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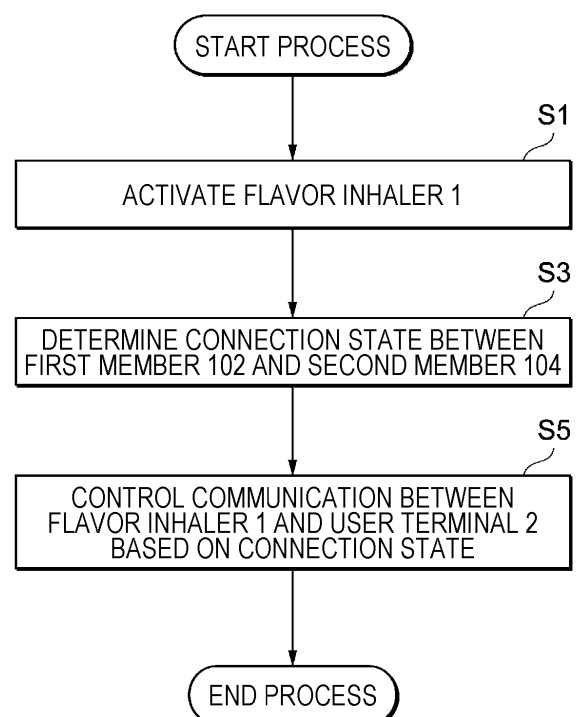
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(54) **BATTERY UNIT, AEROSOL GENERATION DEVICE, INFORMATION PROCESSING METHOD, AND PROGRAM**

(57) Provided is a battery unit for an aerosol generation device that generates aerosol, the battery unit comprising: a communication unit (108) that performs wireless communication between the aerosol generation device and a user terminal (2); and a control unit (106) that determines the connection status between the battery unit and a cartridge equipped with an atomization unit (118) that atomizes an aerosol source. The control unit (106) controls the wireless communication on the basis of the connection status. Accordingly, the consumption of a battery (110), with which the aerosol generation device is equipped, can be reduced.

FIG. 9



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Description

Technical Field

[0001] The present invention relates to a battery unit, an aerosol generation device, an information processing method, and a program.

Background Art

[0002] Patent Literature 1 discloses an aerosol delivery system including a control body for an aerosol delivery device, the control body including processing circuitry; and a cartridge carrying control information that is readable by the processing circuitry, wherein the control body is configured to removably engage the cartridge.

Citation List

Patent Literature

[0003] Patent Literature 1: JP2017-513465A

Summary of Invention

Technical Problem

[0004] In the aerosol delivery system described in Patent Literature 1, the control information carried by the cartridge is read when the control body and the cartridge are engaged, and communication between the control body and the cartridge is performed based on the control information.

[0005] A conventional electronic cigarette system as described above is demanded for reduction in the size of a main body thereof. Since the size of a battery included in the electronic cigarette is limited, the battery capacity is also limited.

[0006] A conventional electronic cigarette may execute short-range wireless communication, such as Bluetooth [registered trademark] or BLE (Bluetooth Low Energy) communication, with another apparatus. The execution of such short-range wireless communication increases the electric power consumption of the electronic cigarette and also increases battery consumption. As a result, it may be impossible to ensure a remaining battery amount sufficient for the user to perform a puff action of inhaling an aerosol using the electronic cigarette.

[0007] Accordingly, some aspects of the present invention have been made in view of the foregoing situation, and an object thereof is to provide a technique that can reduce the consumption of a battery included in an aerosol generation device for generating an aerosol.

Solution to Problem

[0008] A battery unit according to an aspect of the present invention is a battery unit for an aerosol gener-

ation device for generating an aerosol, including a communication unit configured to execute wireless communication between the aerosol generation device and a user terminal; and a control unit configured to determine a connection state between the battery unit and a cartridge including an atomizing unit configured to atomize an aerosol source, wherein the control unit is configured to control the wireless communication based on the connection state.

[0009] An aerosol generation device according to an aspect of the present invention is an aerosol generation device for generating an aerosol, including a communication unit configured to execute wireless communication between the aerosol generation device and a user terminal; and a control unit configured to determine a connection state between a battery unit for the aerosol generation device and a cartridge including an atomizing unit configured to atomize an aerosol source, wherein the control unit is configured to control the wireless communication based on the connection state.

[0010] An information processing method according to an aspect of the present invention is an information processing method executed by an aerosol generation device for generating an aerosol, including a step of executing wireless communication between the aerosol generation device and a user terminal; a step of determining a connection state between the battery unit and a cartridge including an atomizing unit configured to atomize an aerosol source; and a step of controlling the wireless communication based on the connection state.

[0011] A program according to an aspect of the present invention is a program for causing a computer to implement a communication function of executing wireless communication between the aerosol generation device and a user terminal; and a control function of determining a connection state between the battery unit and a cartridge including an atomizing unit configured to atomize an aerosol source, wherein the control function controls the wireless communication based on the connection state.

[0012] According to these aspects, wireless communication is controlled based on the connection state between the battery unit and the cartridge. As a result, an increase in the electric power consumption of the aerosol generation device can be suppressed, and thus the consumption of a battery included in the aerosol generation device can be reduced.

[0013] In the present invention, the terms "unit" or "part" and "device" do not simply refer to physical means and may include functions of the "unit" or "part" and "device", which are implemented by software. In addition, the functions of one "unit" or "part" or one "device" may be implemented by two or more physical means or devices, or the functions of two or more "units" or "parts" or two or more "devices" may be implemented by one physical means or device.

Advantageous Effects of Invention

[0014] According to the present invention, it is possible to reduce the consumption of a battery included in an aerosol generation device.

Brief Description of Drawings

[0015]

[FIG. 1] FIG. 1 is a schematic configuration diagram of an information processing system according to an embodiment of the present invention.

[FIG. 2A] FIG. 2A is a block diagram of a schematic configuration of a flavor inhaler according to the embodiment of the present invention.

[FIG. 2B] FIG. 2B is a diagram illustrating an example schematic appearance of the flavor inhaler according to the embodiment of the present invention.

[FIG. 3] FIG. 3 is a block diagram illustrating a schematic configuration of the flavor inhaler according to the embodiment of the present invention.

[FIG. 4] FIG. 4 is a block diagram illustrating another schematic configuration of the flavor inhaler according to the embodiment of the present invention.

[FIG. 5] FIG. 5 is a diagram illustrating another example schematic appearance of the flavor inhaler according to the embodiment of the present invention.

[FIG. 6] FIG. 6 illustrates another example schematic appearance of the flavor inhaler according to the embodiment of the present invention with an aerosol generating substrate held.

[FIG. 7] FIG. 7 is a block diagram of a schematic configuration of a user terminal according to the embodiment of the present invention.

[FIG. 8] FIG. 8 is a schematic configuration diagram illustrating an example functional configuration of a control unit according to the embodiment of the present invention.

[FIG. 9] FIG. 9 is a flowchart illustrating an example of a communication control process according to a first embodiment of the present invention.

[FIG. 10] FIG. 10 is a flowchart illustrating an example of a communication control process according to a second embodiment of the present invention.

[FIG. 11] FIG. 11 is a flowchart illustrating an example of a communication control process according to a third embodiment of the present invention.

[FIG. 12] FIG. 12 is a flowchart illustrating an example of a communication control process according to a fourth embodiment of the present invention.

[FIG. 13] FIG. 13 is a flowchart illustrating an example of a communication control process according to a fifth embodiment of the present invention.

[FIG. 14] FIG. 14 is a diagram illustrating an example hardware configuration of a computer according to an embodiment of the present invention.

Description of Embodiments

[0016] Embodiments of the present invention will be described hereinafter with reference to the accompanying drawings. The following embodiments are illustrative for describing the present invention and are not intended to limit the present invention to only the embodiments thereof. Further, the present invention may be modified in various ways without departing from the gist thereof. In addition, in the drawings, the same structural elements are denoted by the same reference signs as much as possible, and redundant description will be omitted.

[Configuration of Information Processing System]

[0017] FIG. 1 is a schematic configuration diagram (system configuration diagram) of an information processing system according to this embodiment of the present invention. As illustrated in FIG. 1, an information processing system 100 is configured to include, for illustrative purposes, n flavor inhalers 1 (n is any integer value greater than or equal to 1), and a user terminal 2 configured to be capable of communicating with the n flavor inhalers 1.

[0018] Each of the flavor inhalers 1 includes a battery unit and a cartridge including an atomizing unit that atomizes an aerosol source. The battery unit and the cartridge unit can be electrically or mechanically (including physically) connected to each other. The battery unit includes a communication unit and can communicate with the user terminal 2. In the information processing system 100 according to this embodiment of the present invention, communication between the communication unit of the battery unit and the user terminal 2 is controlled based on the connection state between the battery unit and the cartridge unit in the flavor inhaler 1.

[0019] The "flavor inhaler 1" is a tool used to inhale flavor and is intended to be, for example, but not limited to, an electronic cigarette, a heat-not-burn tobacco product, or a conventional tobacco product. The flavor inhaler 1 may be an aerosol generation device that generates an aerosol and that is used to inhale the generated aerosol. The action of inhaling an aerosol is referred to as "puff action", and the number of times a puff action is performed is referred to as the "number of puffs". The aerosol generation device is intended to be, for example, an electronic cigarette, a heat-not-burn tobacco product, or a nebulizer for medical use. More specifically, the aerosol generation device is, for example, a device that atomizes a liquid (aerosol source) using electric power to generate an aerosol. The aerosol is obtained by atomizing an aerosol source and is a suspension of fine particles in a gas. The aerosol produced by the aerosol generation device may include a flavor. Examples of the aerosol generation device include a heat-not-burn tobacco product and an electronic cigarette. The aerosol generation device further includes a type that directly heats tobacco (direct heating), a type that indirectly heats tobacco (in-

direct heating), and a type that heats a liquid. Alternatively, the aerosol generation device may produce SAWs (Surface Acoustic Waves) using a piezoelectric element substrate having a pair of comb electrodes to atomize a liquid. In the figure, a flavor inhaler 1a and a flavor inhaler 1b are illustrated as n flavor inhalers. In the following description, these n flavor inhalers are simply referred to as "flavor inhalers 1" with some reference signs omitted, when they are described without being distinguished from each other.

[0020] The user terminal 2 is implemented by, for example, a smartphone, a game console, or a personal computer. One user terminal 2 is illustrated in the figure, but it is not limited thereto. The information processing system 100 may include a plurality of user terminals 2.

[0021] The flavor inhaler 1 and the user terminal 2 are associated with each other and perform communication (including wireless communication) with each other. For example, the flavor inhaler 1 and the user terminal 2 are capable of executing short-range wireless communication such as Bluetooth or BLE (Bluetooth Low Energy) communication to transmit and receive information to and from each other. Transmission and reception of information between the flavor inhaler 1 and the user terminal 2 is not limited to BLE communication and may be executed by any communication such as Wi-Fi [registered trademark], LPWAN (Low Power Wide Area Network), or NFC (Near Field Communication). In addition, transmission and reception of information between the flavor inhaler 1 and the user terminal 2 is not limited to wireless communication and may be wired communication such as USB (Universal Serial Bus), Mini USB, Micro USB, or Lightning.

[0022] The flavor inhaler 1 and the user terminal 2 included in the information processing system 100 will be described in detail hereinafter.

[Configuration of Flavor Inhaler]

[0023] FIG. 2A is a block diagram of a schematic configuration of the flavor inhaler according to the embodiment of the present invention. It should be noted that FIG. 2A schematically and conceptually illustrates components included in the flavor inhaler 1 and does not illustrate the precise arrangement, shape, size, positional relationship, and the like of the components and the flavor inhaler 1. It should also be noted that the flavor inhaler 1 may include a component not illustrated in FIG. 2A, such as a tobacco capsule or a liquid cartridge.

[0024] A sensor 11 represents a sensor that detects information regarding, for example, inhalation of a user. The sensor 11 may be any type of sensor for detecting a puff action of the user, such as a flow sensor, a flow velocity sensor, or a pressure sensor. The sensor 11 may be a button to be pressed by the user to perform a puff action. For example, the sensor 11 may be an inhalation sensor and may detect an inhalation of the user through the flavor inhaler 1. The sensor 11 may be an air flow

sensor and may detect an air flow generated by inhalation of the user. The sensor 11 may be a GPS sensor that measures the position of the flavor inhaler 1. The sensor 11 may be a motion sensor that detects a movement of the flavor inhaler 1. The motion sensor may be, for example, a gyro sensor or the like for detecting an angle, a posture, or the like of the flavor inhaler 1, or may be an acceleration sensor for detecting a movement of the flavor inhaler 1 in each axial direction. The motion sensor may be a combination of a gyro sensor, an acceleration sensor, and the like.

[0025] A change part 12 is a block that generates a predetermined change that is externally observable. The change part 12 may be an LED (Light Emitting Diode) that emits light of a predetermined color, for example, a blue LED, and the predetermined change may be light emission of a predetermined color, for example, blue. The predetermined color is not limited to blue and may be any color. The predetermined change may be a change in the color of light emission or a change in the intensity of light emission according to the strength (pressure) of inhalation, which is sensed by the sensor 11. The change part 12 is not limited to an LED and may be a light source having another configuration that emits light of a predetermined color.

[0026] FIG. 2B is a diagram illustrating an example schematic appearance of the flavor inhaler according to the embodiment of the present invention. The arrangement of the change part 12 will be described with reference to FIG. 2B. As presented in FIG. 2B, the flavor inhaler 1 may be, but not limited to, of a stick shape including two ends 161 and 162. The user holds the one end 161 in the mouth to inhale. The user may hold the one end 161 in the mouth to inhale through a mouthpiece for a cigarette or the like attachable to the one end 161. In a case where the flavor inhaler 1 has the shape as presented in FIG. 2B, the change part 12 is preferably disposed in the other end 162 of the two ends. The change part 12 is at least a portion of an outer surface of the flavor inhaler 1 and may have any shape such as a substantially rectangular shape as presented in FIG. 2B or an annular shape (not illustrated) along the outer circumference of the flavor inhaler 1.

