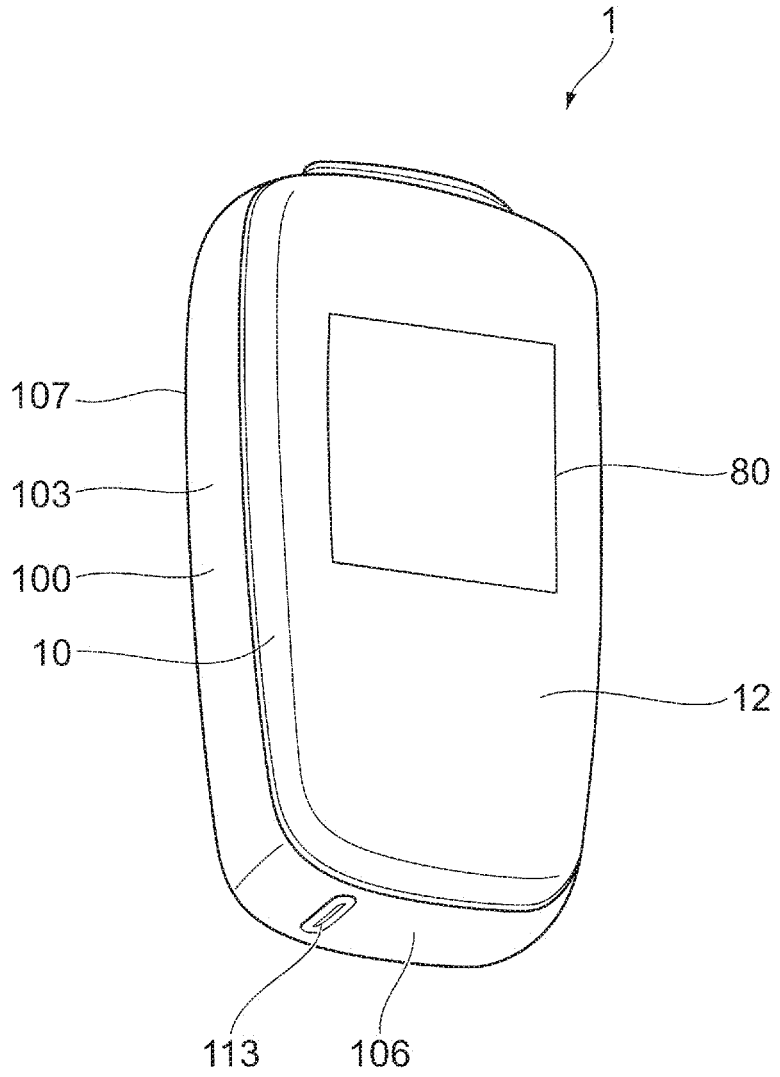

FIG. 3

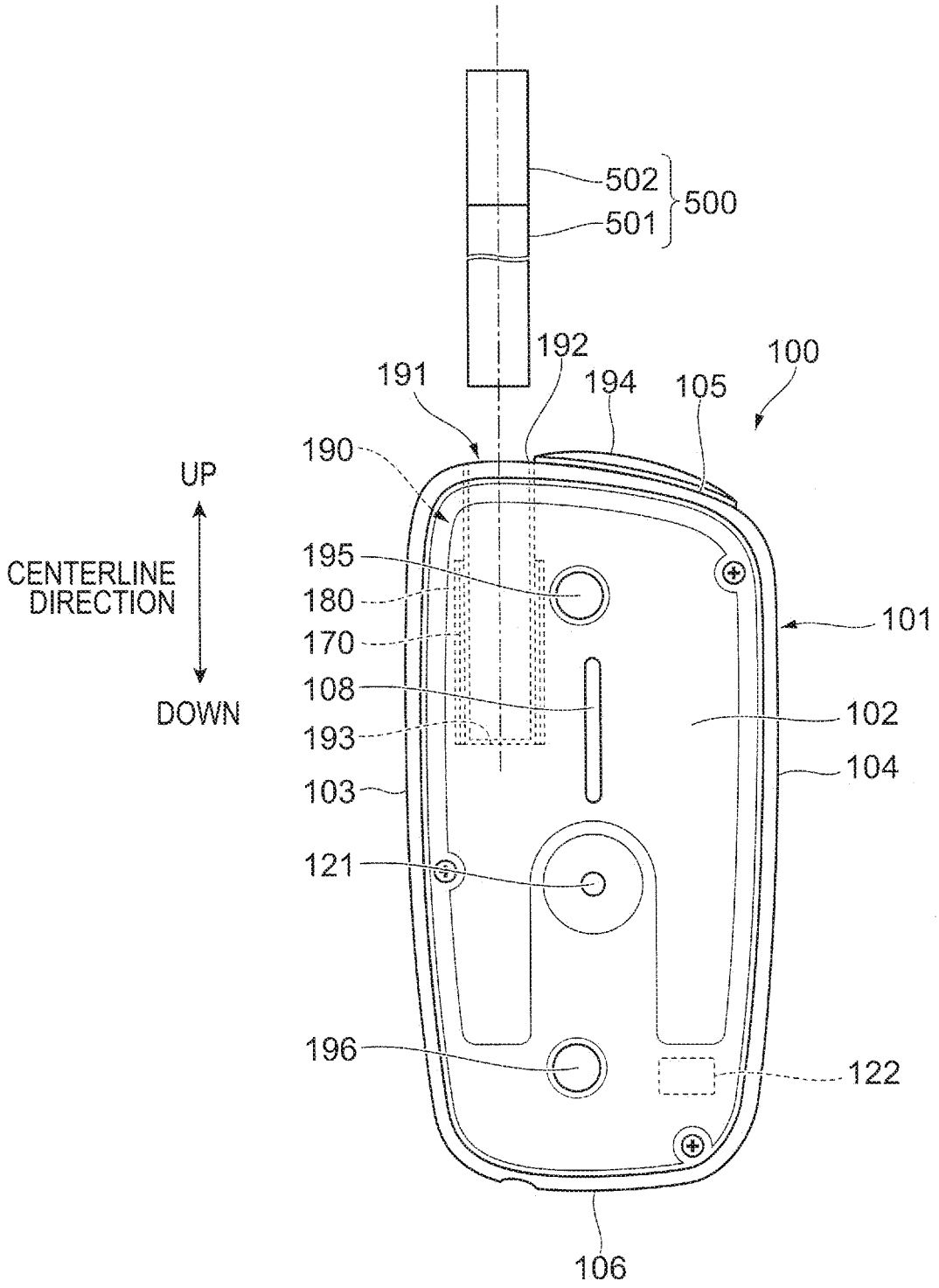
502
501
500
192
191
194
105
100
190
UP
CENTERLINE DIRECTION
DOWN
195
180
170
108
193
103
121
101
102
104
196
122
106

FIG. 4

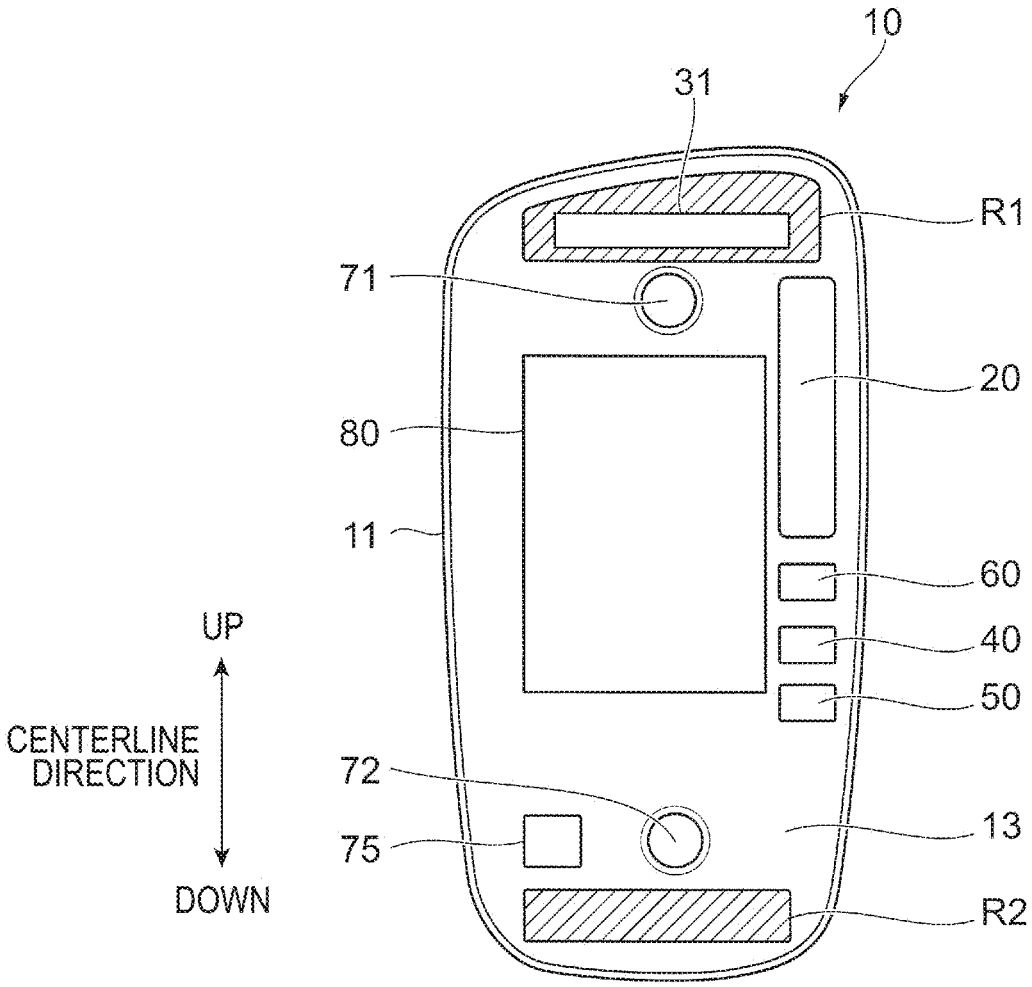
10
31
R1
71
20
80
11
60
40
50
UP
CENTERLINE DIRECTION
72
13
75
DOWN
R2

FIG. 5

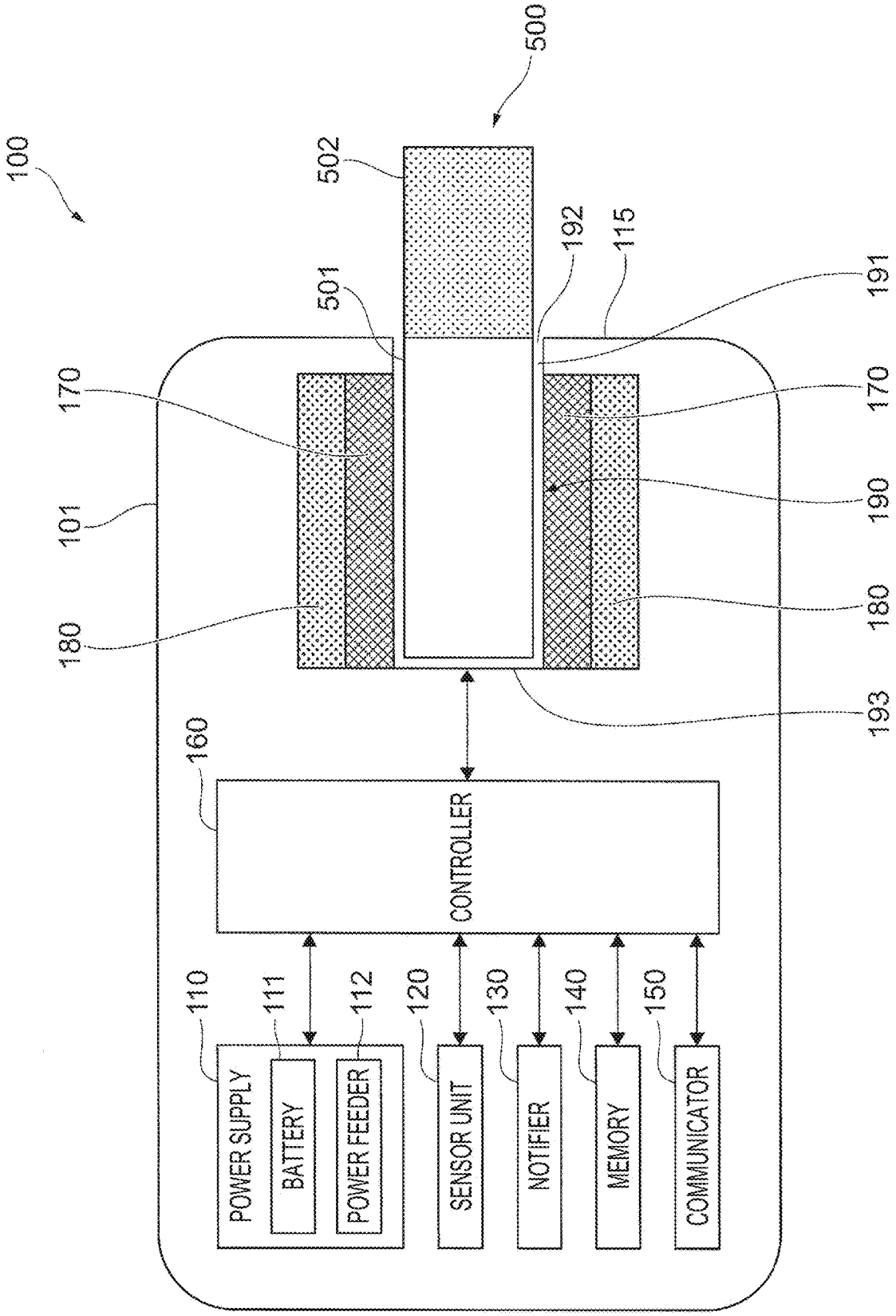
100
500
502
501
192
115
191
170
170
101
190
180
180
193
160
CONTROLLER
110
111
112
120
130
140
150
POWER SUPPLY
BATTERY
POWER FEEDER
SENSOR UNIT
NOTIFIER
MEMORY
COMMUNICATOR