[0027] Referring back to FIG. 2A, a control unit 13 is a block that causes the change part 12 to generate a predetermined change on the basis of at least a signal from the sensor 11. The control unit 13 may cause the change part 12 to produce light emission of a predetermined color when, for example, the magnitude of the signal from the sensor 11 or the strength of inhalation determined based on the signal is greater than or equal to a predetermined threshold value. Further, the control unit 13 may change the color or intensity of light emission of the change part 12 in accordance with, for example, the magnitude of the signal from the sensor 11 or the strength of inhalation determined based on the signal. For example, the control unit 13 may increase the intensity of light emission when inhalation is strong, and decrease the intensity of light

emission when inhalation is weak. Alternatively, for example, the control unit 13 may divide the strength of inhalation into a plurality of levels, set a predetermined color for each of the plurality of levels, and cause emission of light of the predetermined color corresponding to the strength of inhalation. The control unit 13 may be an electronic circuit module configured as a microprocessor or a microcomputer.

[0028] A communication unit 14 performs wireless communication with an external device including the user terminal 2 illustrated in FIG. 1 or another computer. For example, the communication unit 14 executes an authentication connection (corresponding to, for example, a pairing process for executing short-range wireless communication such as Bluetooth or BLE communication) with the external device, the authentication connection being, for example, a process of configuring a communication connection between the flavor inhaler 1 and the external device. The authentication connection is, for example, a process necessary to start communication between the flavor inhaler 1 and the external device. Appropriate authentication connection enables encrypted communication to be executed between the flavor inhaler 1 and the external device. The communication unit 11 may receive a request for an authentication connection from the external device or may transmit a request for an authentication connection to the external device. The communication unit 14 may be implemented using at least a network interface serving as a hardware resource. The control unit 13 is capable of transmitting various kinds of information detected by the sensor 11 to the user terminal 2 or another computer through the communication unit 14. The various kinds of information to be transmitted from the control unit 13 to the user terminal 2 or another computer through the communication unit 14 include, for example, output information for allowing the user terminal 2 to output the state of the flavor inhaler 1. Further, the communication unit 14 is capable of receiving various kinds of information transmitted from the user terminal 2 or another computer. The output information may be information indicating the remaining amount of a battery 110.

[0029] The flavor inhaler 1 according to an embodiment of the present invention includes a conventional tobacco product. The conventional tobacco product does not include the sensor 11, the control unit 13, or the communication unit 14, but a burning portion thereof corresponds to the change part 12. This is because a predetermined change in color or temperature is generated in the burning portion of the conventional tobacco product in response to a puff action of the user.

[0030] In a case where the flavor inhaler 1 is a conventional tobacco product (for example, a cigarette), a mouthpiece (for example, a mouthpiece for a cigarette) attached to one end of the tobacco product may include all or some of the functions of the sensor 11, the control unit 13, and the communication unit 14 in FIG. 2A. In this configuration, the mouthpiece is capable of transmitting

various kinds of information such as inhalation information detected by the sensor 11 to the user terminal 2 or another computer.

[0031] FIG. 3 is a block diagram illustrating a schematic configuration of the flavor inhaler according to the embodiment of the present invention. As illustrated in FIG. 3, a flavor inhaler 1A includes a first member 102 (battery unit) and a second member 104 (cartridge). As illustrated in the diagram, in one example, the first member 102 may include a control unit 106, a communication unit 108, the battery 110, a sensor 112, and a memory 114. The control unit 13 in FIG. 2A corresponds to the control unit 106 in FIG. 3, the sensor 11 in FIG. 2A corresponds to the sensor 112 in FIG. 3, and the communication unit 14 in FIG. 2A corresponds to the communication unit 108 in FIG. 3. In FIG. 3 and FIG. 4, the first member 102 (battery unit) is described as, but not limited to, an element included in the flavor inhaler 1A. For example, an element included in the first member 102, that is, at least one of the control unit 106, the communication unit 108, the battery 110, the sensor 112, or the memory 114, may be an element external to the flavor inhaler 1A.

[0032] In one example, the second member 104 may include a reservoir 116, an atomizing unit 118, an air intake flow path 120, an aerosol flow path 121, and an inhalation port part 122. Some of the components included in the first member 102 may be included in the second member 104. Some of the components included in the second member 104 may be included in the first member 102. The second member 104 may be configured to be removably attached to the first member 102. Alternatively, all of the components included in the first member 102 and the second member 104 may be included in the same housing instead of the first member 102 and the second member 104.

[0033] The reservoir 116 holds an aerosol source. For example, the reservoir 116 is composed of a fibrous or porous raw material and holds an aerosol source as a liquid in gaps between fibers or in pores of the porous material. As the fibrous or porous raw material described above, for example, cotton, glass fiber, or a tobacco raw material can be used. The reservoir 116 may be configured as a tank accommodating a liquid. The aerosol source is a liquid such as a polyhydric alcohol, for example, glycerine or propylene glycol, or water. In a case where the flavor inhaler 1A is a medical inhaler such as a nebulizer, the aerosol source may also include a medicine to be inhaled by a patient. In another example, the aerosol source may include a tobacco raw material or an extract derived from a tobacco raw material that releases an inhaling flavor component when heated. The reservoir 116 may have a configuration in which the aerosol source can be replenished as it is consumed. Alternatively, the reservoir 116 may be configured such that the reservoir 116 itself can be replaced when the aerosol source is consumed. The aerosol source is not limited to a liquid and may be a solid. In a case where the aerosol source is a solid, for example, the reservoir 116 may be a hollow

container that is not made of a fibrous or porous raw material.

[0034] The atomizing unit 118 is configured to atomize the aerosol source to generate an aerosol. When the sensor 112 detects a puff action, the atomizing unit 118 generates an aerosol. For example, a wick (not illustrated) may be disposed so as to couple the reservoir 116 and the atomizing unit 118 to each other. In this case, a portion of the wick communicates with the inside of the reservoir 116 and is in contact with the aerosol source. Another portion of the wick extends to the atomizing unit 118. The aerosol source is transferred from the reservoir 116 to the atomizing unit 118 by capillary action of the wick. In one example, the atomizing unit 118 includes a heater electrically connected to the battery 110. The heater is disposed in contact with or in close proximity to the wick. When a puff action is detected, the control unit 106 controls the heater of the atomizing unit 118 to heat the aerosol source transferred through the wick to atomize the aerosol source. In another example, the atomizing unit 118 may be an ultrasonic atomizer that atomizes the aerosol source by ultrasonic vibration. The atomizing unit 118 is connected to the air intake flow path 120, and the air intake flow path 120 communicates with the outside of the flavor inhaler 1A. The aerosol generated in the atomizing unit 118 is mixed with air taken in through the air intake flow path 120. A fluid mixture of the aerosol and the air is delivered to the aerosol flow path 121, as indicated by an arrow 124. The aerosol flow path 121 has a tubular structure for conveying the fluid mixture of the air and the aerosol generated in the atomizing unit 118 to the inhalation port part 122.

[0035] The inhalation port part 122 is located at a terminal end of the aerosol flow path 121 and is configured to open the aerosol flow path 121 to the outside of the flavor inhaler 1A. The user holds the inhalation port part 122 in the mouth and inhales to take air containing the aerosol into the oral cavity.

[0036] The communication unit 108 communicates with the user terminal or another computer. The communication unit 108 may be implemented using at least a network interface serving as a hardware resource.

[0037] The battery 110 supplies electric power to the components of the flavor inhaler 1A, such as the communication unit 108, the sensor 112, the memory 114, and the atomizing unit 118. The battery 110 may be chargeable when connected to an external power supply via a predetermined port (not illustrated) of the flavor inhaler 1A. Only the battery 110 may be removable from the first member 102 or the flavor inhaler 1A and may be replaceable with a new battery 110. Alternatively, the battery 110 may be replaceable with a new battery 110 by replacing the entire first member 102 with a new first member 102.

[0038] The sensor 112 may include a pressure sensor that detects pressure fluctuations or a flow sensor that detects a flow rate in the air intake flow path 120 and/or the aerosol flow path 121. The sensor 112 may also in-

clude a weight sensor that detects the weight of a component such as the reservoir 116. The sensor 112 may also be configured to detect a puff action performed by the user using the flavor inhaler 1A. The sensor 112 may also be configured to add up the amount of time during which the atomizing unit 118 is energized. The sensor 112 may also be configured to detect the height of the liquid level in the reservoir 116. The sensor 112 may also be configured to detect the SOC (State of Charge), the integrated current value, the voltage, and the like of the battery 110. The integrated current value may be determined by a current integration method, an SOC-OCV (Open Circuit Voltage) method, or the like. The sensor 112 may also be an operation button or the like operable by the user.

[0039] The control unit 106 may be an electronic circuit module configured as a microprocessor or a microcomputer. The control unit 106 may be configured to control the operation of the flavor inhaler 1A in accordance with a computer-executable command stored in the memory 114. The memory 114 is a storage medium such as a ROM, a RAM, or a flash memory. The memory 114 may store the computer-executable command described above, setting information necessary for controlling the flavor inhaler 1A, and the like. The memory 114 stores, for example, action information regarding a predetermined action on the flavor inhaler 1A.

[0040] The predetermined action on the flavor inhaler 1A includes, for example, the following actions (1) to (5):

- (1) a connection, reconnection, or the like made between the first member 102 and the second member 104 including the atomizing unit 118 that atomizes the aerosol source illustrated in FIGs. 3 and 4 (such as an electrical or mechanical (including physical) connection made between the first member 102 and the second member 104, or a successful authentication process in a case where an authentication process is executed when the first member 102 and the second member 104 are electrically or mechanically (including physically) connected to each other);
- (2) execution of a puff action on the flavor inhaler 1A (such as heating of the heater by the atomizing unit 118 to atomize the aerosol source, for example);
- (3) pressing of a predetermined button (not illustrated) included in the flavor inhaler 1A (for example, the flavor inhaler 1A includes a predetermined button for resuming wireless communication, which is pressed by the user to resume wireless communication);
- (4) sensing of the flavor inhaler 1A that is in a predetermined posture (such as sensing of the flavor inhaler 1A whose angle has been changed to a predetermined angle in response to the sensor 112 recognizing a movement of the flavor inhaler 1A in each axial direction, or detection of a vibration of the flavor inhaler 1A by the sensor 112, for example); and
- (5) charging the battery 110 included in the flavor

inhaler 1A (such as charging of the battery 110 in response to the flavor inhaler 1A being connected to a charging device (not illustrated), for example) or sensing of a remaining amount of the battery 110 greater than or equal to a predetermined value or less than a predetermined value.

[0041] In the case of the action (5), the predetermined value may be indicated by a percentage such as 70% or may be indicated by a capacity such as 1000 mAh. The predetermined value may be any value. In this case, the control unit 106 measures the remaining amount of the battery 110 that supplies electric power to the flavor inhaler 1A illustrated in FIGs. 3 and 4. The control unit 106 measures the remaining amount of the battery on the basis of information on the battery 110, such as the SOC, the integrated current value, or the voltage, detected by, for example, the sensor 112 illustrated in FIG. 3 and FIG. 4. The remaining amount of the battery may be indicated by a percentage (%) of how much of the entire amount remains, or may be displayed using another method.

[0042] For example, the memory 114 may store various types of information such as control methods for the communication unit 108 (such as modes of light emission, audio emission, vibration, etc.), values detected by the sensor 112, and a heating history of the heater by the atomizing unit 118. The control unit 106 reads information from the memory 114 as necessary, uses the information to control the flavor inhaler 1A, and stores the information in the memory 114 as necessary.

[0043] FIG. 4 is a block diagram illustrating another schematic configuration of the flavor inhaler according to the embodiment of the present invention. As illustrated in the diagram, a flavor inhaler 1B includes a third member 126 in addition to the elements included in the flavor inhaler 1A in FIG. 4. The third member 126 may include a flavor source 128. In one example, in a case where the flavor inhaler 1B is an electronic cigarette, the flavor source 128 may include an inhaling flavor component of tobacco. As illustrated in the diagram, the aerosol flow path 121 extends across the second member 104 and the third member 126. The inhalation port part 122 is included in the third member 126.

[0044] The flavor source 128 is a component for imparting a flavor to the aerosol. The flavor source 128 is disposed in the middle of the aerosol flow path 121. The fluid mixture of the air and the aerosol generated by the atomizing unit 118 (it should be noted that the fluid mixture may hereinafter be referred to simply as the aerosol) flows to the inhalation port part 122 through the aerosol flow path 121. In this manner, the flavor source 128 is disposed downstream of the atomizing unit 118 with respect to the flow of the aerosol. In other words, the flavor source 128 is located closer to the inhalation port part 122 in the aerosol flow path 121 than the atomizing unit 118. Accordingly, the aerosol generated by the atomizing unit 118 passes through the flavor source 128 before reaching the inhalation port part 122. As the aerosol pass-

es through the flavor source 128, the inhaling flavor component contained in the flavor source 128 is imparted to the aerosol. In one example, in a case where the flavor inhaler 1B is a heat-not-burn tobacco product, the flavor source 128 may be one derived from tobacco, such as a shredded tobacco or a processed product obtained by forming a tobacco raw material into a granular, sheet, or powder shape. Alternatively, the flavor source 128 may be one not derived from tobacco, which is made from a non-tobacco plant (for example, mint or a herb). In one example, the flavor source 128 includes a tobacco component. The flavor source 128 may contain a flavor component such as menthol. In addition to the flavor source 128, the reservoir 116 may also have a substance containing an inhaling flavor component. For example, the flavor inhaler 1B may be configured such that the flavor source 128 holds a flavor substance derived from tobacco and the reservoir 116 includes a flavor substance not derived from tobacco.

[0045] The user holds the inhalation port part 122 in the mouth and inhales. As a result, the user can take air containing the aerosol to which the flavor has been imparted into the oral cavity.

[0046] The control unit 106 is configured to control the flavor inhalers 1A and 1B (hereinafter may be collectively referred to as the "flavor inhaler 1") according to the embodiment of the present disclosure in various ways.

[0047] FIG. 5 is a diagram illustrating another example schematic appearance of the flavor inhaler according to the embodiment of the present invention. FIG. 6 illustrates another example schematic appearance of the flavor inhaler according to the embodiment of the present invention with an aerosol generating substrate held. In this embodiment, for example, the flavor inhaler 1 is configured to heat an aerosol generating substrate such as an inhalation article having a flavor producing material such as a filler that contains an aerosol source and a flavor source to generate an aerosol including a flavor. An inhalation article 140 may be used as the aerosol generating substrate.