FIG. 6

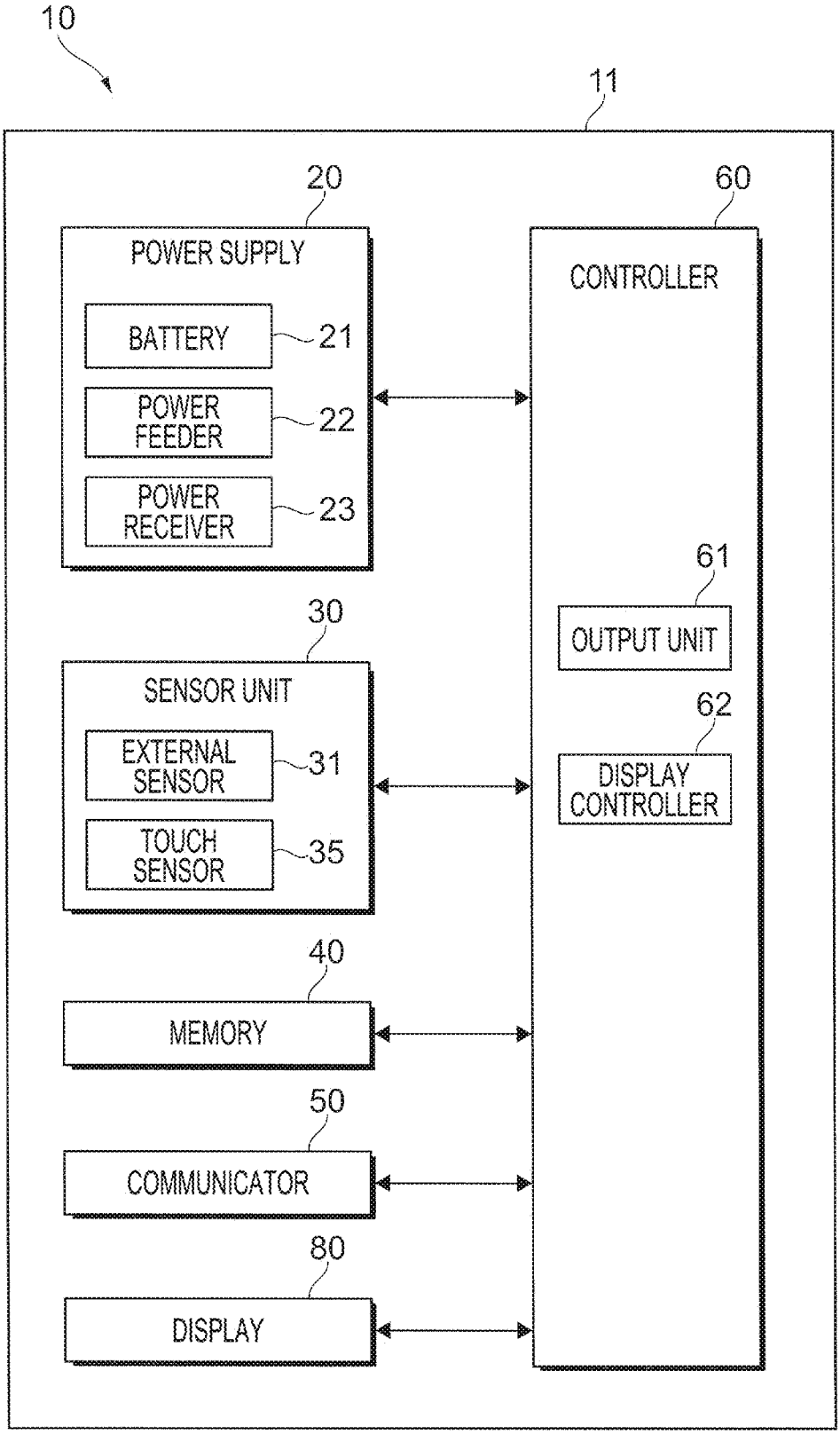
10
11
20
POWER SUPPLY
BATTERY
21
POWER FEEDER
22
POWER RECEIVER
23
60
CONTROLLER
61
OUTPUT UNIT
62
DISPLAY CONTROLLER
30
SENSOR UNIT
EXTERNAL SENSOR
31
TOUCH SENSOR
35
40
MEMORY
50
COMMUNICATOR
80
DISPLAY

FIG. 7

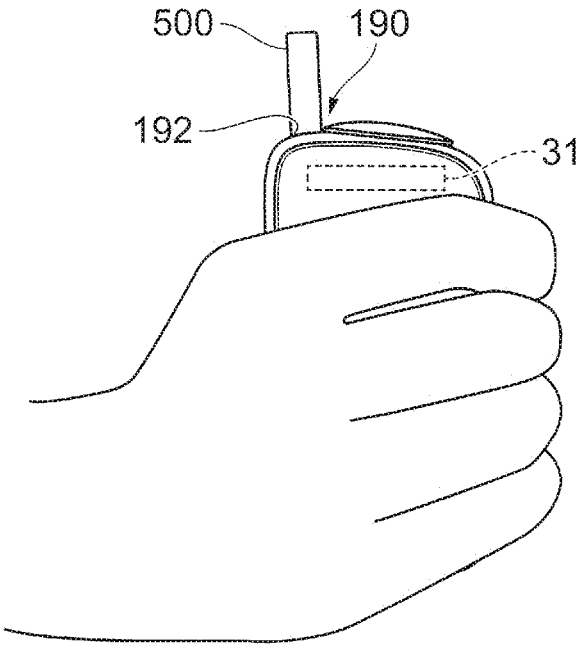

FIG. 8

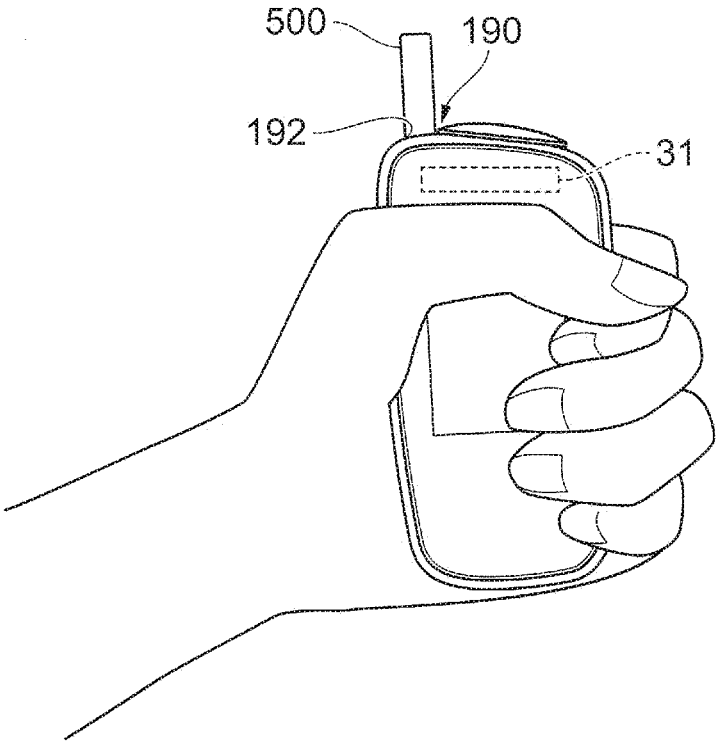

FIG. 9

PREDETERMINED TEMPERATURE RANGE	10°C TO 28°C
PREDETERMINED HUMIDITY RANGE	66% TO 74%
...	...

FIG. 10

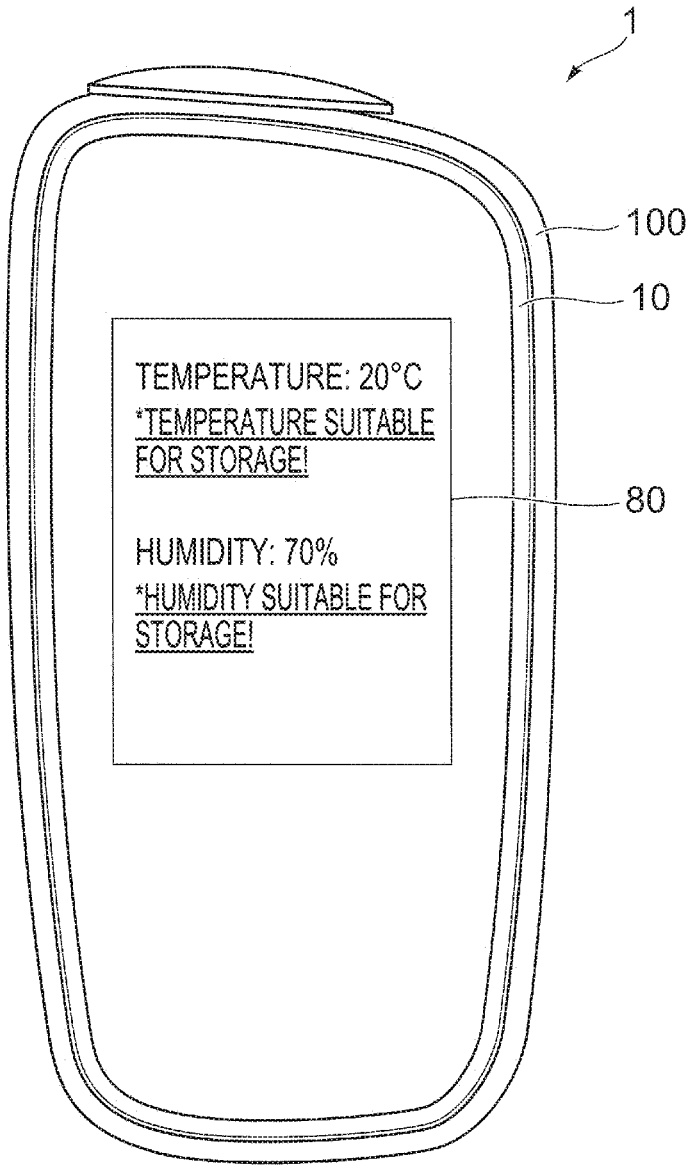
1
100
10
80
TEMPERATURE: 20°C
*TEMPERATURE SUITABLE FOR STORAGE!
HUMIDITY: 70%
*HUMIDITY SUITABLE FOR STORAGE!