[0048] As will be understood by a person skilled in the art, the inhalation article 140 is merely an example of the aerosol generating substrate. The aerosol source contained in the aerosol generating substrate may be a solid or a liquid. The aerosol source may be a liquid such as a polyhydric alcohol, for example, glycerine or propylene glycol, or water, and a mixture thereof. The aerosol source may include a tobacco raw material or an extract derived from a tobacco raw material that releases an inhaling flavor component when heated. In a case where the flavor inhaler 1 is a medical inhaler such as a nebulizer, the aerosol source may include a medicine to be inhaled by a patient. The aerosol generating substrate may include no flavor source in some applications.

[0049] As illustrated in FIG. 5 and FIG. 6, the flavor inhaler 1 has a top housing 131A, a bottom housing 131B, a cover 132, a switch 133, and a lid part 134. The top housing 131A and the bottom housing 131B are connect-

ed to each other to form an outermost housing 131 of the flavor inhaler 1. The housing 131 may be sized to fit in a user's hand. In this case, when the user uses the flavor inhaler 1, the user can hold the flavor inhaler 1 with their hand and inhale the aerosol.

[0050] The top housing 131A has an opening (not illustrated), and the cover 132 is coupled to the top housing 131A such that the opening is closed. As illustrated in FIG. 6, the cover 132 has an opening 132B into which the inhalation article 140 can be inserted. The lid part 134 is configured to open and close the opening 132B in the cover 132. Specifically, the lid part 134 is attached to the cover 132 and is configured to be movable along the front surface of the cover 132 between a first position at which the opening 132B is closed and a second position at which the opening 132B is opened.

[0051] The switch 133 is used to switch on and off the operation of the flavor inhaler 1. For example, as illustrated in FIG. 6, the user operates the switch 133 with the inhalation article 140 inserted into the opening 132B to supply electric power from the battery (not illustrated) to a heater unit (not illustrated). As a result, the inhalation article 140 can be heated without being burned. When the inhalation article 140 is heated, an aerosol is produced from the aerosol source included in the inhalation article 140, and the flavor of the flavor source is incorporated into the aerosol. The user inhales a portion of the inhalation article 140 (a portion illustrated in FIG. 6) protruding from the flavor inhaler 1, thereby being able to inhale the aerosol containing the flavor. In this specification, a direction in which an aerosol generating substrate such as the inhalation article 140 is inserted into the opening 132B is referred to as a longitudinal direction of the flavor inhaler 1.

[0052] The configuration of the flavor inhaler 1 illustrated in FIG. 5 and FIG. 6 is merely an example of the configuration of a flavor inhaler according to the present disclosure. The flavor inhaler according to the present disclosure can be configured in various forms such that an aerosol can be generated by heating an aerosol generating substrate including an aerosol source and the user can inhale the generated aerosol.

[Configuration of User Terminal]

[0053] FIG. 7 is a block diagram of a schematic configuration of a user terminal according to the embodiment of the present invention. It should be noted that FIG. 7 schematically and conceptually illustrates components included in the user terminal 2 and does not illustrate the precise arrangement, shape, size, positional relationship, and the like of the components and the user terminal 2. It should also be noted that the user terminal 2 may include a component not illustrated. A non-limiting example of the user terminal 2 is a computer such as a smartphone, a tablet, or a personal computer. For example, a sensing unit 21 described below may be implemented by a digital camera externally connected to the computer.

[0054] The sensing unit 21 senses an externally observable predetermined change generated in at least a portion of the flavor inhaler 1, for example, in the change part 12. The sensing unit 21 may be implemented using at least a digital camera, a temperature sensor, or the like serving as a hardware resource.

[0055] An output unit 22 executes a message output process on the basis of output information notified from the flavor inhaler 1 illustrated in FIG. 1. The output unit 22 may execute an audio output process on the basis of output information notified from the flavor inhaler 1. The output unit 22 displays information indicating that the predetermined change described above has been detected. The output unit 22 may be implemented using at least a display (including a touch panel display, for example) or the like serving as a hardware resource.

[0056] An input unit 23 receives an input from the user. The input unit 23 may be implemented using at least a keyboard, a mouse, a touch panel display, or the like serving as a hardware resource.

[0057] A recording unit 24 stores programs, information, and the like. The recording unit 24 may be implemented using at least an HDD (Hard Disk Drive), an SSD (Solid State Drive), a memory, or the like serving as a hardware resource.

[0058] A communication unit 25 communicates with another computer. The communication unit 25 may be implemented using at least a network interface serving as a hardware resource.

[0059] A control unit 26 performs various controls. The control unit 26 may be configured to transmit and receive information through the communication unit 25. The output unit 22 can output information based on the received output information. For example, the control unit 26 may be configured to make a determination related to the way in which the user inhales. The output unit 22 can further display a result of the determination. Further, the control unit 26 may be configured to enable the user to select one of a plurality of ways of inhaling via the input unit 23. The output unit 22 can further display information based on the selected way of inhaling. The control unit 26 may be implemented using at least a processor or the like serving as a hardware resource.

[0060] Various functions of the user terminal 2 may be implemented by using an application operating on the user terminal 2. The user terminal 2 may download an application and implement various functions by using the downloaded application. Alternatively, the user terminal 2 may download a program for implementing various functions of the user terminal 2 and execute the downloaded program to implement various functions. The user terminal 2 may implement these functions by using PWA (Progressive Web Apps).

[0061] FIG. 8 is a schematic configuration diagram illustrating an example functional configuration of a control unit according to the embodiment of the present invention. As illustrated in FIG. 8A, the control unit 106 functionally includes a system control unit 200, a battery con-

trol unit 202, a cartridge control unit 204, a communication control unit 206, and an interface sensing unit 208.

[0062] The control unit 106 can be implemented by, for example, a CPU or the like executing a program stored in the memory 114 illustrated in FIGs. 3 and 4. Alternatively, the control unit 106 may be implemented by downloading a program to be used for processing of the control unit 106 and executing the downloaded program. The control unit 13 illustrated in FIG. 2A may functionally include the system control unit 200, the battery control unit 202, the cartridge control unit 204, the communication control unit 206, and the interface sensing unit 208. The functions included in the control unit 106 or the control unit 13, described above, may be included in another element. For example, at least one of the communication control unit 206 or the cartridge control unit 204 may be included in the communication unit 108 illustrated in FIGs. 3 and 4. The interface sensing unit 208 may be included in the sensor 112 illustrated in FIGs. 3 and 4, for example.

[0063] The communication between the flavor inhaler 1 and the user terminal 2 may be any communication such as short-range wireless communication and will be described hereinafter in the case of BLE (Bluetooth Low Energy) communication as an example.

[0064] The system control unit 200 controls the functions included in the control unit 106 (in the example in FIG. 8, the battery control unit 202, the cartridge control unit 204, the communication control unit 206, and the interface sensing unit 208). The system control unit 200 further controls execution of various control programs, an embedded operating system (OS) program, and the like. For example, upon detection of various request signals such as an activation instruction, the system control unit 200 reads a program, an OS code, and the like and performs processing time or resource allocation or the like necessary for execution of the program, the OS code, and the like, thereby processing a process that is the unit of execution of the program. The system control unit 200 is capable of controlling various functions and various processes, without being limited to these examples, necessary for the operation of the flavor inhaler 1.

[0065] The battery control unit 202 controls, for example, supply of electric power from the battery 110 in FIG. 3 and FIG. 4 or a battery included in the flavor inhaler 1 illustrated in FIG. 5 and FIG. 6 (represented as the battery or the like), and charging of the battery or the like. For example, the battery control unit 202 controls supply of electric power from the battery or the like to each element such as a heater included in the flavor inhaler 1 illustrated by way of example in FIG. 3 to FIG. 6. For example, in the case of controlling supply of electric power to the heater, the battery control unit 202 supplies electric power from the battery or the like to the heater in response to sensing of inhalation through the inhalation port 31 illustrated by way of example in FIG. 3 or FIG. 4 or in response to pressing of the switch 133 illustrated by way of example in FIG. 5 or FIG. 6. Further, for example, the battery control unit 202 controls charging of the battery

or the like from an external power supply (not illustrated). Further, for example, the battery control unit 202 may execute a function of detecting the remaining amount of the battery or a function of protecting the battery. Further, for example, the battery control unit 202 may perform heating control of the heater included in the flavor inhaler 100. The battery control unit 202 is capable of executing various types of control, without being limited to these examples, on the battery.

[0066] The cartridge control unit 204 determines, for example, the connection state between the first member 102 and the second member 104 including the atomizing unit 118 that atomizes the aerosol source illustrated in FIGs. 3 and 4. For example, the cartridge control unit 204 determines whether the first member 102 and the second member 104 are electrically or mechanically (including physically) connected to each other.

[0067] An electrical connection of the first member 102 and the second member 104 includes, for example, energization of the first member 102 and the second member 104.

[0068] A mechanical (including physical) connection of the first member 102 and the second member 104 includes, for example, a connection of the first member 102 and the second member 104 by engagement between them. A mechanical (including physical) connection of the first member 102 and the second member 104 may include, for example, a connection of the first member 102 and the second member 104 by screwing. Specifically, the first member 102 has a female connector in a portion thereof adjacent to the second member 104, the female connector having a helical groove, and the second member 104 has a male connector in a portion thereof adjacent to the first member 102, the male connector having a helical projection. The female connector of the first member 102 and the male connector of the second member 104 are screwed into each other to connect the first member 102 and the second member 104 to each other. The first member 102 may have a male connector, and the second member 104 may have a female connector.

[0069] For example, in a case where an authentication process is executed when the first member 102 and the second member 104 are electrically or mechanically connected to each other, the cartridge control unit 204 determines that a connection is made between the first member 102 and the second member 104 if the authentication process is successful. On the other hand, if the authentication process has failed, the cartridge control unit 204 determines that no connection is made between the first member 102 and the second member 104. The details of the authentication process will be described below.

[0070] The cartridge control unit 204 determines whether a predetermined period (for example, 10 seconds, 1 minute, 5 minutes, or the like) has elapsed since the connection between the first member 102 and the second member 104 was released. The cartridge control

unit 204 counts the time elapsed after the release of the connection between the first member 102 and the second member 104 is sensed. The memory 114 illustrated in FIGs. 3 and 4 stores information regarding the predetermined time. For example, the cartridge control unit 204 refers to the information regarding the predetermined time stored in the memory 114 and compares the counted elapsed time with the predetermined time.

[0071] The cartridge control unit 204 executes an authentication process on the second member 104 (cartridge). For example, the cartridge control unit 204 checks the appropriateness of the second member 104 as a connection target to which the first member 102 is connected. For example, the cartridge control unit 204 refers to identification information of each of one or a plurality of second members 104 connectable to the first member 102, which is recorded in advance in the memory 114 illustrated in FIGs. 3 and 4, to determine whether a specific second member 104 is appropriate as a connection target.

[0072] The cartridge control unit 204 may determine, based on the expiration date of the aerosol source included in the reservoir 116 of the second member 104 to which the first member 102 is to be connected, whether the second member 104 is appropriate as a connection target. For example, in a case where the first member 102 and the second member 104 are to be electrically or mechanically connected to each other, the cartridge control unit 204 acquires information regarding the expiration date of the aerosol source from the second member 104. The cartridge control unit 204 refers to the acquired information regarding the expiration date and, if the expiration date of the aerosol source included in the reservoir 116 of the second member 104 to which the first member 102 is to be connected has not expired, determines that the second member 104 is appropriate as a connection target. If the expiration date of the aerosol source included in the reservoir 116 of the second member 104 to which the first member 102 is to be connected has expired, the cartridge control unit 204 determines that the second member 104 is not appropriate as a connection target. Alternatively, the cartridge control unit 204 may acquire remaining-amount information regarding the remaining amount of the aerosol source included in the reservoir 116 of the second member 104 and determine the appropriateness of the second member 104 as a connection target on the basis of the acquired remaining-amount information.

[0073] The communication control unit 206 controls communication between the flavor inhaler 1 and the user terminal 2, based on the connection state between the first member 102 and the second member 104 including the atomizing unit 118 that atomizes the aerosol source illustrated in FIGs. 3 and 4. The communication control unit 206 can control not only wireless communication but also wired communication.

[0074] The communication control unit 206 executes an "authentication connection", which is a process of con-

figuring a communication connection between the flavor inhaler 1 and the user terminal 2. For example, the communication control unit 206 performs an authentication connection of the flavor inhaler 1 and the user terminal 2. When an authentication connection is executed by the communication control unit 206, the flavor inhaler 1 and the user terminal 2 are brought into a "state of being authenticated and connected". Bluetooth communication is executed in units of piconets, for example. In Bluetooth communication, the user terminal 2 is referred to as a "master", and the flavor inhaler 1 is referred to as a "slave". For example, one master can be connected to seven slaves, for example. For example, the master takes the initiative of communication, and information transmission from the master to a slave is executed at any timing. On the other hand, information from a slave to the master is executed in accordance with an instruction from the master (a request for an authentication connection). In communication between the flavor inhaler 1 and the user terminal 2, the user terminal 2 does not necessarily have to take the initiative of the communication. For example, the flavor inhaler 1 may take the initiative of the communication, and information may be transmitted from the flavor inhaler 1 to the user terminal 2 at any timing.

[0075] To establish encrypted communication between a master and one or more slaves, for example, the master and the slaves exchange shared secret information (link key) generated by a random number. Then, communication between the master and each slave is encrypted based on the link key. The key exchange and the procedure for establishing the communication connection setting between the master and the slave are referred to as "authentication connection".

[0076] An example of communication according to an embodiment of the present invention will be described. After an authentication connection is completed, the master and the slave execute communication to synchronize their timings of information transmission (TX) or timings of information reception (RX) with each other.

[0077] In the communication according to the embodiment of the present invention, for example, a "transmission frequency change" function is provided as one of the low-electric-power-consumption operations. The transmission frequency change is an operation of thinning out response communication that has to be made in response to inquiries from the master when the slave has no information to be transmitted to the master to reduce electric power consumption.