FIG. 11

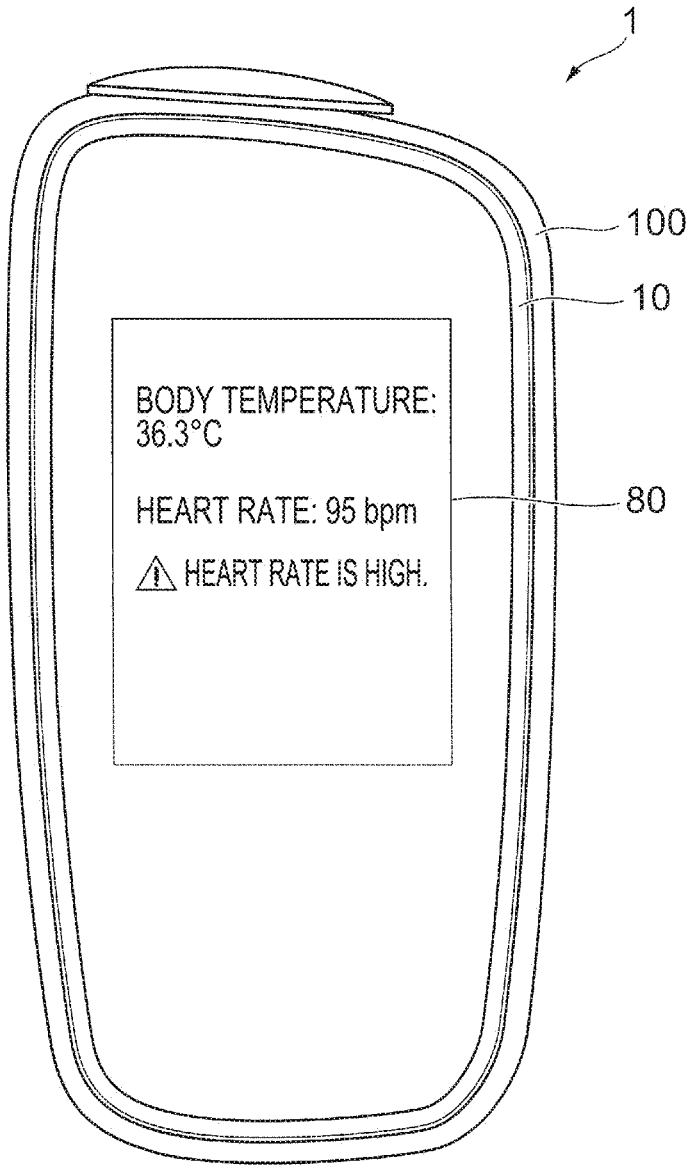
1
100
10
BODY TEMPERATURE:
36.3°C
HEART RATE: 95 bpm
HEART RATE IS HIGH.
80

FIG. 12

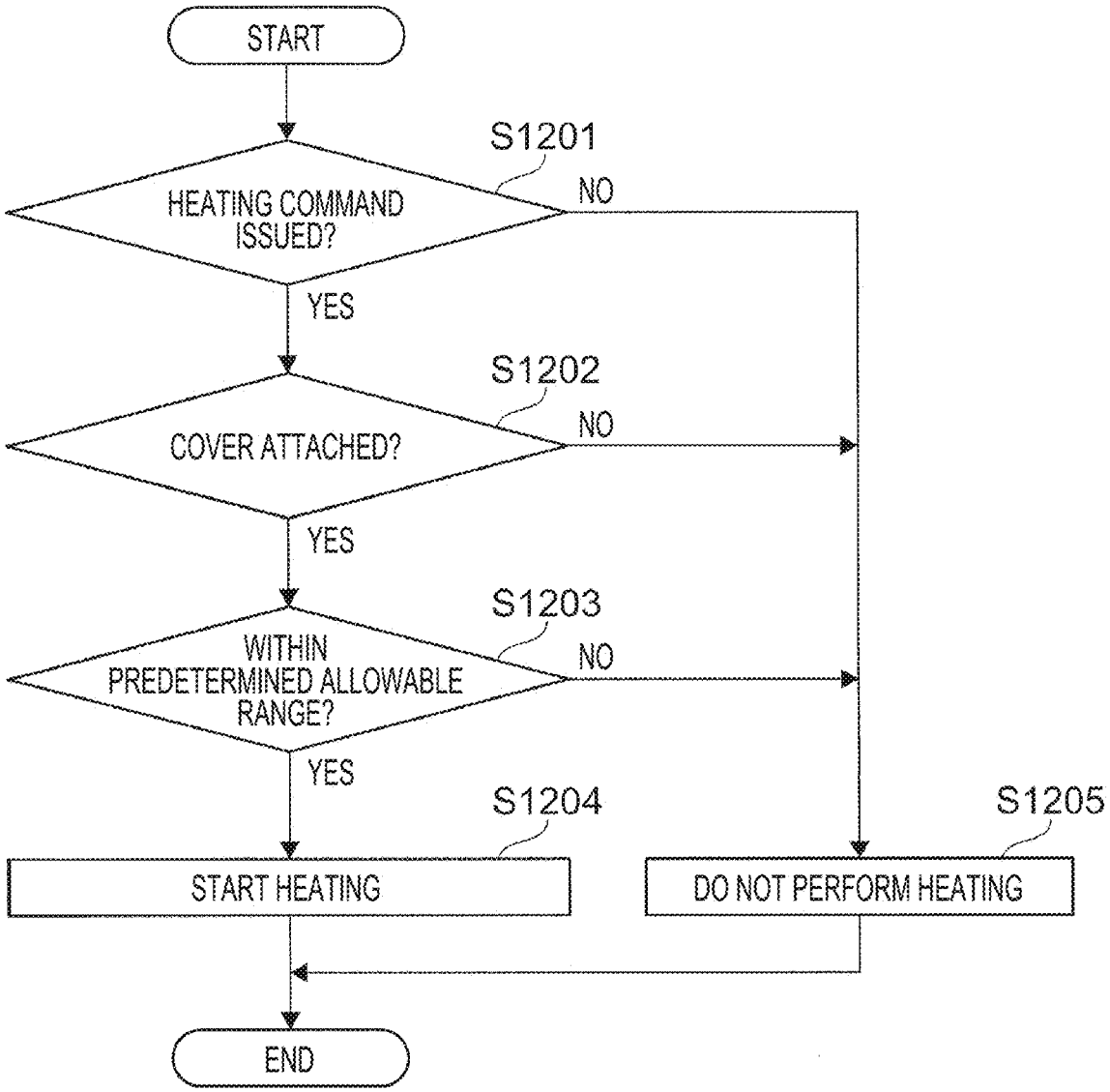
START
S1201
HEATING COMMAND ISSUED?
NO
YES
S1202
COVER ATTACHED?
NO
YES
S1203
WITHIN PREDETERMINED ALLOWABLE RANGE?
NO
YES
S1204
START HEATING
S1205
DO NOT PERFORM HEATING
END

FIG. 13

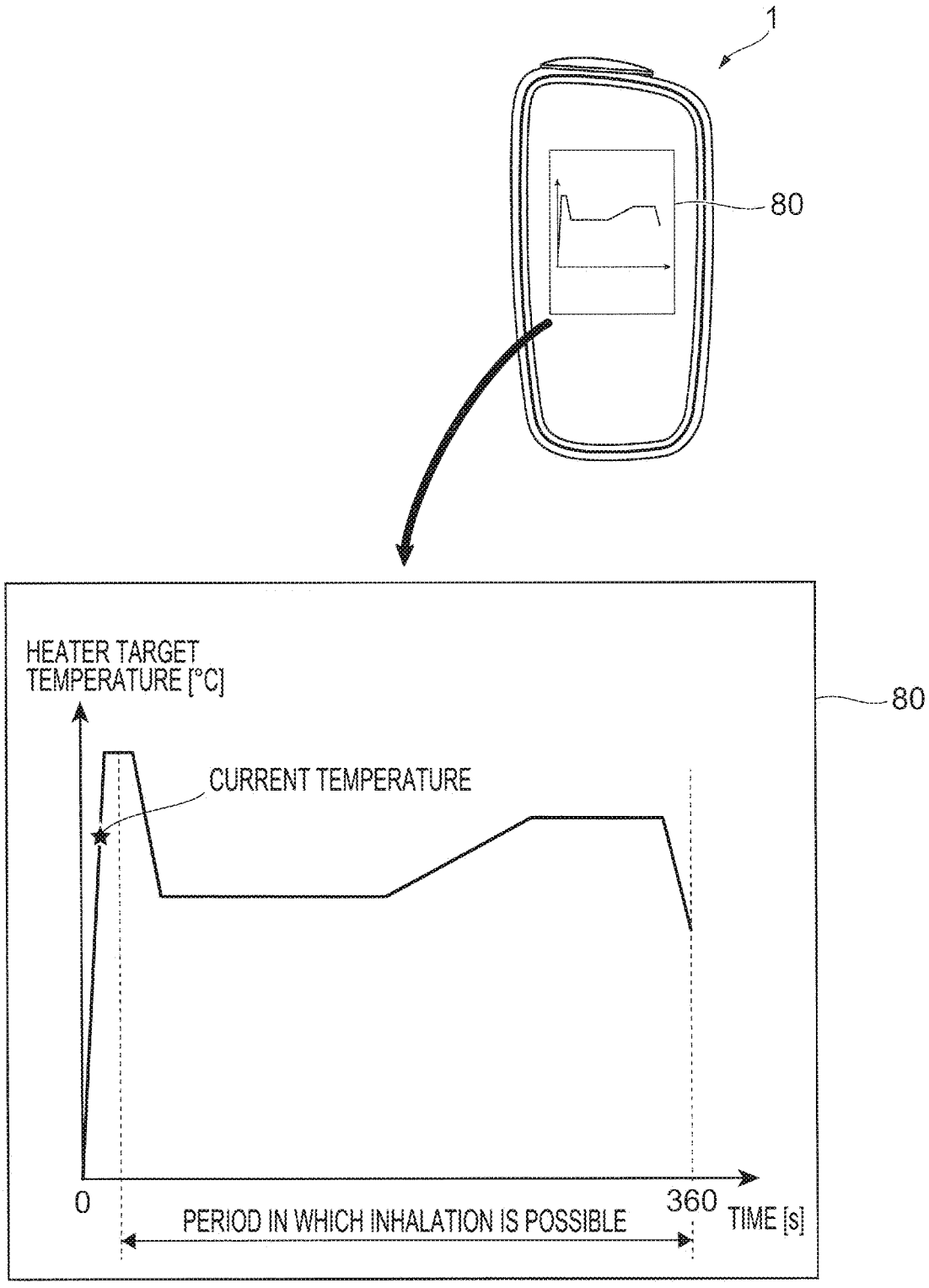
1
80
HEATER TARGET TEMPERATURE [°C]
CURRENT TEMPERATURE
80
0
360
TIME [s]
PERIOD IN WHICH INHALATION IS POSSIBLE