[0078] Specifically, in typical communication between a slave and a master, the slave needs to respond to the master at every preset communication interval L of the master. For example, in a case where the slave does not respond to an inquiry from the master (such as when the slave does not respond over the number of times set in advance as the number of communication interruptions), the master disconnects the communication connection to the slave. However, the slave performs response com-

munication in response to an inquiry from the master even if the slave has no information (for example, updated information or the like) to be transmitted, leading to unnecessary electric power consumption.

[0079] Accordingly, in the transmission frequency change, for example, setting (or changing) a transmission frequency setting value to "4" enables the slave to maintain the communication connection without responding to an inquiry from the master up to four times. In this way, the slave can thin out the response communication and reduce the electric power consumption. Even in the case of thinning out communication in response to a transmission frequency change, for example, the slave executes communication for maintaining the communication connection to the master with minimum electric power consumption.

[0080] In the communication according to the embodiment of the present invention, for example, a "forced transmission" function is provided. The forced transmission is an operation in which even in a case where communication is thinned out in response to a transmission frequency change, the slave transmits predetermined information to be transmitted to the master to the master at a transmission timing that would be next before thinning. For example, when the transmission frequency setting value is set to "4" in response to a transmission frequency change, the response transmission of the slave is thinned out. Setting forced transmission makes it possible to transmit information to be transmitted to the master at a transmission timing that would be next before thinning, even in a period during which communication is thinned out (that is, in a case where a transmission frequency change is set). As described above, the transmission frequency change and the forced transmission in the communication according to the embodiment of the present invention are operations that enable efficient information transmission while being low-electric-power-consumption operations.

[0081] The content of settings for communication between the flavor inhaler 1A and the user terminal 2 may be initially set by the communication control unit 206 or by the communication unit 108 illustrated in FIGs. 3 and 4 or the communication control unit 206. For example, the initial setting of communication is performed based on information recorded in advance in the flavor inhaler 1A, information entered by the user, or information included in an authentication connection request or the like from the user terminal 2.

[0082] Here, "control" of communication between the flavor inhaler 1 and the user terminal 2 includes, for example, "restriction" of the communication. The "restriction" of communication includes, for example, "restricting the transmission of information" between the flavor inhaler 1 and the user terminal 2. Further, the "restriction" of communication includes, for example, "restricting an authentication connection" that is a process of configuring a communication connection between the flavor inhaler 1 and the user terminal 2.

[0083] The "control" of communication between the flavor inhaler 1 and the user terminal 2 includes, for example, "changing the content of the settings for the communication". "Changing the content of the settings for communication" includes, for example, "changing the frequency of communication" between the flavor inhaler 1 and the user terminal 2. "Changing the frequency of communication" includes, for example, "changing the response frequency" of the flavor inhaler 1 to an inquiry from the user terminal 2. Specifically, the communication control unit 206 may execute wireless communication in accordance with the response frequency to be changed. Further, "changing the frequency of communication" includes, for example, "changing a transmission frequency setting value" between the user terminal 2 and the flavor inhaler 1. Specifically, the communication control unit 206 may execute wireless communication in accordance with the transmission frequency setting value to be changed. Further, "changing the frequency of communication" includes, for example, "changing a communication interval" between the user terminal 2 and the flavor inhaler 1. Specifically, the communication control unit 206 may execute wireless communication in accordance with the communication interval to be changed.

[0084] The "restriction of an authentication connection" includes "placing an authentication connection on standby" by the flavor inhaler 1, and includes waiting, by the flavor inhaler 1, for a response to a request for an authentication connection from the user terminal 2.

[0085] The "restriction" of communication between the flavor inhaler 1 and the user terminal 2 includes, for example, "stop" of the communication. The "stop" of the communication includes, for example, "stopping the transmission of information" from the flavor inhaler 1 to the user terminal 2. Further, the "restriction" of communication includes, for example, "stopping an authentication connection" that is a process of configuring a communication connection between the flavor inhaler 1 and the user terminal 2. Specifically, for example, the communication control unit 206 may stop communication between the flavor inhaler 1 and the user terminal 2. For example, the communication control unit 206 may control communication such that the communication unit 108 illustrated in FIGs. 3 and 4 stops transmitting information to the user terminal 2. The communication control unit 206 may control communication such that the communication unit 108 stops receiving information from the user terminal 2.

[0086] Restricting or stopping at least one of transmission of information or reception of information reduces the electric power consumption of the flavor inhaler 1A and also reduces battery consumption. For example, transmission of information requires larger electric power consumption of the battery 110 than reception of information. Preferentially restricting or stopping transmission of information can further reduce the consumption of the battery 110.

[0087] The control of communication is not limited to

the example described above. For example, the control of communication includes prohibiting the communication unit 108 from transmitting at least part of information that can be transmitted to the user terminal 2.

[0088] Further, the control of communication may permit the communication unit 108 to transmit only a response to an authentication connection request to the user terminal 2. For example, during execution of a puff action on the flavor inhaler 1, the communication control unit 206 may permit the communication unit 108 to receive a request for an authentication connection from the user terminal 2. The communication control unit 206 may execute an authentication connection (for example, respond to the request) after the heating of the heater is completed.

[0089] The interface sensing unit 106 senses a predetermined action on the flavor inhaler 1. For example, the interface sensing unit 106 senses at least one of the actions (1) to (5) described above.

[0090] The interface sensing unit 106 senses a connection or reconnection between the first member 102 and the second member 104 including the atomizing unit 118 that atomizes the aerosol source illustrated in FIGs. 3 and 4. In response to energization of the first member 102 and the second member 104, the interface sensing unit 106 senses an electrical connection of the first member 102 and the second member 104. In a case where an authentication process is executed when the first member 102 and the second member 104 are electrically or mechanically connected to each other, the interface sensing unit 106 may sense a connection of the first member 102 and the second member 104 if the authentication process is successful. The interface sensing unit 106 determines that a puff action has been executed on the flavor inhaler 1A on the basis of, for example, the heating state of the heater included in the atomizing unit 118 illustrated in FIGs. 3 and 4. The interface sensing unit 106 senses pressing of a predetermined button (not illustrated) included in the flavor inhaler 1A.

[0091] The interface sensing unit 106 senses the flavor inhaler 1 that is in a predetermined posture or the like on the basis of the detection result of the sensor 112. For example, when the sensor 112 serving as a motion sensor recognizes a movement of the flavor inhaler 1A in each axial direction, the interface sensing unit 106 senses the flavor inhaler 1A whose angle has been changed to a predetermined angle. Alternatively, for example, the interface sensing unit 106 may sense a vibration of the flavor inhaler 1A by using the sensor 112 serving as a motion sensor.

[0092] The control unit 106 may control communication using the following method. As an operation in the processing of the functions of the control unit 106, a method (for example, a method typified by a real-time system) may be used in which functional elements, for example, the parts constituting the control unit 106 in FIG. 8 described above, are each handled as a single process or a group of processes such that the entire system is op-

erated so as to satisfy a time constraint condition.

[0093] For example, in a case where the battery control unit 202 is handled as one group of processes and the communication control unit 206 is handled as one group of processes, the two groups of processes may be simultaneously requested to be performed. Specifically, the communication control unit 206 may receive a response request from the user terminal 2 via wireless communication while a puff action is executed on the flavor inhaler 1. In this case, which process to prioritize needs to be determined in advance. Examples of the prioritization of processes include addressing abnormality in the flavor inhaler 1 as the process with the highest priority. In a still further example of prioritization, priorities may be placed on, for example, a heater heating process, a connection state sensing process of the aerosol generation device, a process of detecting an operation in response to a user operation, and a communication response request process from the user terminal 2 in this order. It is required to enable the entire system to be operated so as to satisfy the time constraint condition described above regardless of the order in which the priorities of the processes are set. To satisfy the time constraint condition, the execution time of each process may be predicted in advance, and the order of the processes may be adjusted such that the time constraints on all the processes having a time constraint condition can be satisfied. According to the set priorities described above, a process having a higher priority may be preferentially executed over a process having a lower priority. Further, the processes may be controlled such that a process having a high priority interrupts a process having a low priority that is even being executed. In addition, a process having a high priority may be executed exclusive of a process having a low priority.

[0094] With the use of the operation method of the system as described above, for example, even when the communication control unit 206 receives a response request from the user terminal 2 via wireless communication while a puff action is executed on the flavor inhaler 1, it is possible to execute the processes according to a predetermined priority and to satisfy a time constraint condition.

[0095] The above is merely an example, and many operation methods for the system are disclosed. The method is not limited to the example described above as long as it can be applied to this embodiment.

[0096] Further, the control unit 106 may control communication as follows. For example, when the state of the flavor inhaler 1 transitions from an activated state (a state in which heating of the heater or any other necessary process is executable in response to a puff action of a user) to a sleep state (a state in which the flavor inhaler 1 is on standby in power-saving mode after temporarily stopping its operation), the control unit 106 may change the content of the settings for communication executed between the flavor inhaler 1A and the user terminal 2 to control communication. Further, for example, when a predetermined period (for example, 1 minute, 5

minutes, or the like) elapses after the connection between the first member 102 and the second member 104 is released, the control unit 106 may stop communication to control communication. The predetermined period is not limited to 1 minute or 5 minutes, and may be any period and can be set in any manner. In a case other than when a predetermined period elapses, such as when a predetermined action by which it can be determined that the user does not use the flavor inhaler 1 is sensed, the control unit 106 may stop communication to control communication. The predetermined action by which it can be determined that the user does not use the flavor inhaler 1 is, for example, removal of the third member 126 in the case of FIG. 3 or the inhalation article 140 in the case of FIG. 6 from the flavor inhaler 1, but is not limited thereto, and may be any action.

[Communication Control Process]

<First Embodiment>

[0097] An example of a communication control process according to a first embodiment of the present invention will be described with reference to FIG. 9. FIG. 9 is a flowchart illustrating an example of the communication control process according to the first embodiment of the present invention. As illustrated in FIG. 9, in step S1, as a premise of the communication control process, first, for example, a user presses a power button (not illustrated) on the outer surface of the flavor inhaler 1 to activate the flavor inhaler 1. The process for activating the flavor inhaler 1 is similarly executed in communication control processes according to embodiments described below. The process for activating the flavor inhaler 1 is not limited to pressing of the power button and may be, for example, a puff action or the like on the flavor inhaler 1. Any method for activating the flavor inhaler 1 may be used.

[0098] In step S3, for example, the flavor inhaler 1 determines the connection state between the first member 102 (battery unit) and the second member 104 (cartridge) illustrated in FIGs. 3 and 4. For example, the cartridge control unit 204 determines whether the first member 102 and the second member 104 are electrically or mechanically (including physically) connected to each other.

[0099] In step S5, the flavor inhaler 1 controls the communication between the flavor inhaler 1 and the user terminal 2 on the basis of the connection state between the first member 102 and the second member 104. For example, when no connection is made between the first member 102 and the second member 104 (for example, when the connection is released), the flavor inhaler 1 restricts the communication between the flavor inhaler 1 and the user terminal 2. For example, the flavor inhaler 1 may stop the communication between the flavor inhaler 1 and the user terminal 2 to restrict the communication, or the flavor inhaler 1 may stop or restrict the transmission of information from the communication unit 108 illustrated in FIGs. 3 and 4 to the user terminal 2, or may execute

communication corresponding to the content of the settings changed by the communication control unit 206. Alternatively, the flavor inhaler 1 may restrict or stop the authentication connection between the flavor inhaler 1 and the user terminal 2 to restrict the communication.

[0100] As described above, according to the first embodiment of the present invention, the flavor inhaler 1 controls communication between the flavor inhaler 1 and the user terminal 2 on the basis of the connection state between the battery unit and the cartridge. As a result, an increase in the electric power consumption of the flavor inhaler 1 can be suppressed, and thus the consumption of the battery 110 included in the flavor inhaler 1 can be reduced.

<Second Embodiment>

[0101] A second embodiment presents a communication control process for starting communication between the flavor inhaler 1 and the user terminal 2 after the first member 102 and the second member 104, which are not connected to each other, are connected to each other. FIG. 10 is a flowchart illustrating an example of the communication control process according to the second embodiment of the present invention. FIG. 10 illustrates a restriction of an authentication connection to control communication, by way of example. The restriction of an authentication connection includes placing an authentication connection on standby by the flavor inhaler 1.

[0102] In the second embodiment, the control of communication is not limited to the restriction of an authentication connection. The control of communication may be, for example, to restrict or stop communication between the flavor inhaler 1 and the user terminal 2, to restrict or stop the transmission of information from the communication unit 108 illustrated in FIGs. 3 and 4 to the user terminal 2, to execute communication corresponding to the content of the settings changed by the communication control unit 206, or to stop an authentication connection.

[0103] In the second embodiment, the flavor inhaler 1 may change the content of the settings for wireless communication between the flavor inhaler 1 and the user terminal 2 to control communication. For example, in the transmission frequency change, the flavor inhaler 1 may change the response frequency of the flavor inhaler 1 to an inquiry from the user terminal 2. For example, in the transmission frequency change, the flavor inhaler 1 may change the transmission frequency setting value between the user terminal 2 and the flavor inhaler 1. For example, in the transmission frequency change, the flavor inhaler 1 may change the communication interval between the user terminal 2 and the flavor inhaler 1. Accordingly, since transmission and reception of information between the flavor inhaler 1 and the user terminal 2 are thinned out when considered per unit time, the electric power consumption of the flavor inhaler 1 for communication can be reduced. Therefore, the electric power con-

sumption of the battery 110 of the flavor inhaler 1 is reduced.

[0104] In step S11, first, for example, a user presses a power button (not illustrated) on the outer surface of the first member 102 to activate the first member 102. The means for activating the first member 102 is not limited to pressing of the power button, and any means may be used.

[0105] If the first member 102 and the second member 104 are connected to each other in step S13 (in the case of Yes in step S13), the flavor inhaler 1 proceeds to step S15. On the other hand, if the first member 102 and the second member 104 are not connected to each other (in the case of No in step S13), the flavor inhaler 1 stands by until the first member 102 and the second member 104 are connected to each other.

[0106] In step S15, the flavor inhaler 1 executes an authentication connection with the user terminal 2. Then, in step S17, the flavor inhaler 1 determines whether the authentication connection is completed.

[0107] If the authentication connection is completed (in the case of Yes in step S17), the flavor inhaler 1 proceeds to step S19. On the other hand, if the authentication connection with the user terminal 2 is not completed (in the case of No in step S17), the flavor inhaler 1 stands by until the authentication connection is completed.

[0108] In step S19, the flavor inhaler 1 starts transmission and reception of predetermined information to and from the user terminal 2. The predetermined information includes inhalation information and the like, for example.

[0109] As described above, according to the second embodiment of the present invention, after the first member 102 and the second member 104, which are not connected to each other, are connected to each other, communication is started between the flavor inhaler 1 and the user terminal 2. Accordingly, since the flavor inhaler 1 starts communication with the user terminal 2 in response to a connection of the first member 102 and the second member 104 as a trigger, communication with the user terminal 2 can be controlled if no connection is made between the first member 102 and the second member 104, and the electric power consumption of the flavor inhaler 1 for communication can be reduced. Therefore, it is possible to reduce the consumption of the battery 110.

<Third Embodiment>

[0110] A third embodiment presents a communication control process in which after the flavor inhaler 1 starts communication with the user terminal 2, the connection between the first member 102 and the second member 104 is released, and the communication is controlled. FIG. 11 is a flowchart illustrating an example of the communication control process according to the third embodiment of the present invention. FIG. 11 illustrates a restriction of communication to control communication, by way of example. In the third embodiment, the control of

communication is not limited to this. Step S21 illustrated in FIG. 11 is similar to step S1 illustrated in FIG. 9, and a description thereof will be omitted.

[0111] In step S23, for example, the flavor inhaler 1 executes an authentication connection with the user terminal 2. When the authentication connection is completed, the flavor inhaler 1 starts transmission and reception of predetermined information to and from the user terminal 2 via Bluetooth.

[0112] If the connection between the first member 102 and the second member 104 is released in step S25 (in the case of Yes), the flavor inhaler 1 proceeds to step S27. On the other hand, if the connection between the first member 102 and the second member 104 is not released (the connection is maintained) (in the case of No), the flavor inhaler 1 continues transmission and reception of predetermined information to and from the user terminal 2 via Bluetooth without restricting the communication with the user terminal 2.

[0113] In step S27, the flavor inhaler 1 restricts the communication with the user terminal 2. For example, the flavor inhaler 1 restricts the transmission of information from the flavor inhaler 1 to the user terminal 2. In the third embodiment, the restriction of communication is not limited to the restriction of transmission of information. The restriction of communication may be, for example, to stop communication between the flavor inhaler 1 and the user terminal 2, to stop the communication unit 108 illustrated in FIGs. 3 and 4 from transmitting information to the user terminal 2, to execute communication corresponding to the content of the settings changed by the communication control unit 206, or to restrict or stop an authentication connection.

[0114] As described above, when the connection between the first member 102 and the second member 104 is released, communication between the flavor inhaler 1 and the user terminal 2 is restricted. Thus, the electric power consumption of the flavor inhaler 1 for communication can be reduced. Therefore, the electric power consumption of the battery 110 of the flavor inhaler 1 is reduced.

[0115] In the third embodiment, the flavor inhaler 1 may change the content of the settings for wireless communication between the flavor inhaler 1 and the user terminal 2 to restrict communication. For example, in the transmission frequency change, the flavor inhaler 1 may change the response frequency of the flavor inhaler 1 to an inquiry from the user terminal 2. For example, in the transmission frequency change, the flavor inhaler 1 may change the transmission frequency setting value between the user terminal 2 and the flavor inhaler 1. For example, in the transmission frequency change, the flavor inhaler 1 may change the communication interval between the user terminal 2 and the flavor inhaler 1. Accordingly, since transmission and reception of information between the flavor inhaler 1 and the user terminal 2 are thinned out when considered per unit time, the electric power consumption of the flavor inhaler 1 for communi-

cation can be reduced. Therefore, the electric power consumption of the battery 110 of the flavor inhaler 1 is reduced.

[0116] As described above, according to the third embodiment of the present invention, after starting communication with the user terminal 2, the flavor inhaler 1 restricts the communication with the user terminal 2 in response to a release of the connection between the first member 102 and the second member 104. Accordingly, the flavor inhaler 1 restricts communication between the flavor inhaler 1 and the user terminal 2 in response to a release of the connection between the first member 102 and the second member 104. Since the electric power consumption of the flavor inhaler 1 for communication can be reduced, it is possible to reduce the consumption of the battery 110.

<Fourth Embodiment>

[0117] A fourth embodiment presents a communication control process in which after the flavor inhaler 1 starts communication with the user terminal 2, the communication is continued for a certain period when the connection between the first member 102 and the second member 104 is released and the communication is controlled. FIG. 12 is a flowchart illustrating an example of the communication control process according to the fourth embodiment of the present invention. FIG. 12 illustrates a restriction of communication to control communication, by way of example. However, the control of communication in the fourth embodiment is not limited to a restriction of communication. Steps S31 to S35 and S39 illustrated in FIG. 12 are similar to steps S21 to S27 illustrated in FIG. 11, and a description thereof will be omitted.

[0118] If it is determined in step S37 that a predetermined period (for example, 10 seconds, 1 minute, 5 minutes, or the like) has elapsed since the connection between the first member 102 and the second member 104 was released (in the case of Yes in step S37), the flavor inhaler 1 proceeds to step S39. On the other hand, if the flavor inhaler 1 determines that the predetermined period (for example, 10 seconds, 1 minute, 5 minutes, or the like) has not elapsed since the connection between the first member 102 and the second member 104 was released (in the case of No in step S37), the flavor inhaler 1 continues the communication with the user terminal 2 via Bluetooth without restricting the communication with the user terminal 2 until the predetermined period has elapsed. Although not described in the flowchart illustrated by way of example in FIG. 12, for example, if an abnormality such as abnormal heat generation of the battery 110 illustrated in FIGs. 3 and 4 occurs until the communication is restricted, that is, until it is determined that the predetermined period has elapsed, the flavor inhaler 1 can notify the user terminal 2 of the abnormality of the battery 110.

[0119] As described above, according to the fourth em-

bodiment of the present invention, after the flavor inhaler 1 starts communication with the user terminal 2, the communication is continued for a certain period when the connection between the first member 102 and the second member 104 is released and the communication is restricted. Accordingly, the flavor inhaler 1 can prevent the communication between the flavor inhaler 1 and the user terminal 2 from being stopped immediately after the connection between the first member 102 and the second member 104 is released. For example, in a case where the user removes the cartridge from the battery unit and then immediately attaches a new cartridge to replace the cartridge of the flavor inhaler 1, it is not necessary to restrict communication. Accordingly, after the connection between the first member 102 and the second member 104 is released, the communication is continued until a predetermined period elapses, and when a new second member 104 is connected to the first member 102 within the predetermined period, the communication is continued without restriction. As a result, for example, when the user replaces the cartridge, the flavor inhaler 1 can continue the communication without restricting the communication.

<Fifth Embodiment>

[0120] A fifth embodiment presents a communication control process in which in a case where the connection between the first member 102 and the second member 104 is released, in response to sensing of a predetermined action after communication between the flavor inhaler 1 and the user terminal 2 is restricted, the restriction of the communication is released. FIG. 13 is a flowchart illustrating an example of the communication control process according to the fifth embodiment of the present invention. FIG. 13 illustrates a restriction of communication to control communication, by way of example. However, the control of communication in the fourth embodiment is not limited to a restriction of communication. Steps S41 to S45 illustrated in FIG. 13 are similar to steps S31 to S35 illustrated in FIG. 11, and a description thereof will be omitted.

[0121] In step S47, the flavor inhaler 1 restricts communication between the flavor inhaler 1 and the user terminal 2 in response to a release of the connection between the first member 102 and the second member 104.

[0122] When sensing a predetermined action in step S49 (in the case of Yes in step S49), the flavor inhaler 1 proceeds to step S51. For example, the flavor inhaler 1 senses at least one of the actions (1) to (5) described above.

[0123] For example, the flavor inhaler 1 senses an electrical or mechanical (including physical) connection or a reconnection between the first member 102 and the second member 104 illustrated in FIGs. 3 and 4. In a case where an authentication process is executed when the first member 102 and the second member 104 are electrically or mechanically (including physically) con-

nected to each other, the flavor inhaler 1 may sense a connection of the first member 102 and the second member 104 if the authentication process is successful.

[0124] Further, the flavor inhaler 1 may sense pressing of a predetermined button (not illustrated) included in the flavor inhaler 1. Alternatively, the flavor inhaler 1 may sense the flavor inhaler 1 that is in a predetermined posture on the basis of the detection result of the sensor 112. Alternatively, for example, the flavor inhaler 1 may sense a charged state of the battery 110 of the flavor inhaler 1 as one of the predetermined actions.

[0125] On the other hand, if no predetermined action is sensed in step S49 (in the case of No in step S49), the flavor inhaler 1 stands by, that is, the flavor inhaler 1 maintains a state where the communication is restricted.

[0126] In step S51, the flavor inhaler 1 releases the restriction of the communication between the flavor inhaler 1 and the user terminal 2.

[0127] As described above, according to the fifth embodiment of the present invention, in a case where the connection between the first member 102 and the second member 104 is released, in response to sensing of a predetermined action after communication between the flavor inhaler 1 and the user terminal 2 is restricted, the flavor inhaler 1 releases the restriction of the communication. Accordingly, after communication between the flavor inhaler 1 and the user terminal 2 is restricted, the restriction of communication is automatically released in response to sensing of a predetermined action. Therefore, flexibility regarding the release of the restriction of communication after the communication is restricted is increased.

[0128] FIG. 14 is a diagram illustrating an example hardware configuration of a computer according to an embodiment of the present invention. An example hardware configuration of a computer that can be used to configure the user terminal 2 illustrated in FIG. 1 will be described with reference to FIG. 14.

[0129] As illustrated in FIG. 14, a computer 40 mainly includes, as hardware resources, a processor 41, a main recording device 42, an auxiliary recording device 43, an input/output interface 44, and a communication interface 45, and these are connected to each other via a bus line 46 including an address bus, an information bus, a control bus, and the like. An interface circuit (not illustrated) may be interposed, as necessary, between the bus line 46 and each hardware resource.

[0130] The processor 41 controls the entire computer. The main recording device 42 provides a work area for the processor 41 and is a volatile memory such as an SRAM (Static Random Access Memory) or a DRAM (Dynamic Random Access Memory). The auxiliary recording device 43 is a non-volatile memory such as an HDD, an SSD, or a flash memory that stores a program, information, and the like that are software. The program, the information, and the like are loaded from the auxiliary recording device 43 to the main recording device 42 via the bus line 46 at any point in time.

[0131] The input/output interface 44 performs one or both of presenting information and receiving input of information, and is a digital camera, a keyboard, a mouse, a display, a touch panel display, a microphone, a speaker, a temperature sensor, or the like.

[0132] It will be apparent to a person skilled in the art that the computer 40 can function as desired means, execute desired steps, and implement desired functionality through cooperation of the hardware resources exemplified above and software.

[0133] The embodiments described above are intended to facilitate understanding of the present invention and are not to be construed as limiting the present invention. The present invention may be modified/improved without departing from the gist thereof, and the present invention also includes equivalents thereof.

Reference Signs List

[0134]	
1, 1A, 1B	flavor inhaler
2	user terminal
11	sensor
12	change part
13	control unit
14	communication unit
21	sensing unit
22	output unit
23	input unit
24	recording unit
25	communication unit
26	control unit
100	information processing system
102	first member
104	second member
106	control unit
108	communication unit
110	battery
112	sensor
114	memory
116	reservoir
118	atomizing unit
120	air intake flow path
121	aerosol flow path
122	inhalation port part
126	third member
128	flavor source
131	housing
131A	top housing
131B	bottom housing
132	cover
132B	opening
133	switch
134	lid part
140	inhalation article
161, 162	end
200	system control unit

202 battery control unit
 204 cartridge control unit
 206 communication control unit
 208 interface sensing unit

Claims

1. A battery unit for an aerosol generation device for generating an aerosol, the battery unit comprising:

a communication unit configured to execute wireless communication between the aerosol generation device and a user terminal; and
 a control unit configured to determine a connection state between the battery unit and a cartridge including an atomizing unit configured to atomize an aerosol source, wherein the control unit is configured to control the wireless communication based on the connection state.

2. The battery unit according to claim 1, wherein the control unit is configured to restrict the wireless communication when no connection is made between the battery unit and the cartridge.

3. The battery unit according to claim 1 or 2, wherein the control unit is configured to restrict transmission of information to the user terminal when no connection is made between the battery unit and the cartridge.

4. The battery unit according to any one of claims 1 to 3, wherein the control unit is configured to change content of a setting for the wireless communication.

5. The battery unit according to claim 4, wherein the control unit is configured to change a frequency of the wireless communication between the aerosol generation device and the user terminal.

6. The battery unit according to claim 4 or 5, wherein the control unit is configured to change a response frequency to an inquiry from the user terminal.

7. The battery unit according to any one of claims 4 to 6, wherein the control unit is configured to change a communication interval between the aerosol generation device and the user terminal.

8. The battery unit according to any one of claims 1 to

7, wherein the control unit is configured to restrict an authentication connection when no connection is made between the battery unit and the cartridge, the authentication connection being a process of configuring a communication connection between the aerosol generation device and the user terminal.

9. The battery unit according to claim 8, wherein the control unit is configured to execute an authentication process of the cartridge and restrict the authentication connection when the authentication process is not completed.

10. The battery unit according to any one of claims 1 to 9, wherein the control unit is configured to restrict the wireless communication between the aerosol generation device and the user terminal in response to a release of a connection between the battery unit and the cartridge.

11. The battery unit according to claim 10, wherein the control unit is configured to maintain the communication for a predetermined period after the connection between the battery unit and the cartridge is released.

12. The battery unit according to claim 11 or 12, wherein the control unit is configured to sense a predetermined action on the aerosol generation device and release the restriction of the wireless communication in response to sensing of the predetermined action.