FIG. 14

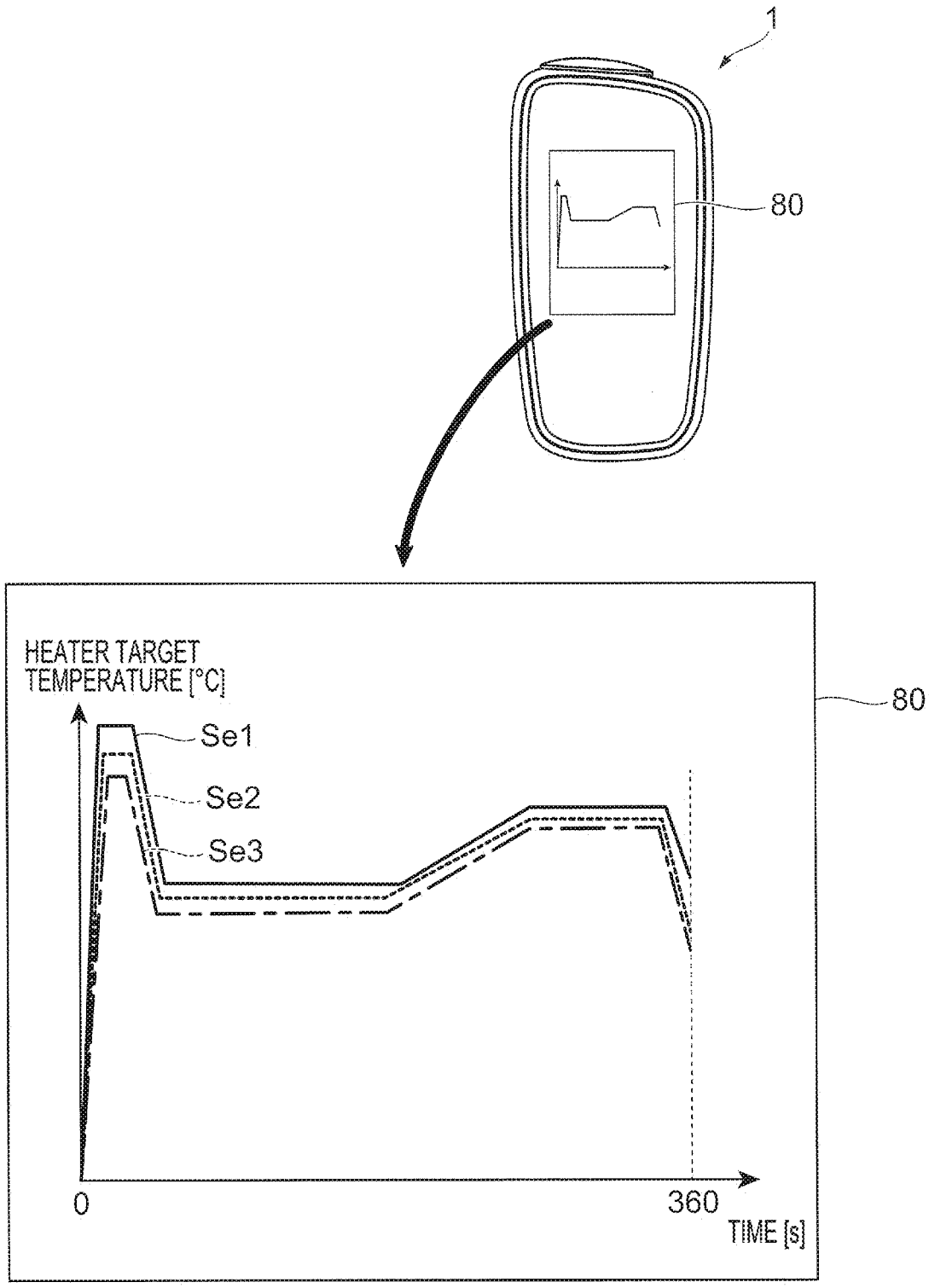

FIG. 15

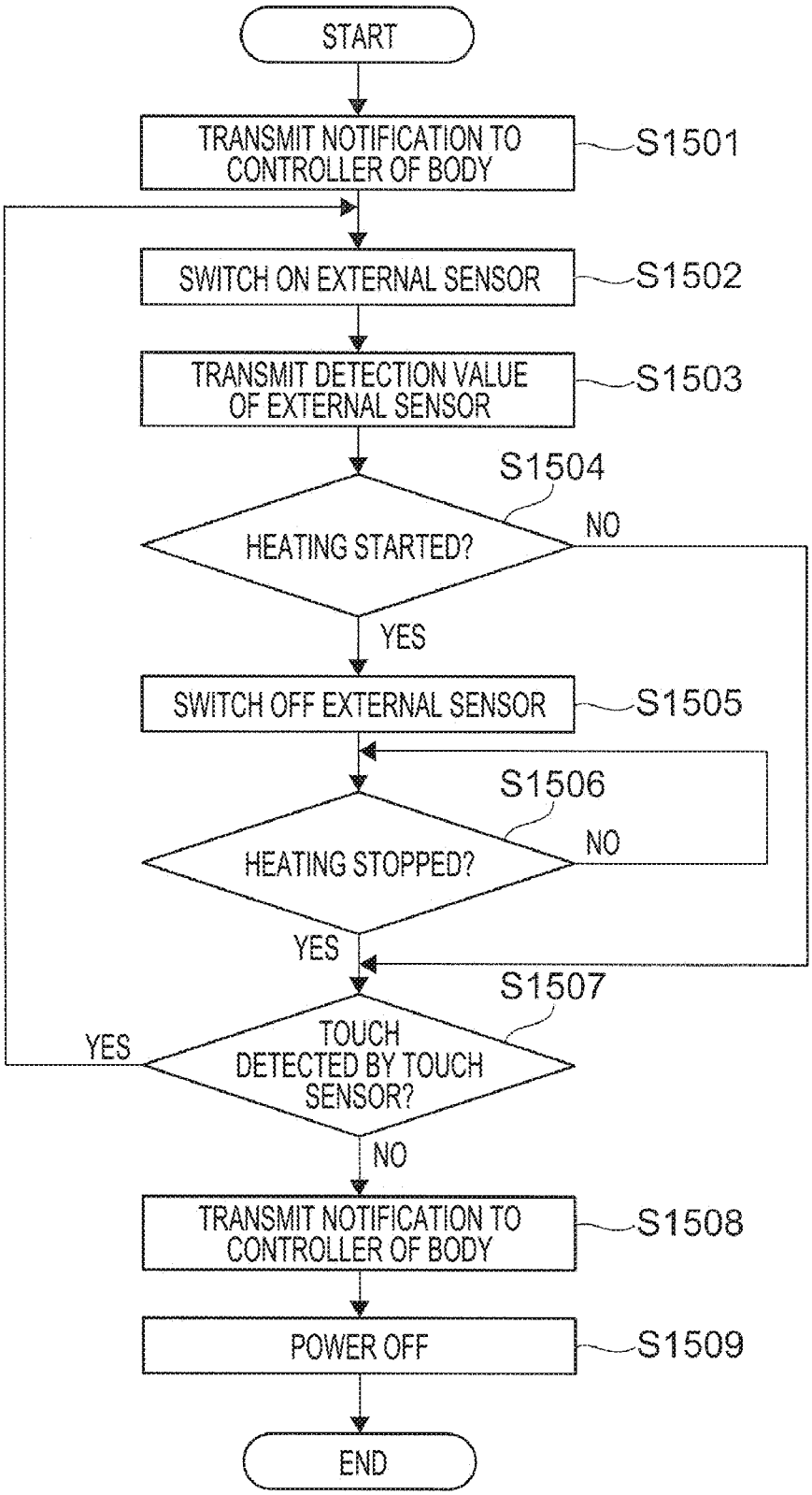
START
TRANSMIT NOTIFICATION TO CONTROLLER OF BODY
S1501
SWITCH ON EXTERNAL SENSOR
S1502
TRANSMIT DETECTION VALUE OF EXTERNAL SENSOR
S1503
S1504
HEATING STARTED?
NO
YES
SWITCH OFF EXTERNAL SENSOR
S1505
S1506
HEATING STOPPED?
NO
YES
S1507
TOUCH DETECTED BY TOUCH SENSOR?
YES
NO
TRANSMIT NOTIFICATION TO CONTROLLER OF BODY
S1508
POWER OFF
S1509
END

FIG. 16

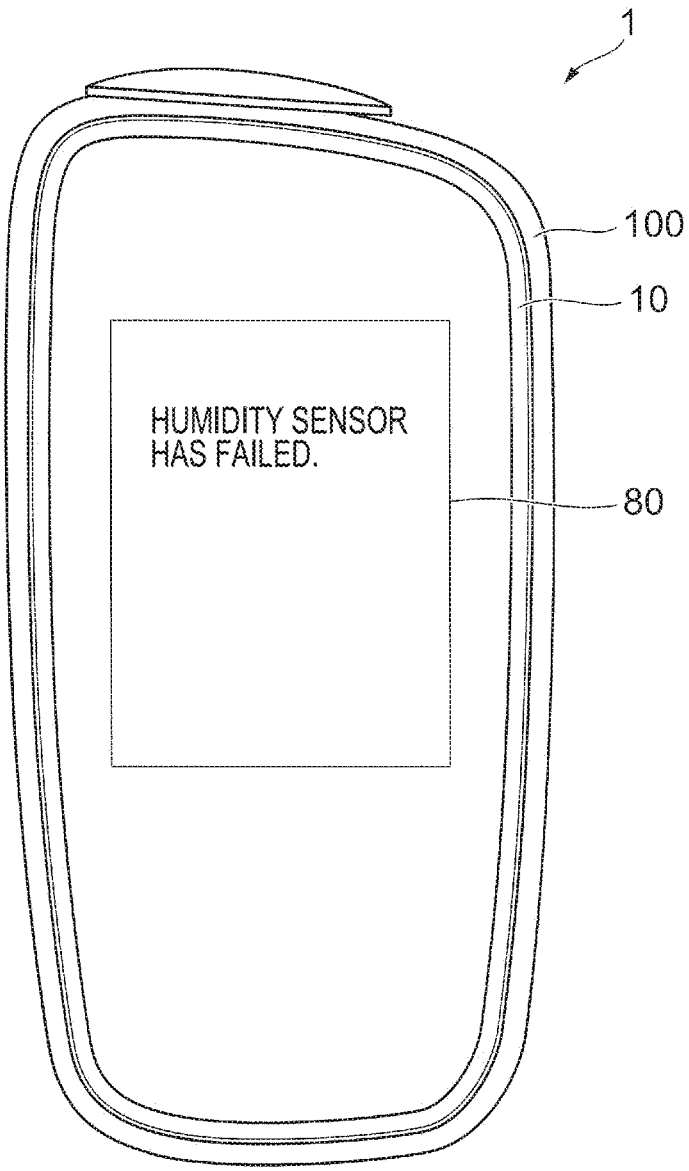

FIG. 17

SENSOR TYPE		DISPLAY REQUIREMENT
AMBIENT AIR SENSOR	TEMPERATURE SENSOR	REQUIRED
	HUMIDITY SENSOR	REQUIRED
	ATMOSPHERIC PRESSURE SENSOR	NOT REQUIRED
VITAL SENSOR	BODY TEMPERATURE SENSOR	REQUIRED
	HEART RATE SENSOR	REQUIRED
	PULSE RATE SENSOR	REQUIRED
	BLOOD OXYGEN SATURATION LEVEL SENSOR	REQUIRED
	BLOOD FLOW RATE SENSOR	REQUIRED
	ALCOHOL CONCENTRATION SENSOR	REQUIRED
	COHb SENSOR	REQUIRED
DISTANCE SENSOR		NOT REQUIRED
COLOR SENSOR		NOT REQUIRED
...		...

COVER AND AEROSOL GENERATION DEVICE

CROSS-REFERENCE TO RELATED APPLICATION

[0001] The present application is a continuation of International Application No. PCT/JP2022/034121 filed on Sep. 12, 2022, the entire contents of which are incorporated herein by reference.

TECHNICAL FIELD

[0002] The present disclosure relates to a cover and an aerosol generation device.

BACKGROUND ART

[0003] Inhaler devices capable of detecting biological information of a user have been proposed.

[0004] For example, PTL 1 describes an inhaler device including an operation unit operated by a user and a biological-information detector that detects biological information of the user. The biological-information detector is disposed on or near the operation unit.

CITATION LIST

Patent Literature

[0005] PTL 1: International Publication No. 2021/240617

[0006] For the user's convenience, it is desirable to enable the user to check not only the biological information but also external information other than information related to the state of the aerosol generation device.

[0007] The present disclosure provides a cover or the like on which external information can be checked.

SUMMARY

[0008] According to the present disclosure made to achieve the above-described object, a cover is attachable to a body including a heater that heats a substrate containing an aerosol source and includes a sensor that detects external information other than internal information related to a state of the body and internal information related to a state of the cover; a display that displays information; and a display controller that causes the display to display at least the external information detected by the sensor or information acquired from an external device other than the cover.

BRIEF DESCRIPTION OF DRAWINGS

[0009] FIG. **1** is an example of a front view of an aerosol generation device from an upper position.

[0010] FIG. **2** is an example of a front view of the aerosol generation device from a lower position.

[0011] FIG. **3** is an example of a front view of a body from which a cover is removed.

[0012] FIG. **4** is an example of a rear view of the cover.

[0013] FIG. **5** is an example of a diagram schematically illustrating the configuration of the body.

[0014] FIG. **6** is an example of a diagram schematically illustrating the configuration of the cover.

[0015] FIG. **7** illustrates an example of the generation device held in the right hand.

[0016] FIG. **8** illustrates an example of the generation device held in the left hand.

[0017] FIG. **9** illustrates an example of information stored in a memory.

[0018] FIG. **10** illustrates an example of information displayed on a display.

[0019] FIG. **11** illustrates an example of information displayed on the display.

[0020] FIG. **12** is a flowchart of an example of a heat control process performed by a controller.

[0021] FIG. **13** illustrates an example of the temporal change in the target temperature of a heater displayed on the display of the cover.

[0022] FIG. **14** illustrates an example of a control sequence selection screen displayed on the display of the cover.

[0023] FIG. **15** is a flowchart of an example of an on-off control process performed by the controller.

[0024] FIG. **16** illustrates an example of information that the display is caused to display by a display controller.

[0025] FIG. **17** illustrates examples of sensors and whether or not the display is required to display a notification for each sensor.

DESCRIPTION OF EMBODIMENTS

[0026] FIG. **1** is an example of a front view of an aerosol generation device **1** from an upper position.

[0027] FIG. **2** is an example of a front view of the aerosol generation device **1** from a lower position.

[0028] FIG. **3** is an example of a front view of a body **100** from which a cover **10** is removed.

[0029] FIG. **4** is an example of a rear view of the cover **10**.

[0030] FIG. **5** is an example of a diagram schematically illustrating the configuration of the body **100**.

[0031] FIG. **6** is an example of a diagram schematically illustrating the configuration of the cover **10**.

[0032] The aerosol generation device **1** (hereinafter sometimes referred to simply as "generation device **1**") includes a body **100** and a cover **10** removably attachable to the body **100**. The body **100** includes a heater **170** that heats a substrate **500** containing an aerosol source (hereinafter sometimes referred to simply as "substrate **500**").

[0033] The body **100** includes a substantially rectangular-parallelepiped-shaped housing **101** accommodating the heater **170** and other components. The cover **10** covers one face of the housing **101**. Among six faces of the housing **101**, a face to which the cover **10** is attached is hereinafter referred to as a front face **102**, a side face on the left side when viewed from the front face **102** as a left side face **103**, a side surface on the right side as a right side face **104**, a face on the top as a top face **105**, and a face on the bottom as a bottom face **106**. Among the six faces of the housing **101**, a face connected to the left side face **103**, the right side face **104**, the top face **105**, and the bottom face **106** and that differs from the front face **102** is referred to as a rear face **107**. The cover **10** covers the front face **102** of the housing **101**. The left side face **103**, the right side face **104**, the top face **105**, the bottom face **106**, and the rear face **107** are exposed to the outside when the cover **10** is attached.

Body **100**

[0034] As illustrated in FIG. **5**, the body **100** includes a power supply **110**, a sensor unit **120**, a notifier **130**, a memory **140**, a communicator **150**, a controller **160**, a heater **170**, a heat insulator **180**, and a holder **190**. The power

supply **110**, the sensor unit **120**, the notifier **130**, the memory **140**, the communicator **150**, the controller **160**, the heater **170**, and the heat insulator **180** are accommodated in the housing **101**. The body **100** also includes a shutter **194** (see FIG. **1**) disposed on the top face **105** and slidable along the top face **105**.

[0035] Individual structural elements will now be described in sequence below.

Power Supply **110**

[0036] The power supply **110** includes a battery **111** that stores electric power and a power feeder **112** that supplies electric power.

[0037] The battery **111** may be, for example, a rechargeable battery, such as a lithium ion secondary battery. The battery **111** may be charged by connection to an external power supply with a cable or the like connected to a universal serial bus (USB) terminal **113**. Alternatively, the battery **111** may be charged by wireless power transmission technology without connection to a power transmission device. The battery **111** may be independently removable from the body **100** or be replaceable with a new battery **111**.

[0038] The power feeder **112** supplies electric power to the structural elements of the body **100** under the control of the controller **160**. The power feeder **112** also supplies electric power to the cover **10**.

[0039] The power feeder **112** supplies electric power to the cover **10** by, for example, contactless power transmission. An example of contactless power transmission is power transmission by near-field communication. This enables supply of electric power to the cover **10** by a simple configuration.

Sensor Unit **120**

[0040] The sensor unit **120** detects various information related to the body **100**. The sensor unit **120** outputs the detected information to the controller **160**. In one example, the sensor unit **120** includes a pressure sensor such as a condenser microphone, a flow sensor, or a temperature sensor. When the sensor unit **120** detects a value associated with user's inhalation, the sensor unit **120** outputs information indicating that the user has performed inhalation to the controller **160**. In addition, the sensor unit **120** detects the temperature of the heater **170** and outputs the detected temperature to the controller **160**. In another example, the sensor unit **120** includes an input device, such as a button or a switch, that receives information input by the user. In particular, the sensor unit **120** may include a button for issuing a command to start/stop the aerosol generation. The sensor unit **120** outputs the information input by the user to the controller **160**.

[0041] The sensor unit **120** includes, as the button, an operation button **121** for issuing a command to start the generation of an aerosol. As illustrated in FIG. **3**, the operation button **121** is exposed on the front face **102** of the housing **101**.

Notifier **130**

[0042] The notifier **130** presents information to the user. In one example, the notifier **130** includes a light-emitting device, such as a light emitting diode (LED). In that case, the notifier **130** emits light in different light emission patterns for different situations, such as when the battery **111** of the power supply **110** needs charging, when the battery **111** is being charged, and when an abnormality has occurred in the body **100**. The term light emission pattern as used herein conceptually includes, for example, color and light-on/light-off timing. The notifier **130** may include, in addition to or instead of the light-emitting device, a display device that displays an image, a sound output device that outputs sound, a vibration device that vibrates, and the like.

[0043] The front face **102** of the housing **101** has a display window **108** that transmits light emitted from the light-emitting device, such as the LED, as an example of the notifier **130**. The light-emitting device is disposed behind the display window **108**.

Memory **140**

[0044] The memory **140** stores various information for the operation of the generation device **1**. The memory **140** includes, for example, a non-volatile storage medium, such as a flash memory. An example of the information stored in the memory **140** is information related to the operating system (OS) of the generation device **1**, such as control details of the structural elements controlled by the controller **160**. Another example of the information stored in the memory **140** is information related to the user's inhalation, such as the number of inhalations, the time of inhalation, and the cumulative duration of inhalation. Another example of the information stored in the memory **140** is information related to a control sequence specifying the temporal change in the target temperature of the heater **170** during heating of the heater **170**. The memory **140** may store information related to multiple types of control sequences with different temporal changes in the target temperature of the heater **170**.

Communicator **150**

[0045] The communicator **150** is a communication interface for transmission and reception of information between the generation device **1** and another device. The communicator **150** performs communication in conformity with any wired or wireless communication standard. The communication standard may be, for example, wireless local area network (LAN), wired LAN, Wi-Fi (registered trademark), or Bluetooth (registered trademark). In one example, the communicator **150** transmits information related to the user's inhalation to another device (e.g., a portable terminal described below) to cause the other device to display the information related to the user's inhalation. In another example, the communicator **150** receives new OS information from a server to update the OS information stored in the memory **140**.

Controller **160**

[0046] The controller **160** functions as an arithmetic processing unit and a control unit, and controls the overall internal operation of the generation device **1** in accordance with various programs. The controller **160** is implemented by, for example, an electronic circuit, such as a central processing unit (CPU) or a microprocessor. The controller **160** may also include a read only memory (ROM) that stores programs, arithmetic parameters, and the like to be used and a random access memory (RAM) for temporarily storing parameters and the like that change as appropriate. The generation device **1** executes various processes under the control of the controller **160**. Examples of processes con-

trolled by the controller **160** include supplying power from the power supply **110** to other structural elements; charging the power supply **110**; detection by the sensor unit **120**; notification of information by the notifier **130**; storing and reading of information by the memory **140**; and transmission and reception of information by the communicator **150**. The controller **160** also controls other processes performed by the generation device **1**, such as inputting information to the structural elements and processes based on information output from the structural elements.

Heater **170**

[0047] The heater **170** heats the aerosol source to atomize the aerosol source and generate an aerosol. The heater **170** may be made of any material, such as metal or polyimide. For example, the heater **170** is film-shaped and disposed to cover the outer circumference of the holder **190**. When the heater **170** produces heat, the aerosol source contained in the substrate **500** is heated from the outer circumference of the substrate **500** and atomized to generate the aerosol. The heater **170** produces heat to heat the substrate **500** in response to the supply of electric power from the power supply **110**. The user's inhalation is enabled when the temperature of the substrate **500** heated by the heater **170** reaches a predetermined temperature. After that, the supply of electric power may be stopped when the sensor unit **120** detects a predetermined user input.

Heat Insulator **180**

[0048] The heat insulator **180** prevents heat transmission from the heater **170** to another structural element of the generation device **1**. The heat insulator **180** is disposed to cover at least the outer circumference of the heater **170**. The heat insulator **180** is composed of, for example, a vacuum heat insulator or an aerogel heat insulator. The vacuum heat insulator is a heat insulator obtained by wrapping glass wool, silica (silicon powder), or the like with a resin film and establishing a high-vacuum state to substantially eliminate gaseous thermal conduction.

Holder **190**

[0049] The holder **190** has a column-shaped internal space **191** provided in the housing **101** and an opening **192** formed in the top face **105** of the housing **101** to provide communication between the internal space **191** and the outside. The internal space **191** is defined by a tubular body with a bottom **193** serving as a bottom face. The holder **190** is formed so that at least a portion of the tubular body in the height direction has an inside diameter smaller than the outside diameter of the substrate **500**. This allows the holder **190** to hold the substrate **500** inserted into the internal space **191** through the opening **192** by pressing against the outer circumference of the substrate **500**. The holder **190** also defines a flow path for air passing through the substrate **500**. An air inlet hole through which air flows into the flow path is disposed at, for example, the bottom **193**. An air outlet hole through which air flows out of the flow path is the opening **192**. The opening **192** is exposed when the shutter **194** is slid to an open position and covered when the shutter **194** is slid to a closed position.

Shutter **194**

[0050] The shutter **194** has a magnet on a back surface thereof. A magnetic sensor (not illustrated) included in the sensor unit **120** is attached to the top face **105** of the housing **101** within a range of movement of the shutter **194**. The magnetic sensor is a Hall IC including a Hall element, an operational amplifier, and the like, and outputs a voltage corresponding to the intensity of the magnetic field that passes the Hall element. In the present embodiment, the controller **160** detects opening and closing of the shutter **194** based on a change in the voltage output from the magnetic sensor when the shutter **194** is slid.

Substrate **500**

[0051] The substrate **500** is a stick-shaped member. The substrate **500** includes a substrate portion **501** and an inhalation port **502**.

[0052] The substrate portion **501** contains the aerosol source. The aerosol source is atomized by heating to generate an aerosol. The aerosol source may be, for example, a tobacco-derived material, such as a processed material obtained by forming shredded tobacco or a tobacco raw material into granular, sheet, or powder form. The aerosol source may include a non-tobacco-derived material made from a plant other than tobacco (e.g., mint or herb). In one example, the aerosol source may contain a flavor component such as menthol. If the generation device **1** is a medical inhaler, the aerosol source may include a medicine for inhalation by a patient. The aerosol source is not necessarily a solid. Alternatively, for example, the aerosol source may be a liquid such as polyhydric alcohol or water. Examples of the polyhydric alcohol include glycerol and propylene glycol. At least a portion of the substrate portion **501** is accommodated in the internal space **191** of the holder **190** when the substrate **500** is held by the holder **190**.

[0053] The inhalation port **502** is a member on which the user sucks during inhalation. At least a portion of the inhalation port **502** protrudes from the opening **192** when the substrate **500** is held by the holder **190**. As the user sucks and inhales on the inhalation port **502** protruding from the opening **192**, air flows into the holder **190** through the air inlet hole (not illustrated). After entering the holder **190**, the air passes through the internal space **191** of the holder **190**, that is, through the substrate portion **501**, and reaches the inside of the user's mouth together with the aerosol generated from the substrate portion **501**.

Example of Appearance of Body **100**

[0054] As illustrated in FIG. **3**, the body **100** includes two magnets, an upper magnet **195** and a lower magnet **196**, that are exposed on the front face **102** of the housing **101** and used to connect the body **100** to the cover **10**. The upper magnet **195** and the lower magnet **196** have a cylindrical shape that is circular when viewed from the front. The upper magnet **195** and the lower magnet **196** are arranged so that the centers of the circles are aligned in a centerline direction of the substrate **500** held by the holder **190** (hereinafter sometimes referred to simply as a "centerline direction"). The upper magnet **195** is disposed in an upper section of the body **100**, and the lower magnet **196** in a lower section of the body **100**.

[0055] The body **100** includes an operation button **121** exposed on the front face **102** of the housing **101** in a central region of the body **100** in the centerline direction. In other words, the operation button **121** is disposed between the upper magnet **195** and the lower magnet **196**.

[0056] The body **100** includes the display window **108** disposed above the operation button **121** and between the upper magnet **195** and the operation button **121**. The display window **108** transmits light from the light-emitting device, such as an LED. The display window **108** is a window provided at a position corresponding to the position of the light-emitting device disposed in the housing **101** of the body **100**, and transmits light from the light-emitting device. Thus, the user can see the light from the outside of the body **100**.

[0057] The body **100** includes a magnetic sensor **122**. The magnetic sensor **122** detects magnetic force based on a magnetic field applied by a magnet **75** on the cover **10** described below. For example, the magnetic sensor **122** may be a Hall sensor including a Hall element. Thus, the attachment of the cover **10** to the body **100** can be detected.

Cover **10**

[0058] The cover **10** will now be described in detail.

[0059] As illustrated in FIG. **6**, the cover **10** includes a cover body **11**, a power supply **20**, a sensor unit **30**, a memory **40**, a communicator **50**, a controller **60**, and a display **80**.

Cover Body **11**

[0060] The cover body **11**, which is a plate-shaped member that transmits light, covers the front face **102** of the housing **101** of the body **100** and is shaped to form no step between the cover body **11** and any of the left side face **103**, the right side face **104**, the top face **105**, and the bottom face **106** of the housing **101**. Accordingly, the cover **10** forms an integrated appearance together with the left side face **103**, the right side face **104**, the top face **105**, and the bottom face **106** of the housing **101** and has an ornamental function. The cover **10** also has a function of suppressing the propagation of heat emitted from the body **100**. The power supply **20**, the sensor unit **30**, the memory **40**, the communicator **50**, the controller **60**, and the display **80** are attached to the cover body **11**.

Power Supply **20**

[0061] The power supply **20** includes a battery **21** that stores electric power, a power feeder **22** that supplies electric power to the structural elements of the cover **10**, and a power receiver **23** that receives electric power from the power feeder **112** of the power supply **110** included in the body **100**.

[0062] The battery **21** may be, for example, a rechargeable battery, such as a film-shaped lithium ion secondary battery. The battery **21** is charged with electric power supplied to the cover **10** from the power feeder **112** of the power supply **110** included in the body **100**.

[0063] The power feeder **22** supplies electric power of the battery **21** to the structural elements of the cover **10**. The power feeder **22** also supplies electric power received by the power receiver **23** to the structural elements of the cover **10**. Thus, the structural elements of the cover **10** including the sensor unit **30** can be operated by the electric power supplied to the cover **10** from the body **100**.

[0064] When the power feeder **112** included in the body **100** supplies electric power to the cover **10** by contactless power transmission, such as near-field communication, the power receiver **23** includes a near-field communication (NFC) reader/writer module and an NFC antenna.

Sensor Unit **30**

[0065] The sensor unit **30** includes an ambient air sensor that detects information of the air around the generation device **1**. The information of the air may include, for example, a temperature and a humidity. In other words, the sensor unit **30** may include, as examples of the ambient air sensor, a temperature sensor capable of detecting the temperature around the generation device **1** (e.g., room temperature) and a humidity sensor capable of detecting the humidity around the generation device **1**. Additionally, the information of the air may be an atmospheric pressure. The sensor unit **30** may include, as an example of the ambient air sensor, an atmospheric pressure sensor capable of detecting the atmospheric pressure around the generation device **1**.