13. The battery unit according to any one of claims 10 to 12, wherein the predetermined action includes at least one of:

an action of reconnecting the battery unit and the cartridge to each other;
 a puff action of a user to inhale the aerosol using the aerosol generation device;
 an action of pressing a predetermined button included in the aerosol generation device; or
 an action of bringing the aerosol generation device into a predetermined posture.

14. An aerosol generation device for generating an aerosol, the aerosol generation device comprising:

a communication unit configured to execute wireless communication between the aerosol generation device and a user terminal; and
 a control unit configured to determine a connection state between a battery unit for the aerosol generation device and a cartridge including an

atomizing unit configured to atomize an aerosol source, wherein the control unit is configured to control the wireless communication based on the connection state.

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15. An information processing method executed by an aerosol generation device for generating an aerosol, the information processing method comprising:

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a step of executing wireless communication between the aerosol generation device and a user terminal;

a step of determining a connection state between the battery unit and a cartridge including an atomizing unit configured to atomize an aerosol source; and

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a step of controlling the wireless communication based on the connection state.

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16. A program for causing a computer to implement:

a communication function of executing wireless communication between the aerosol generation device and a user terminal; and

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a control function of determining a connection state between the battery unit and a cartridge including an atomizing unit configured to atomize an aerosol source, wherein

the control function

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controls the wireless communication based on the connection state.

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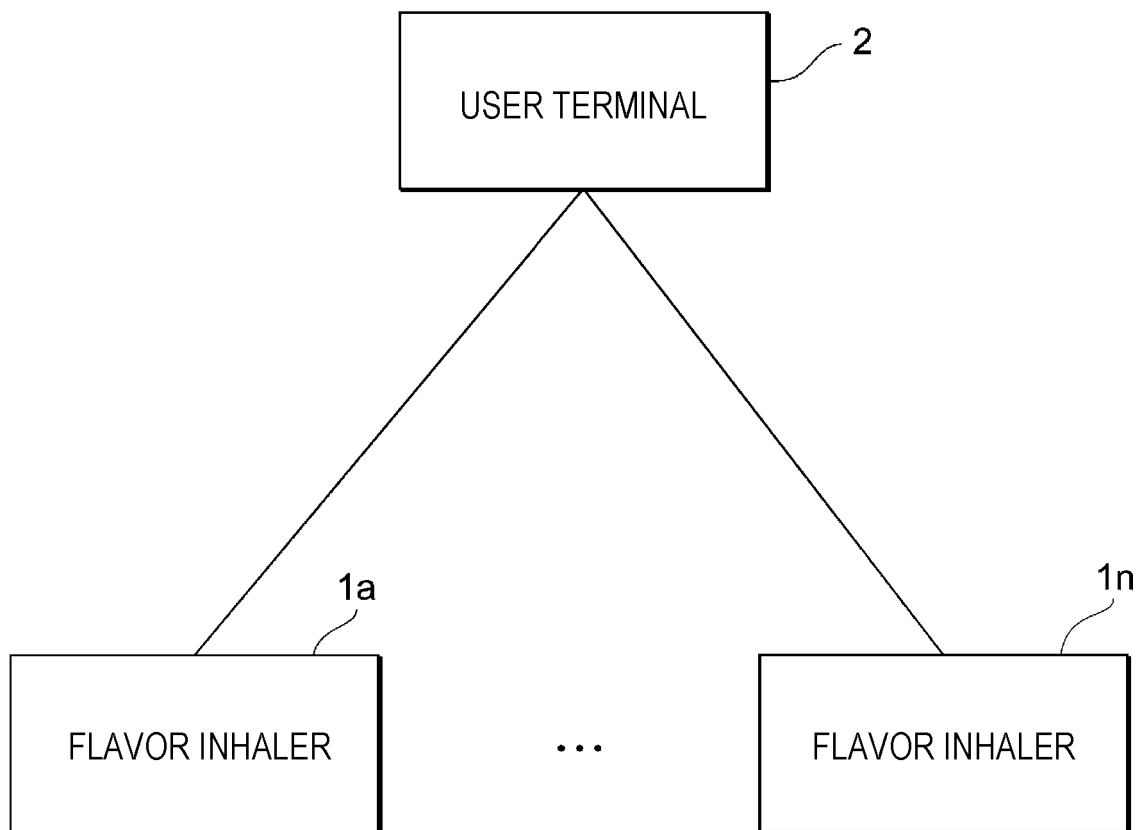
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FIG. 1



100

FIG. 2A

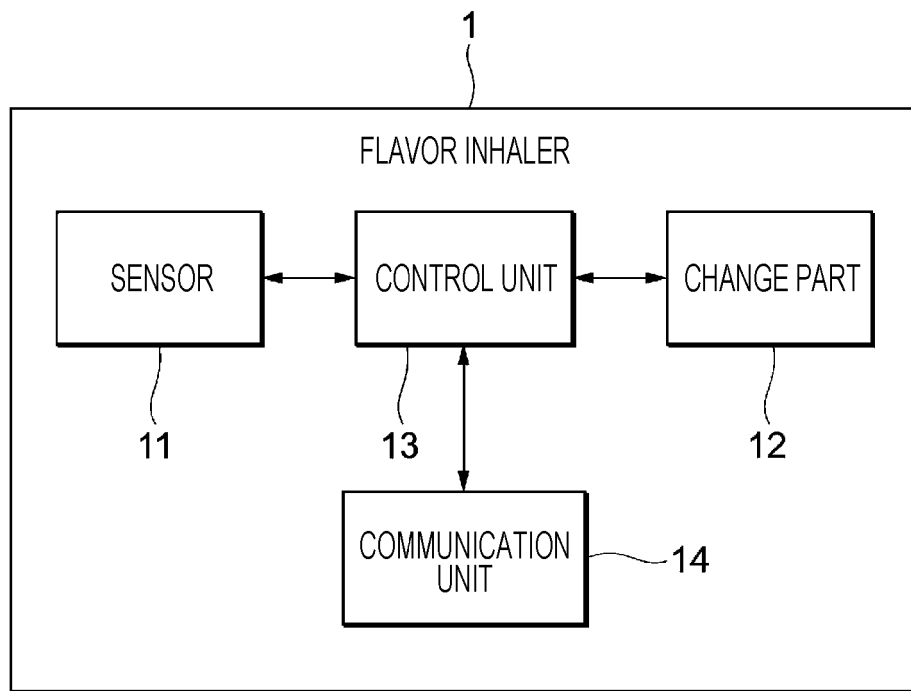


FIG. 2B

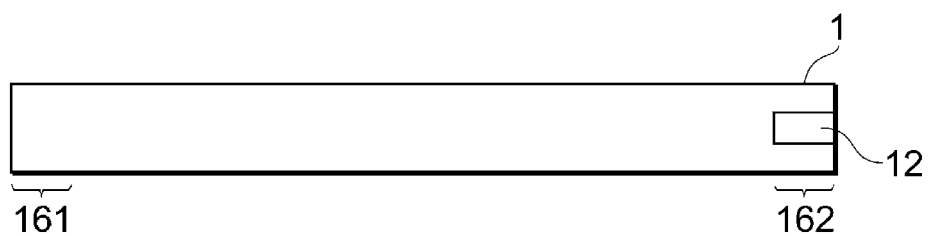


FIG. 3

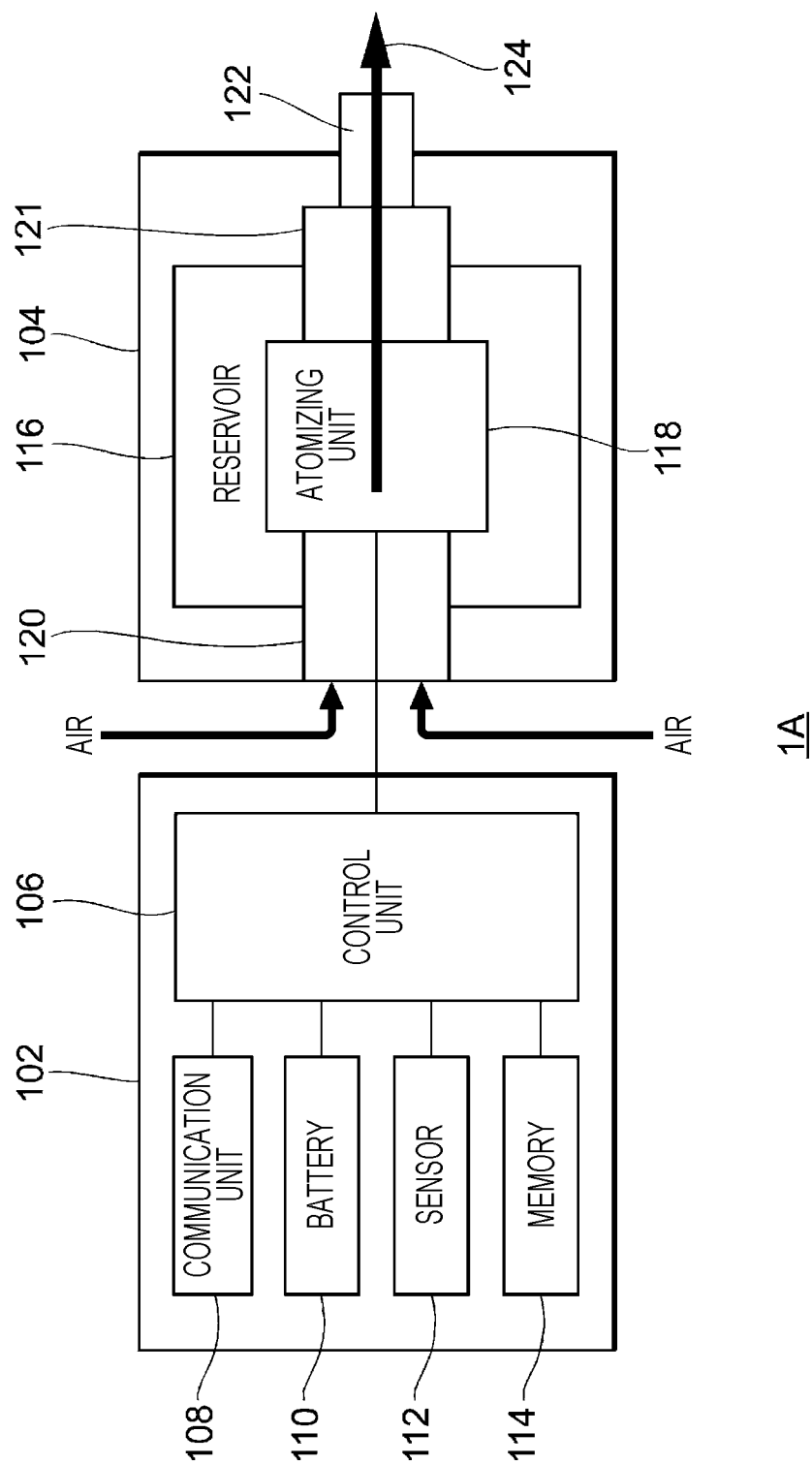
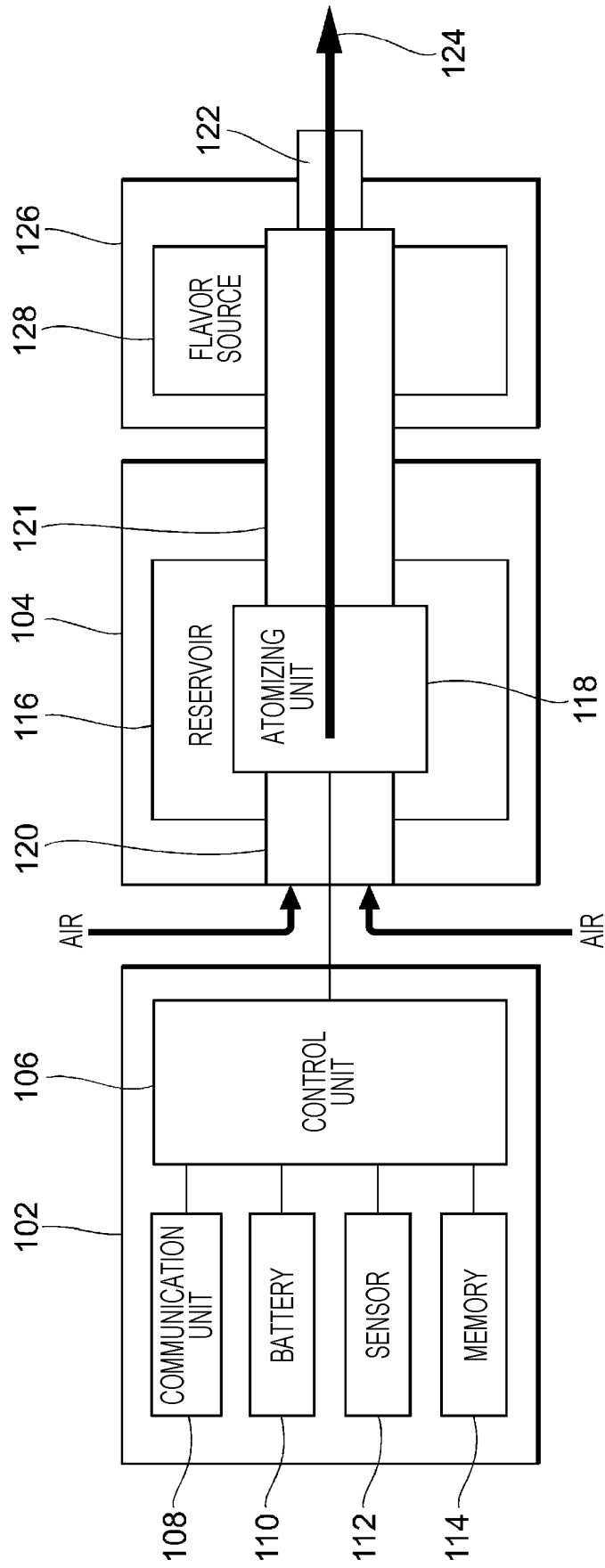