[0066] Additionally, the sensor unit **30** may include a vital sensor that detects biological information of the user. The vital sensor may be, for example, a sensor capable of detecting any of the user's body temperature, heart rate, pulse rate, blood oxygen saturation level, blood flow rate, and COHb (carboxyhemoglobin). The sensor that detects the user's body temperature may be, for example, a sensor that converts infrared radiation from the forehead or the like into body temperature. The sensor that detects at least one of the heart rate, pulse rate, blood oxygen saturation level, blood flow rate, and COHb may be, for example, an optical sensor. The optical sensor includes a light-emitting element for emitting light toward the human body and a light-receiving element that receives the light emitted by the light-emitting element and returning from the user's body. The optical sensor outputs the information related to the light received by the light-receiving element. The light-emitting element is a light source and is composed of, for example, an LED. The light-receiving element is composed of, for example, a photodiode. The light received by the light-receiving element is, for example, light reflected by the human body. The reflected light includes light scattered and reflected in the human body (that is, scattered light).

[0067] The vital sensor may be a sensor capable of detecting the alcohol concentration in breath exhaled by the user. Additionally, the sensor unit **30** may include a distance sensor capable of detecting the distance from the generation device **1** to an object or a color sensor capable of detecting the color of an object.

[0068] Additionally, the sensor unit **30** includes a touch sensor **35** that detects when the cover **10** is touched by the user. The touch sensor **35** is implemented as a function of detecting the user's touch provided by the display **80**. To clarify the distinction from the touch sensor **35**, the term "external sensor **31**" may be hereinafter used to refer to a sensor that detects external information other than the information related to the state of the body **100** and external information other than the information related to the state of the cover **10**, that is, external information other than the information related to the state of the generation device **1**. The external sensor **31** is a generic term that collectively refers to the sensors for detecting information of the external environment around the generation device **1**, such as the temperature sensor, the humidity sensor, and the atmospheric pressure sensor, the vital sensor for detecting the biological information of the user, the distance sensor, and the color sensor. The external information includes the biological information, such as body temperature, heart rate, pulse rate, blood oxygen saturation level, blood flow rate,

and COHb, and the information of the external environment, such as temperature and humidity.

Memory **40**

[0069] The memory **40** stores various information for the operation of the cover **10**. The memory **40** includes, for example, a non-volatile storage medium, such as a flash memory. An example of the information stored in the memory **40** is information related to the operating system (OS) of the cover **10**, such as control details of the structural elements controlled by the controller **60**. The memory **40** also stores information acquired from the sensor unit **30**. The memory **40** also stores a predetermined temperature range, a predetermined humidity range, and a predetermined allowable range described below. The memory **40** also stores information related to a control sequence specifying the temporal change in the target temperature of the heater **170** during heating of the heater **170** by the controller **160** of the body **100**. The memory **40** may store information related to multiple types of control sequences with different temporal changes in the target temperature of the heater **170**.

Communicator **50**

[0070] The communicator **50** is a communication interface for transmission and reception of information between the cover **10** and an external device other than the cover **10**. The communicator **50** performs communication in conformity with any wired or wireless communication standard. The communication standard may be, for example, wireless local area network (LAN), wired LAN, Wi-Fi (registered trademark), or Bluetooth (registered trademark).

[0071] The external device is the body **100** or a device other than the generation device **1**. The device other than the generation device **1** may be, for example, a portable terminal, such as a multifunction mobile phone (so-called "smartphone", hereinafter sometimes referred to as "mobile phone") of the user or a server (not illustrated). The portable terminal may be a tablet terminal, a tablet PC, a portable digital assistant (PDA), or a notebook PC. For example, the communicator **50** transmits the information detected by the sensor unit **30** to a mobile phone. Additionally, the communicator **50** receives new OS information from a server to update the OS information stored in the memory **40**.

[0072] The communicator **50** may communicate with the body **100** by, for example, near-field communication. When electric power is supplied from the body **100** to the cover **10** by near-field communication as described above, and when the communicator **50** communicates with the body **100** by near-field communication, the efficiency of communication and electric power transmission between the body **100** and the cover **10** can be increased, and the structures of the body **100** and the cover **10** can be simplified. When electric power is supplied from the body **100** to the cover **10** by near-field communication and when the communicator **50** communicates with the body **100** by near-field communication, the communicator **50** may be composed of the same NFC reader/writer module, NFC antenna, etc., as those of the power receiver **23**.

[0073] When the body **100** and the cover **10** are connected by a physical power supply interface, the communicator **50** may communicate with the body **100** through this power supply interface.

Controller **60**

[0074] The controller **60** functions as an arithmetic processing unit and a control unit, and controls the overall internal operation of the cover **10** in accordance with various programs. The controller **60** is implemented by, for example, an electronic circuit, such as a CPU or a microprocessor. The controller **60** may also include a ROM that stores programs, arithmetic parameters, and the like to be used and a RAM for temporarily storing parameters and the like that change as appropriate. The cover **10** executes various processes under the control of the controller **60**. Examples of processes controlled by the controller **60** include supplying power from the power supply **20** to other structural elements; charging the power supply **20**; detection by the sensor unit **30**; storing and reading of information by the memory **40**; and transmission and reception of information by the communicator **50**. The controller **60** also controls other processes performed by the cover **10**, such as inputting information to the structural elements and processes based on information output from the structural elements.

[0075] The controller **60** also transmits and receives data to and from the controller **160** of the body **100** through the communicator **50**. The controller **60** transmits, for example, the detections values obtained by the sensor unit **30** to the controller **160** of the body **100**. The controller **60** receives, for example, notification that heating of the heater **170** has been started or stopped from the controller **160** of the body **100**.

Display **80**

[0076] The display **80** may be, for example, a liquid crystal display, an organic electroluminescence (EL) display, or electronic paper having a display function and a function of detecting the user's touch. The function of detecting the user's touch provided by the display **80** may be regarded as the above-described touch sensor **35**.

Magnets

[0077] As illustrated in FIG. **4**, the cover **10** includes an upper magnet **71** and a lower magnet **72** on a rear face **13** of the cover body **11** facing the body **100**. The upper magnet **71** and the lower magnet **72** have a cylindrical shape that is circular when viewed from the rear, and are disposed at positions corresponding to the positions of the upper magnet **195** and the lower magnet **196** provided on the body **100**. In other words, the upper magnet **71** and the lower magnet **72** are arranged in the centerline direction, and the upper magnet **71** is disposed in an upper section of the cover **10** and the lower magnet **72** in a lower section of the cover **10**.

[0078] When, for example, the upper magnet **71** and the lower magnet **72** of the cover **10** are N poles, the upper magnet **195** and the lower magnet **196** of the body **100** are S poles. The cover **10** is attached to the body **100** by the attraction force between the magnets.

[0079] Either the magnets on the cover **10** (upper magnet **71** and lower magnet **72**) or the magnets on the body **100** (upper magnet **195** and lower magnet **196**) may be pieces of iron or another magnetic metal.

[0080] The cover **10** is not necessarily attached to the body **100** by the attraction force between the magnets. For example, the cover **10** and the body **100** may be physically fitted together. To physically fit the cover **10** and the body **100** together, for example, one of the cover **10** and the body

100 (e.g., the cover 10) may have fitting lugs to be fitted to holes or recesses formed in the other (e.g., body 100).

[0081] As illustrated in FIG. 4, the above-described display 80 is disposed between the upper magnet 71 and the lower magnet 72, in other words, in a central region of the cover 10 in the centerline direction. Since the user touches the display 80 (e.g., touch sensor 35) to enable inhalation, in the example illustrated in FIG. 4, the display 80 is disposed in the central region of the generation device 1 in the centerline direction. However, the position of the display 80 is not limited to the position illustrated in FIG. 4.

[0082] The cover 10 includes the magnet 75 on the left side of the line connecting the upper magnet 71 and the lower magnet 72 in FIG. 4. The magnet 75 is provided at a position corresponding to the position of the magnetic sensor 122 on the body 100. The attachment of the cover 10 to the body 100 is detected by the magnetic sensor 122 on the body 100.

Location of External Sensor 31

[0083] The external sensor 31 included in the sensor unit 30 is preferably provided at one of the ends of the cover 10 in the centerline direction, in other words, in a first region R1 above the upper magnet 71 or a second region R2 below the lower magnet 72 in FIG. 4.

[0084] When, for example, the external sensor 31 is an optical sensor, the external sensor 31 includes a light-emitting element for emitting light toward a finger or the like placed in front of the front face 12 of the cover body 11 and a light-receiving element for receiving the light emitted by the light-emitting element and returning from the finger or the like. Therefore, the detection cannot be accurately performed if dirt adheres to a portion that transmits light.

[0085] FIG. 7 illustrates an example of the generation device 1 held in the right hand. FIG. 8 illustrates an example of the generation device 1 held in the left hand.

[0086] FIG. 4 illustrates an example in which the external sensor 31 is disposed in the first region R1. Since the external sensor 31 is disposed in the first region R1, the user is less likely to touch the external sensor 31. More specifically, even when the generation device 1 is held in the right or left hand as illustrated in FIG. 7 or 8 for inhalation using the generation device 1, the hand does not easily cover a region closer to the opening 192 of the holder 190 than the upper magnet 71 (region above the upper magnet 71), and therefore does not easily touch the external sensor 31.

[0087] In the cover 10 of the present embodiment, the external sensor 31 is disposed in a region that is unlikely to be touched by the user, so that dirt does not easily adhere to the front face 12 of the cover 10. Accordingly, the detection can be accurately performed.

[0088] In addition, since the external sensor 31 is disposed in the first region R1, the external sensor 31 does not easily receive the load applied by the user. The external sensor 31 may also be disposed in the second region R2 below the lower magnet 72. This is because, even when the generation device 1 is held in the right or left hand for inhalation using the generation device 1, the second region R2 is where the little finger is placed and does not easily receive the load applied by the user.

[0089] Also when the external sensor 31 is a sensor other than an optical sensor (e.g., a temperature sensor or a humidity sensor), the external sensor 31 may be disposed in the first region R1 or the second region R2, so that the external sensor 31 does not easily receive the load applied by the user and therefore does not easily break.

Display of Detection Values of External Sensor 31

[0090] The controller 60 includes an output unit 61 (see FIG. 6) that outputs the information detected by the external sensor 31 of the sensor unit 30 to the external device through the communicator 50. The controller 60 also includes a display controller 62 (see FIG. 6) that causes the display 80 to display the information detected by the external sensor 31 of the sensor unit 30.

[0091] The output unit 61 outputs, for example, the biological information detected by the vital sensor, which is an example of the external sensor 31, to the controller 160 of the body 100.

[0092] The display controller 62 causes, for example, the display 80 to display the temperature and the humidity detected by the temperature sensor and the humidity sensor, which are examples of the external sensor 31. Accordingly, the user can check the information related to the ambient air on the display 80.

[0093] FIG. 9 illustrates an example of information stored in the memory 40.

[0094] FIGS. 10 and 11 illustrate examples of information displayed on the display 80.

[0095] Based on the temperature or the humidity detected by the temperature sensor or the humidity sensor, the display controller 62 causes the display 80 to display a notification that the temperature or the humidity is suitable for storage of the substrate 500.

[0096] For example, as illustrated in FIG. 9, the memory 40 stores, as a temperature range suitable for storage of the substrate 500, a temperature range determined in advance (hereinafter sometimes referred to as a "predetermined temperature range"). When the temperature detected by the temperature sensor is within the predetermined temperature range, the display controller 62 causes the display 80 to display the temperature detected by the temperature sensor together with a notification that the temperature is suitable for storage. Thus, as illustrated in FIG. 10, the display 80 displays a notification that the temperature is suitable for storage. The predetermined temperature range may be, for example, 10° C. to 28° C., preferably 17° C. to 21° C.

[0097] In addition, as illustrated in FIG. 9, the memory 40 stores, as a humidity range suitable for storage of the substrate 500, a humidity range determined in advance (hereinafter sometimes referred to as a "predetermined humidity range"). When the humidity detected by the humidity sensor is within the predetermined humidity range, the display controller 62 causes the display 80 to display the humidity detected by the humidity sensor together with a notification that the humidity is suitable for storage. Thus, as illustrated in FIG. 10, the display 80 displays a notification that the humidity is suitable for storage. The predetermined humidity range may be, for example, 66% to 74%, preferably 68% to 72%.

[0098] The memory 40 may store a predetermined temperature range as a temperature range suitable for storage of the substrate 500 and a predetermined humidity range as a humidity range suitable for storage. Then, when the temperature detected by the temperature sensor is within the predetermined temperature range and the humidity detected by the humidity sensor is within the predetermined humidity range, the display controller 62 may cause the display 80 to

display the temperature detected by the temperature sensor and the humidity detected by the humidity sensor together with a notification that the temperature and the humidity are suitable for storage.

[0099] Additionally, the display controller **62** may cause the display **80** to display the information detected by the vital sensor included in the sensor unit **30**. For example, when the vital sensor detects at least one of the user's body temperature, heart rate, pulse rate, blood oxygen saturation level, blood flow rate, COHb, and alcohol concentration, the display controller **62** causes the display **80** to display at least one of the user's body temperature, heart rate, pulse rate, blood oxygen saturation level, blood flow rate, COHb, and alcohol concentration detected by the vital sensor. In addition, when the value detected by the vital sensor is outside a predetermined allowable range described below, the display controller **62** may cause the display **80** to display a warning statement.

[0100] FIG. **11** illustrates the display **80** displaying the body temperature and heart rate when the sensor unit **30** includes a vital sensor that detects the user's body temperature and heart rate and when the display controller **62** causes the display **80** to display the body temperature and heart rate detected by the vital sensor. Additionally, in FIG. **11**, the display **80** also displays a warning icon together with a message "heart rate is high" as an example of a warning statement because the heart rate detected by the vital sensor is 95 bpm (times/min), which is outside a predetermined allowable range (65 to 85 bpm) described below. This display allows the user to check the information related to their own body on the display **80** of the cover **10**.

[0101] In addition, the display controller **62** may cause the display **80** to display the information detected by the sensor unit **120** of the body **100** and acquired from the body **100** through the communicator **50**. For example, the display controller **62** may cause the display **80** to display the temperature detected by the temperature sensor included in the sensor unit **120** of the body **100**. When the sensor unit **120** of the body **100** includes the vital sensor, the display **80** may be caused to display the biological information detected by this vital sensor.

[0102] In addition, the display controller **62** may cause the display **80** to display information acquired by a portable terminal, such as a mobile phone, and received from the portable terminal through the communicator **50**. For example, the display controller **62** may cause the display **80** to display an email or a message received by the mobile phone.

Heat Control

[0103] The controller **160** of the body **100** allows the generation of an aerosol when the cover **10** is attached. Namely, the controller **160** allows the heater **170** to be heated when the cover **10** is attached to the body **100**. In other words, the cover **10** is attached to the body **100** to allow the body **100** to heat the heater **170**. As described above, the controller **160** is capable of determining that the cover **10** is attached to the body **100** by using the output value of the Hall sensor.

[0104] Additionally, the controller **160** of the body **100** may control the heating of the heater **170** based on the output of the sensor unit **30** of the cover **10**. Thus, the generation device **1** can be appropriately operated based on the state of the user.

[0105] Here, the quality of inhalation experience (e.g., smoking experience) experienced by the user by using the generation device **1** is affected by the user's condition. Therefore, even when the aerosol source and the flavor source suit the user's preference, the user may not be able to have a high-quality inhalation experience if the user is not feeling well. If the generation device **1** generates an aerosol even though the user is unable to have a high-quality inhalation experience, the aerosol source and the flavor source may be wasted.

[0106] In light of the above, even when the cover **10** is attached to the body **100**, the generation device **1** may restrict the heater **170** from being heated if the value detected by the vital sensor included in the sensor unit **30** is outside a predetermined range. In the following description, the predetermined range of the detection value of the vital sensor in which the heating of the heater **170** is allowed may be referred to as a "predetermined allowable range".

[0107] For example, when the vital sensor is a sensor capable of detecting the user's body temperature, the predetermined allowable range may be 38° C. or less. When the vital sensor is a sensor capable of detecting the user's heart rate, the predetermined allowable range may be 65 to 85 bpm (times/min). When the vital sensor is a sensor capable of detecting the user's pulse rate, the predetermined allowable range may be 65 to 100 bpm (times/min). When the vital sensor is a sensor capable of detecting the blood oxygen saturation level, the predetermined allowable range may be 96% or more. When the vital sensor is a sensor capable of detecting the blood flow rate, the predetermined allowable range may be 20 to 60 ml/min/100 g. When the vital sensor is a sensor capable of detecting COHb, the predetermined allowable range may be less than 2%. When the vital sensor is an alcohol sensor capable of detecting the alcohol concentration in the exhaled breath, the predetermined allowable range may be 0.20 mg or less.

[0108] In the generation device **1**, the memory **140** stores the predetermined allowable range for each type of biological information. Then, the controller **160** of the body **100** may acquire the detection value of the vital sensor from the cover **10** and restrict the heater **170** from being heated when the detection value is outside the predetermined allowable range.

[0109] An example of a heat control process performed by the controller **160** of the body **100** will be described with reference to a flowchart. In this heat control process, the heating of the heater **170** is allowed when the detection value of the vital sensor is within the predetermined allowable range.

[0110] FIG. **12** is a flowchart of an example of a heat control process performed by the controller **160**. The controller **160** repeats this process every preset time interval (e.g., 1 millisecond).

[0111] The controller **160** determines whether or not a heating command is issued (S**1201**). The issuance of the heating command may be, for example, a predetermined operation performed on the display **80**. The predetermined operation may be, for example, a continuous touch on an icon displayed on the display **80** for a predetermined time (e.g., 3 seconds). When a heating command is issued (YES in S**1201**), the controller **160** determines whether or not the cover **10** is attached (S**1202**). This process is a process of determining whether or not the magnetic sensor **122** has detected magnetic force.

[0112] When the cover **10** is attached (YES in S**1202**), the controller **160** determines whether or not the value detected by the vital sensor is within the predetermined allowable range (S**1203**). When the value is within the predetermined allowable range (YES in S**1203**), the controller **160** starts to heat the heater **170** (S**1204**). Also, the controller **160** transmits a notification that the heating of the heater **170** has been started to the controller **60** of the cover **10**. Then, the controller **160** heats the heater **170** in accordance with the control sequence stored in the memory **140** of the body **100** and specifying the temporal change in the target temperature of the heater **170** during heating of the heater **170**, and then stops heating the heater **170**. After the controller **160** stops heating the heater **170**, the controller **160** transmits a notification that the heating of the heater **170** has been stopped to the controller **60** of the cover **10**.

[0113] The controller **160** does not start to heat the heater **170** (S**1205**) when the heating command is not issued (NO in S**1201**), when the cover **10** is not attached (NO in S**1202**), or when the value detected by the vital sensor is not within the predetermined allowable range (NO in S**1203**).

[0114] As described above, the controller **160** of the body **100** allows the heater **170** to be heated when the detection value of the vital sensor is within the predetermined allowable range. This enables the user to have a high-quality inhalation experience and prevents wasting of the aerosol source or the like.

[0115] The controller **160** may allow the heater **170** to be heated irrespective of the detection value of the vital sensor. As an example of the heat control process performed irrespective of the detection value of the vital sensor, the controller **160** may start to heat the heater **170** without performing the determination in S**1203** in FIG. **12** if the cover **10** is attached (YES in S**1202**).

[0116] The controller **160** may allow the heater **170** to be heated even when the cover **10** is not attached. As an example of the heat control process in which the heater **170** is allowed to be heated even when the cover **10** is not attached, the controller **160** may start to heat the heater **170** without performing the determination in S**1202** in FIG. **12** if the detection value of the vital sensor is within the predetermined allowable range (YES in S**1203**).

Display of Control Sequence

[0117] FIG. **13** illustrates an example of the temporal change in the target temperature of the heater **170** displayed on the display **80** of the cover **10**.

[0118] As illustrated in FIG. **13**, after the body **100** starts to heat the heater **170** (S**1204**), the display controller **62** of the cover **10** causes the display **80** of the cover **10** to display the temporal change in the target temperature of the heater **170**, and also causes the display **80** of the cover **10** to display the current temperature detected by the temperature sensor included in the sensor unit **120**. This enables the user to check, for example, the time required to reach the temperature at which the aerosol can be inhaled, whether inhalation is possible, and the time left before the end of the period in which inhalation is possible.

[0119] When the memories of the generation device **1** (the memory **140** of the body **100** and the memory **40** of the cover **10**) store a plurality of control sequences, the controller **160** of the body **100** may allow the user to select one of the control sequences stored in these memories.

[0120] FIG. **14** illustrates an example of a control sequence selection screen displayed on the display **80** of the cover **10**.

[0121] For example, in the heat control process described with reference to the flowchart of FIG. **12**, after it is determined that the value is within the predetermined allowable range (YES in S**1203**) and before the heating of the heater **170** is started (S**1204**), the controller **160** causes the display **80** of the cover **10** to display the selection screen illustrated in FIG. **14**. In this process, the display controller **62** of the controller **60** causes the display **80** to present the display in accordance with instructions from the controller **160**. For example, as illustrated in FIG. **14**, the display controller **62** causes the display **80** to display the temporal changes in the target temperature of the heater **170** according to a first sequence Se**1** and a second sequence Se**2** stored in the memory **140** of the body **100** and a third sequence Se**3** stored in the memory **40** of the cover **10**. Then, the controller **160** determines one of the control sequences displayed on the display **80** (the first sequence Se**1**, the second sequence Se**2**, and the third sequence Se**3**) that is touched by the user as the control sequence selected by the user. Then, the controller **160** may control the heating of the heater **170** in accordance with the temporal change in the target temperature based on the determined control sequence. When the user is allowed to select a control sequence on the display **80** as described above, the function of detecting the user's touch provided by the display **80** can be regarded as an operation unit that allows the selection of one of a plurality of control sequences displayed on the display **80**.

[0122] When the control sequence stored in the memory **40** of the cover **10** (e.g., the third sequence Se**3**) is selected, the controller **60** of the cover **10** transmits the information related to the control sequence to the controller **160** of the body **100** through the communicator **50**. Then, the controller **160** of the body **100** may heat the heater **170** by using the information received from the cover **10**.

On-off Control of Sensor of Sensor Unit **30**

[0123] The timing at which the switch of a sensor of the sensor unit **30** is turned on and off will now be described. In the following description, the on state of the switch of a sensor may be referred to as the on state of the sensor, and the off state of the switch of a sensor as the off state of the sensor.

[0124] The switch of the touch sensor **35** is constantly on, and an on signal is output to the controller **60** when the cover **10** is touched by the user. The switch of the external sensor **31** is turned on when the on signal is output from the touch sensor **35**, in other words, when the cover **10** is touched by the user. While the external sensor **31** is in the on state, the external sensor **31** performs detection every predetermined time interval (e.g., 1 second).

[0125] The switch of the external sensor **31** may be turned off while the heater **170** of the body **100** is being heated. When the external sensor **31** is turned off while the heater **170** of the body **100** is being heated as described above, energy can be saved.

[0126] An example of an on-off control process for a sensor of the sensor unit **30** performed by the controller **60** of the cover **10** will be described with reference to a flowchart.

[0127] FIG. **15** is a flowchart of an example of the on-off control process performed by the controller **60**. The con-

troller **60** is activated when, for example, the touch sensor **35** detects that the cover **10** is touched by the user, and repeats the process illustrated in FIG. **15** every preset time interval (e.g., 1 millisecond).

[0128] First, the controller **60** transmits a notification that the controller **60** is activated to the controller **160** of the body **100** (S**1501**). Then, the controller **60** turns on the switch of the external sensor **31** (S**1502**), and transmits the detection value of the external sensor **31** to the controller **160** of the body **100** (S**1503**). After that, the controller **60** determines whether or not the heating of the heater **170** of the body **100** is started (S**1504**). In this process, the controller **60** determines whether or not a notification that the heating of the heater **170** is started is received from the controller **160** of the body **100**.

[0129] When the heating is started (YES in S**1504**), the controller **60** turns off the switch of the external sensor **31** (S**1505**). After that, the controller **60** determines whether or not the heating of the heater **170** of the body **100** is stopped (S**1506**). When the heating is not stopped (NO in S**1506**), the controller **60** waits until the heating is stopped.

[0130] When the heating is stopped (YES in S**1506**), the controller **60** determines whether or not the user's touch on the cover **10** is detected by the touch sensor **35** (S**1507**). When the user's touch is detected by the touch sensor **35** (YES in S**1507**), the controller **60** performs the process of S**1502** and the following steps. When the user's touch is not detected by the touch sensor **35** (NO in S**1507**), the controller **60** transmits a notification that the controller **60** is to be powered off to the controller **160** of the body **100** (S**1508**), and is powered off (S**1509**).

[0131] When the heating is not started (NO in S**1504**), the controller **60** performs the process of S**1507** and the following steps.

Failure Notification of Sensor of Sensor Unit **30**

[0132] A process performed when a sensor of the sensor unit **30** fails will now be described.

[0133] FIG. **16** illustrates an example of information that the display **80** is caused to display by the display controller **62**.

[0134] When the external sensor **31** included in the sensor unit **30** fails, the display controller **62** of the controller **60** causes the display **80** to display a notification that the external sensor **31** has failed. For example, when the humidity sensor fails, the display controller **62** causes the display **80** to display a notification that the humidity sensor has failed. Accordingly, as illustrated in FIG. **16**, the display **80** displays a notification that the humidity sensor has failed. The external sensor **31** fails due to, for example, disconnection or short-circuiting. The controller **60** determines that the external sensor **31** has failed when no output value can be received from the external sensor **31**.

[0135] The display controller **62** may cause the display **80** to display a notification depending on the type of the external sensor **31**. For example, the display controller **62** may cause the display **80** to display a notification when the vital sensor, the temperature sensor, or the humidity sensor fails, but may not cause the display **80** to display a notification when the atmospheric pressure sensor, the distance sensor, or the color sensor fails.