FIG. 4



1B

FIG. 5

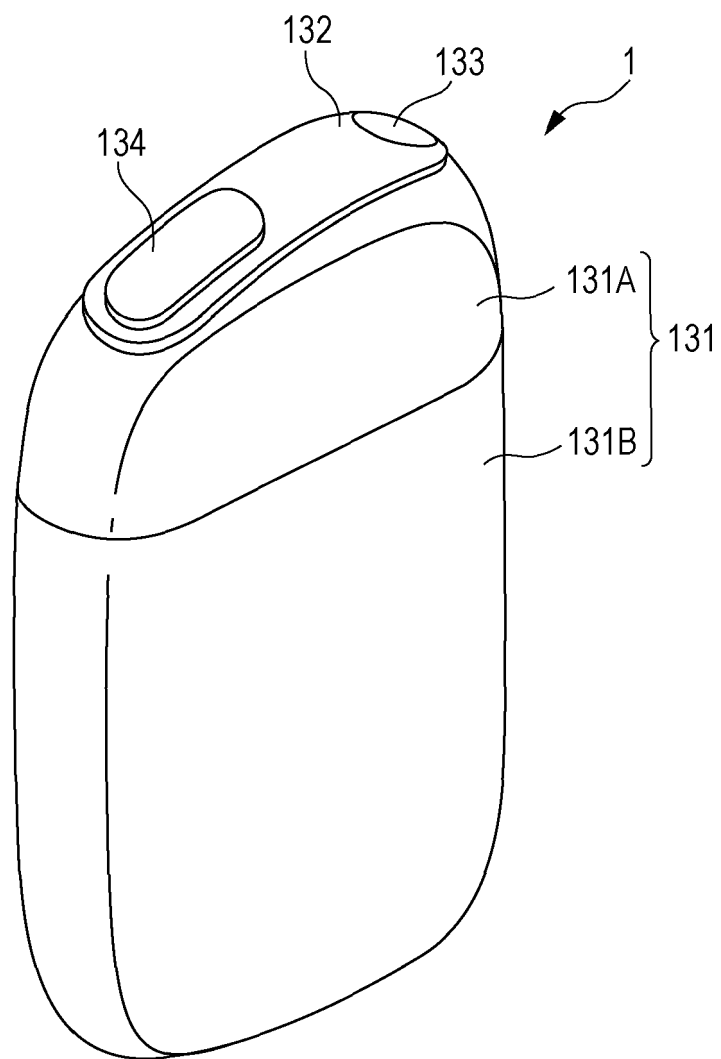


FIG. 6

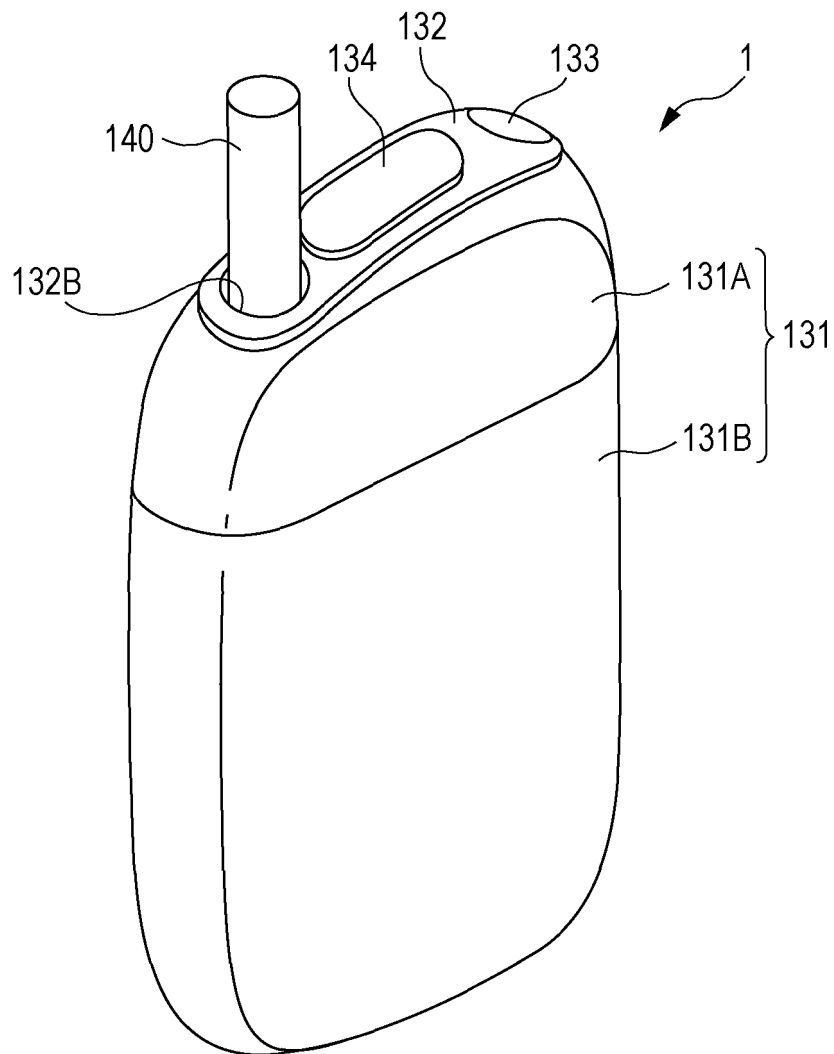


FIG. 7

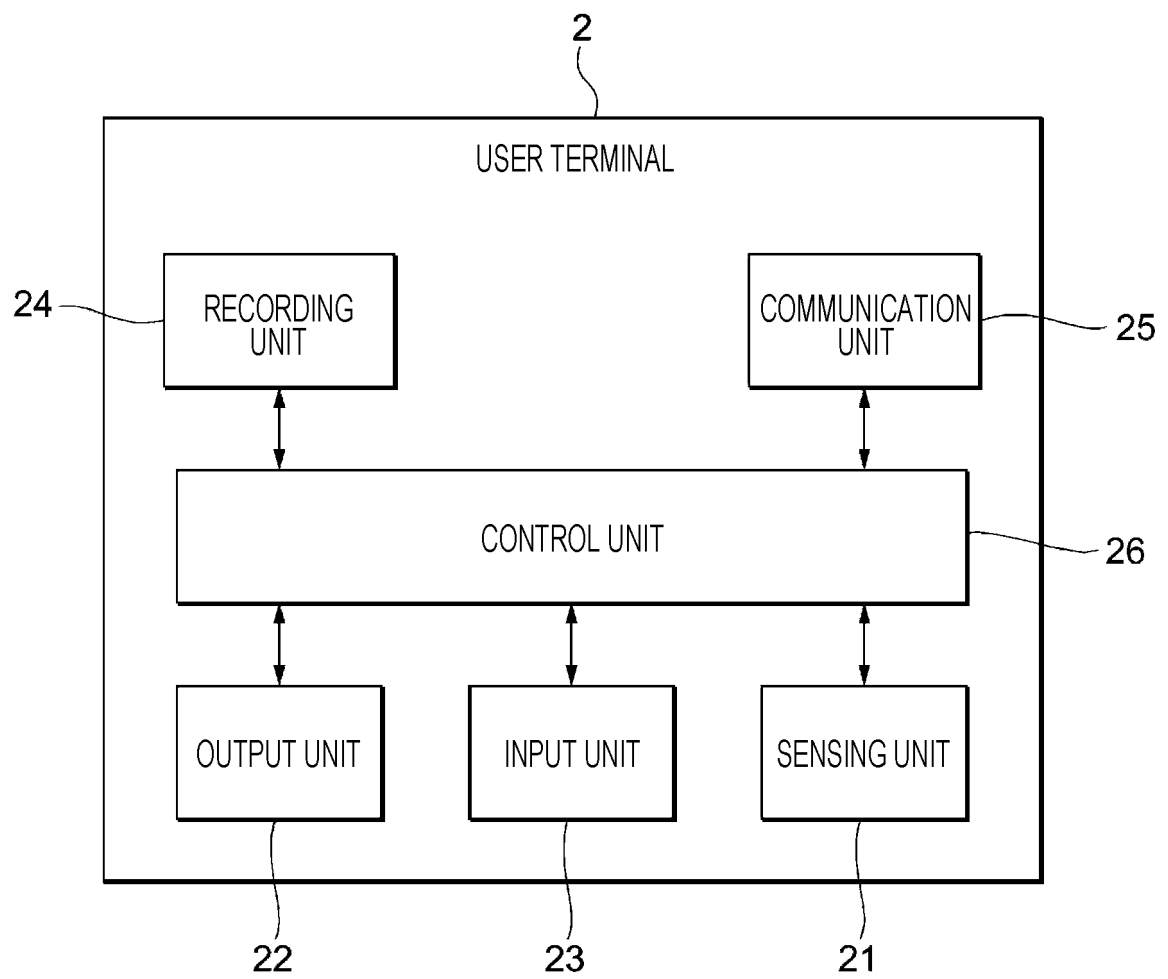


FIG. 8

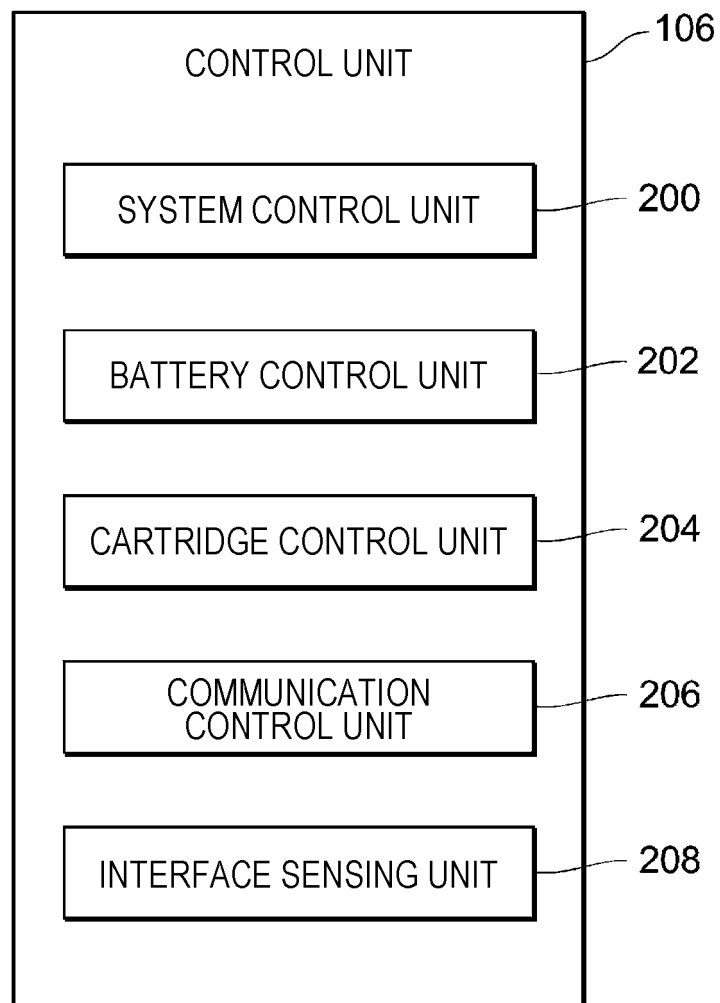


FIG. 9