[0136] The reason why the display **80** is caused to display a notification when the vital sensor fails is because the heating of the heater **170** is not allowed unless the detection value of the vital sensor is within the predetermined allowable range, and the user may not be able to inhale the aerosol when the vital sensor fails.

[0137] The reason why the display **80** is caused to display a notification when the temperature sensor or the humidity sensor fails is because the user cannot be notified that the temperature and the humidity are within the predetermined temperature range and the predetermined humidity range, respectively.

[0138] The types of the external sensor **31** for which the display **80** is caused to display a notification in case of failure and the types of the external sensor **31** for which the display **80** is not caused to display a notification in case of failure are not particularly limited, and may be set as appropriate.

[0139] FIG. **17** illustrates examples of sensors and whether or not the display **80** is required to display a notification for each sensor.

[0140] The memory **40** stores whether or not the display **80** is to display a notification in case of failure of the external sensor **31** for each type of the external sensor **31** included in the sensor unit **30**. In the example illustrated in FIG. **17**, the memory **40** stores information that the display **80** is required to display a notification when the vital sensor, the temperature sensor, or the humidity sensor fails but is not required to display a notification when the atmospheric pressure sensor, the distance sensor, or the color sensor fails.

[0141] When any of the sensors fails, the display controller **62** may cause the display **80** to display a notification if the memory **40** stores information that the display **80** is required to display a notification in case of failure of that sensor, and may not cause the display **80** to display a notification if the memory **40** stores information that the display **80** is not required to display a notification in case of failure of that sensor.

[0142] Referring to FIG. **17**, for example, if the stored information indicates that the display **80** is required to display a notification that a vital sensor has failed in case of failure of the vital sensor, the display controller **62** causes the display **80** to display a notification that the vital sensor has failed. In contrast, referring to FIG. **17**, if the stored information indicates that the display **80** is not required to display a notification that the atmospheric pressure sensor has failed, the display controller **62** does not cause the display **80** to display a notification that the atmospheric pressure sensor has failed.

[0143] As described above, the cover **10** is attachable to the body **100** including the heater **170** that heats the substrate **500** containing the aerosol source. The cover **10** includes the external sensor **31** and the display **80**. The external sensor **31** is an example of a sensor that detects external information other than the internal information related to the state of the body **100** (e.g., the temperature of the heater **170**) and the internal information related to the state of the cover **10**. The display **80** displays information. The cover **10** also includes the display controller **62** that causes the display **80** to display at least the external information detected by the external sensor **31** or information acquired from the external device other than the cover **10** (e.g., the body **100** or a portable terminal). According to the cover **10** having the above-described structure, the user can check their biological information, such as body temperature, heart rate, pulse rate, blood oxygen saturation level, blood flow rate, COHb, and alcohol concentration, and information of the external envi-

ronment, such as temperature and humidity, on the display **80**. Therefore, the user's convenience can be improved.

[0144] The cover **10** further includes the upper magnet **71** and the lower magnet **72**, which are examples of connectors to be connected to the body **100**. The display **80** is disposed between the upper magnet **71** and the lower magnet **72**. The external sensor **31** may be disposed at one of the ends in the centerline direction of the column-shaped holder **190** formed in the body **100** to accommodate a portion of the substrate **500**. Accordingly, the visibility of the display **80** can be increased, and the external sensor **31** does not easily receive the load applied by the user, so that the external sensor **31** does not easily break. In addition, when the external sensor **31** is an optical sensor, interference between the optical sensor and another light source (e.g., an LED or liquid crystal display) included in the display **80** can be suppressed.

[0145] The external sensor **31** may be closer to the opening **192** in the holder **190** than the upper magnet **71** in the centerline direction. Since the region closer to the opening **192** than the upper magnet **71** (region above the upper magnet **71**) is unlikely to be touched by the user when the user holds the generation device **1** in the right or left hand for inhalation, dirt does not easily adhere to the front face **12** of the cover **10**. Accordingly, the detection can be accurately performed.

[0146] The cover **10** may include the memory **40** that stores a control sequence specifying the temporal change in the target temperature of the heater **170** during heating of the heater **170**, and the display controller **62** may cause the display **80** to display the temporal change in the target temperature of the heater **170** according to the control sequence stored in the memory **40** (example of information related to the control sequence). Accordingly, the user can check the control sequence stored in the memory **40** of the cover **10**. In addition, the user can more easily imagine the inhalation experience they can have by using the generation device **1**.

[0147] In addition, the memory **40** may store a plurality of control sequences, and the cover **10** may allow a selection of one control sequence from the control sequences displayed by the display **80**. Accordingly, the user can easily select the inhalation experience to have by using the generation device **1** based on their condition or mood at the time.

[0148] The external sensor **31** may detect the temperature or the humidity, and the display controller **62** may cause the display **80** to display a notification that the temperature or the humidity is suitable for the storage of the substrate **500** based on at least the temperature or the humidity detected by the external sensor **31**, or the temperature or the humidity acquired from the external device. When the cover **10** is structured as described above, the user can check the location suitable for the storage of the substrate **500** on the cover **10**, and accordingly the user's convenience can be improved. In addition, the substrate **500** can be stored at an appropriate location.

[0149] In addition, the external sensor **31** may detect the heart rate or the pulse rate, and the display controller **62** may cause the display **80** to display a warning when the heart rate or the pulse rate detected by the external sensor **31** is outside the predetermined range.

[0150] In addition, in case of failure of the external sensor **31**, the display controller **62** may cause the display **80** to display a notification that the external sensor **31** has failed. Accordingly, the user can be notified that the external sensor **31** has failed.

[0151] The cover **10** may include a plurality of sensors (e.g., the temperature sensor and the vital sensors), and may also include the memory **40** that stores whether or not a notification is required in case of failure for each of the sensors. When any of the sensors fails, the display controller **62** causes the display **80** to display a notification if the memory **40** stores information that a notification is required in case of failure of that sensor, and does not cause the display **80** to display a notification if the memory **40** stores information that no notification is required in case of failure of that sensor. Accordingly, a notification of failure may or may not be presented depending on the type of the sensor, and the user can be informed only of truly necessary information, so that the convenience can be improved. In addition, more energy can be saved than when a notification of failure is output to the external device for all of the sensors.

[0152] In addition, since the cover **10** having the above-described structure includes the battery **21**, even when the cover **10** is not attached to the body **100**, the temperature, the humidity, the biological information, etc., can be detected by the external sensor **31** and displayed on the display **80**. Therefore, the user can find a location suitable for storage of the substrate **500** without carrying the body **100**.

[0153] In addition, since the cover **10** includes the battery **21**, even when the electric power supply from the body **100** to the cover **10** becomes unstable for some reason, the battery **21** can reliably supply electric power to the structural elements of the cover **10**. Therefore, the structural elements can be reliably operated.

[0154] Since only a small amount of electric power can be transmitted from the power feeder **112** of the body **100** to the cover **10** per unit time through contactless power transmission, such as near-field communication, the structural elements (e.g., external sensor **31**) mountable in the cover **10** are limited if only contactless power transmission is used. However, when the battery **21** is provided, the flexibility of the structural elements mountable in the cover **10** can be increased.

[0155] However, the cover **10** may have no battery **21** and be operated only by the electric power supplied from the body **100** through contactless power transmission when the cover **10** is attached to the body **100** or when the cover **10** is near the body **100**.

[0156] Different types of covers **10** having the above-described structure may be provided, and the external sensor **31** of each type of cover **10** may include different types of sensors. For example, one cover **10** may include only the temperature sensor, the humidity sensor, and the atmospheric pressure sensor while another cover **10** includes only the vital sensors. In this case, the user can replace the cover **10** to change the functions provided by the generation device **1**. Additionally, when the cover **10** is replaceable, the cover **10** can be replaced to change the appearance of the generation device **1**. Thus, the user can customize the appearance and function of the generation device **1** based on, for example, their preference. As a result, the product value of the generation device **1** can be increased.

[0157] When the cover **10** is removably attachable to the body **100**, for example, in case of failure of the body **100**, only the body **100** may be replaced and the cover **10** may be

continuously used. Since the cover **10** includes the memory **40**, when only the body **100** is replaced, the information stored in the memory **140** of the body **100** can be transferred to the memory **40** of the cover **10**. The information stored in the memory **140** of the body **100** may be, for example, the programs of the heat control process described with reference to FIG. **12** and the control sequence specifying the temporal change in the target temperature of the heater **170** during heating of the heater **170**. The information may be transferred by contactless power transmission, such as near-field communication, or by forming a USB terminal on the cover **10** and connecting a cable to this USB terminal and the USB terminal **113** of the body **100**.

[0158] Although whether or not a command for heating the heater **170** is issued is determined based on a touch on the display **80** in a central region of the cover **10**, the cover **10** is not limited to this. For example, a projection that projects from the rear face **13** toward the body **100** may be provided at a position corresponding to the operation button **121** of the body **100** and between the upper magnet **71** and the lower magnet **72**, and the projection may be capable of pressing the operation button **121** when the cover **10** is elastically deformed. Whether or not the heating command is issued may be determined based on whether the operation button **121** is operated in a predetermined manner (e.g., continuously pressed for 3 seconds).

[0159] The present disclosure includes the following structures.

[0160] (1) A cover attachable to a body including a heater that heats a substrate containing an aerosol source, the cover including: a sensor that detects external information other than internal information related to a state of the body and internal information related to a state of the cover; a display that displays information; and a display controller that causes the display to display at least the external information detected by the sensor or information acquired from an external device other than the cover.

[0161] (2) The cover according to (1), further including a plurality of connectors connectable to the body, wherein the display is provided between the plurality of connectors, and wherein the sensor is provided at one of ends in a centerline direction of a column-shaped holder formed in the body to accommodate a portion of the substrate.

[0162] (3) The cover according to (2), wherein the sensor is closer to an opening of the holder than the plurality of connectors in the centerline direction.

[0163] (4) The cover according to any one of (1) to (3), further including a memory that stores a control sequence specifying a temporal change in a target temperature of the heater during heating of the heater, wherein the display controller causes the display to display information related to the control sequence stored in the memory.

[0164] (5) The cover according to (4), wherein the memory stores the control sequence including a plurality of control sequences, and wherein one control sequence is selectable from the plurality of control sequences displayed by the display.

[0165] (6) The cover according to any one of (1) to (5), wherein the sensor detects a temperature or a humidity, and wherein the display controller causes the display to display a notification that a temperature or a humidity is suitable for storage of the substrate based on at least the temperature or the humidity detected by the sensor, or a temperature or a humidity acquired from the external device.

[0166] (7) The cover according to any one of (1) to (5), wherein the sensor detects a heart rate or a pulse rate, and wherein the display controller causes the display to display a warning when the heart rate or the pulse rate detected by the sensor is outside a predetermined range.

[0167] (8) An aerosol generation device including: a body including a heater that heats a substrate containing an aerosol source; and the cover according to any one of (1) to (7) attached to the body.

REFERENCE SIGNS LIST

[0168] **1** aerosol generation device
[0169] **10** cover
[0170] **30** sensor unit
[0171] **31** external sensor (example of sensor)
[0172] **35** touch sensor
[0173] **40** memory
[0174] **50** communicator
[0175] **60** controller
[0176] **62** display controller
[0177] **71** upper magnet (example of connector)
[0178] **72** lower magnet (example of connector)
[0179] **80** display
[0180] **100** body (example of external device)
[0181] **170** heater
[0182] **190** holder
[0183] **192** opening
[0184] **500** substrate

1. A cover attachable to a body including a heater that heats a substrate containing an aerosol source, the cover comprising:
- a sensor that detects external information other than internal information related to a state of the body and internal information related to a state of the cover;
- a display that displays information; and
- a display controller that causes the display to display at least the external information detected by the sensor or information acquired from an external device other than the cover.

2. The cover according to claim **1**, further comprising:
- a plurality of connectors connectable to the body,
- wherein the display is provided between the plurality of connectors, and
- wherein the sensor is provided at one of ends in a centerline direction of a column-shaped holder formed in the body to accommodate a portion of the substrate.

3. The cover according to claim **2**, wherein the sensor is closer to an opening of the holder than the plurality of connectors in the centerline direction.

4. The cover according to claim **1**, further comprising:
- a memory that stores a control sequence specifying a temporal change in a target temperature of the heater during heating of the heater,
- wherein the display controller causes the display to display information related to the control sequence stored in the memory.

5. The cover according to claim **4**, wherein the memory stores a plurality of control sequences, and
- wherein one control sequence is selectable from the plurality of control sequences displayed by the display.

6. The cover according to claim **1**, wherein the sensor detects a temperature or a humidity, and
- wherein the display controller causes the display to display a notification that a temperature or a humidity is

suitable for storage of the substrate based on at least the temperature or the humidity detected by the sensor, or a temperature or a humidity acquired from the external device.

7. The cover according to claim **1**, wherein the sensor detects a heart rate or a pulse rate, and

wherein the display controller causes the display to display a warning when the heart rate or the pulse rate detected by the sensor is outside a predetermined range.

8. An aerosol generation device comprising:

a body including a heater that heats a substrate containing an aerosol source; and

the cover according to claim **1** attached to the body.

* * * * *