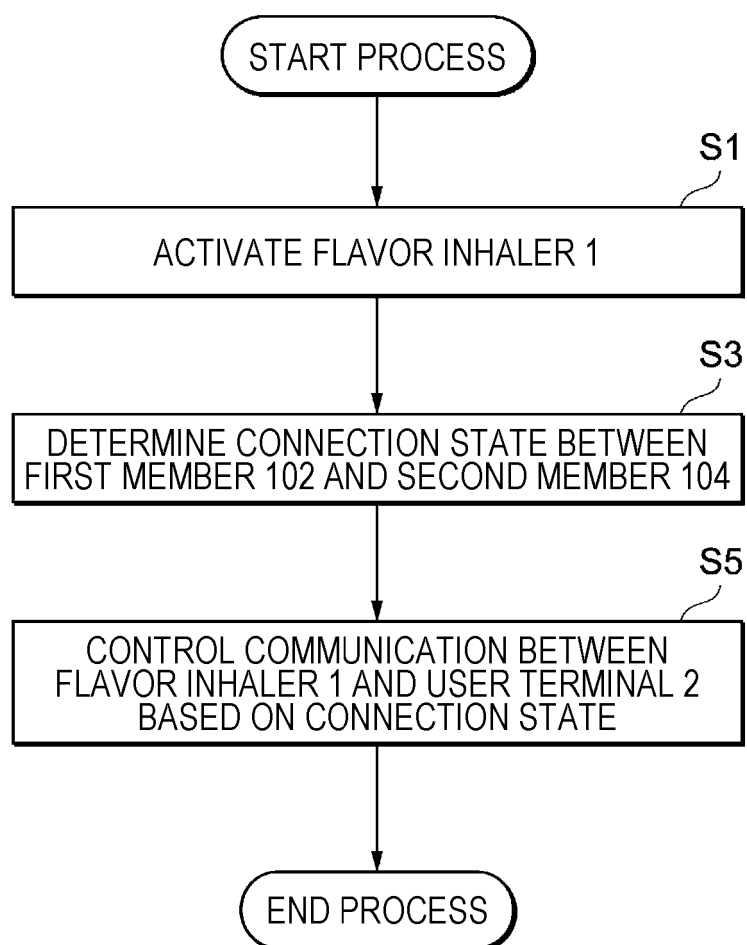


FIG. 10

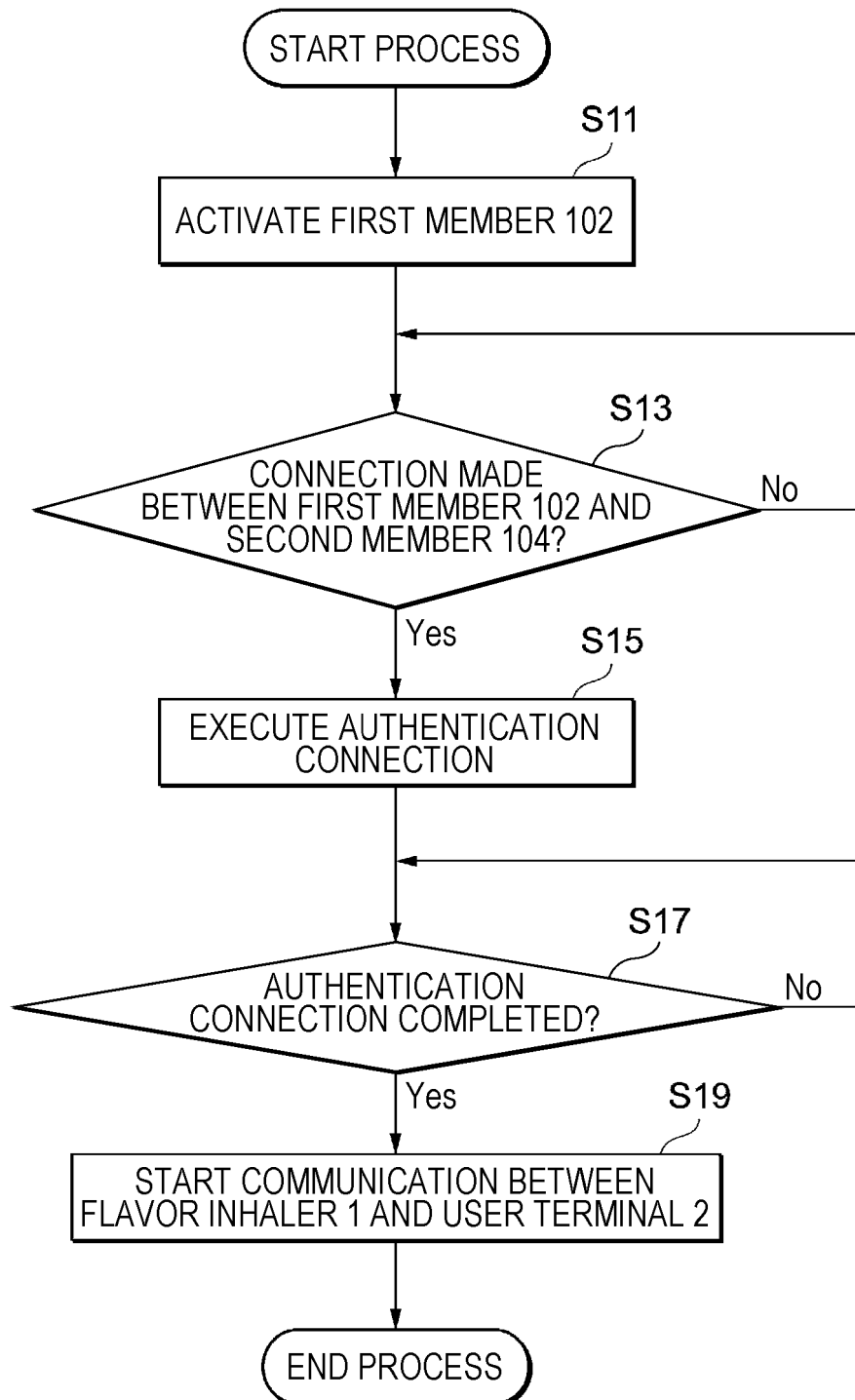


FIG. 11

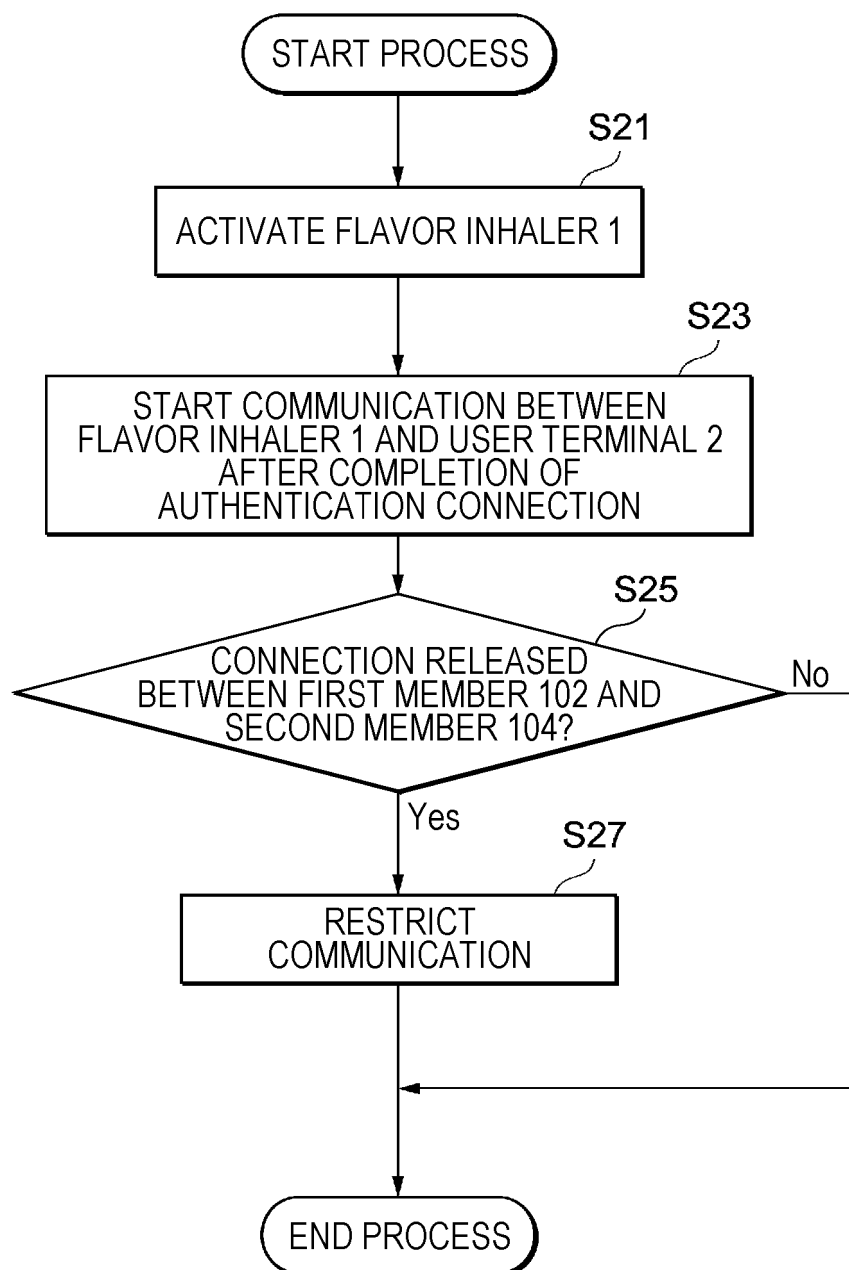


FIG. 12

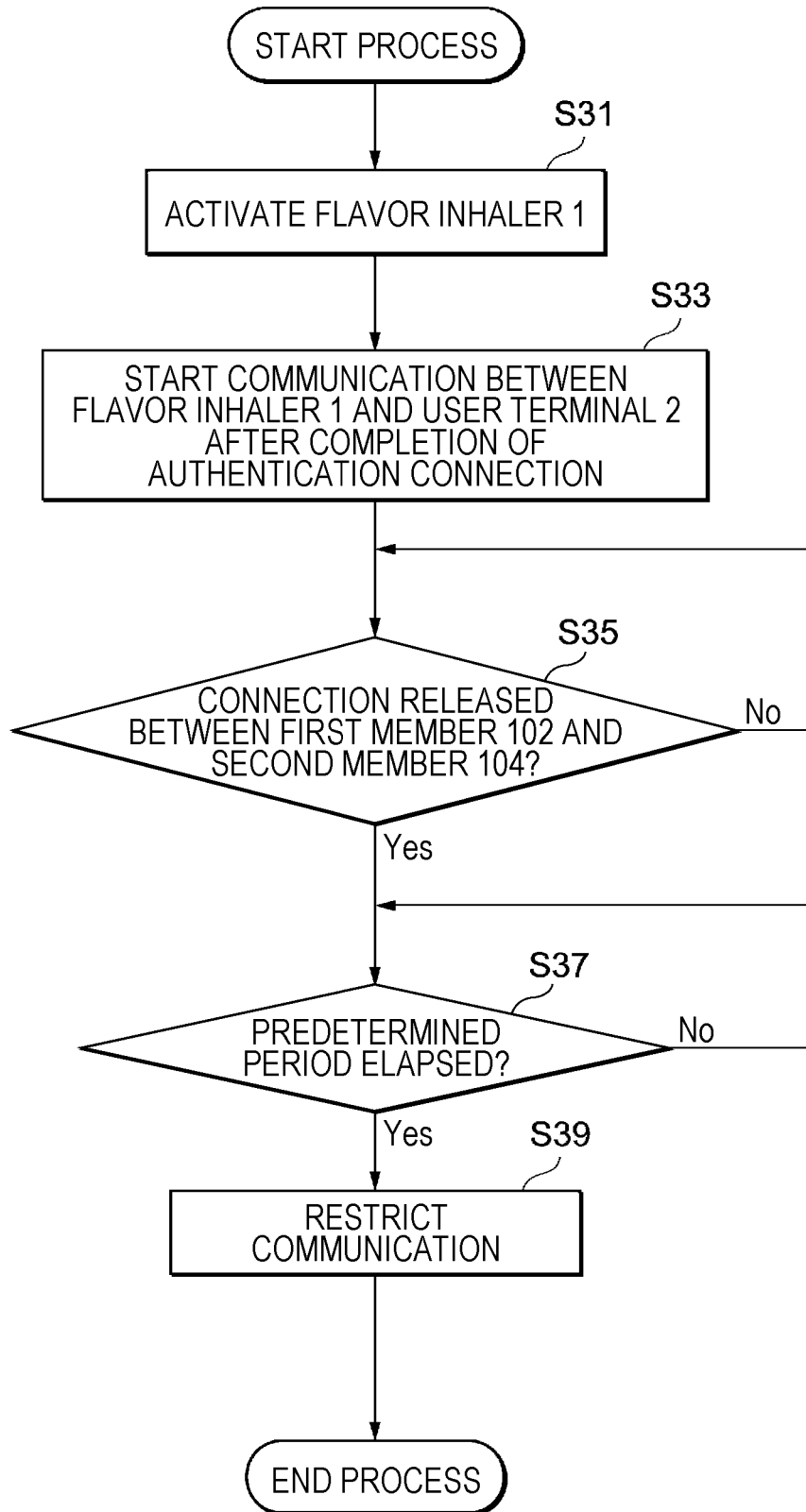


FIG. 13

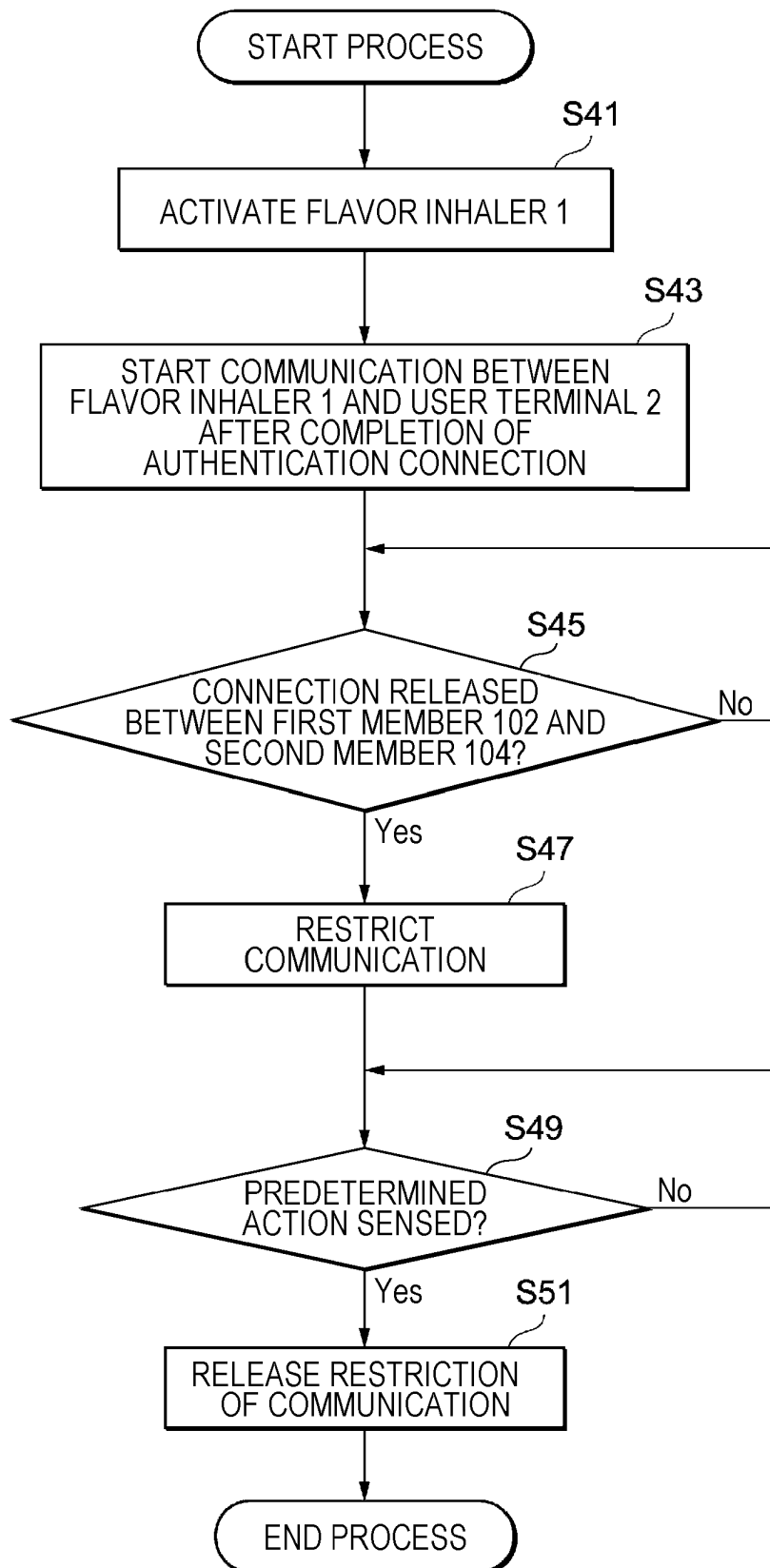
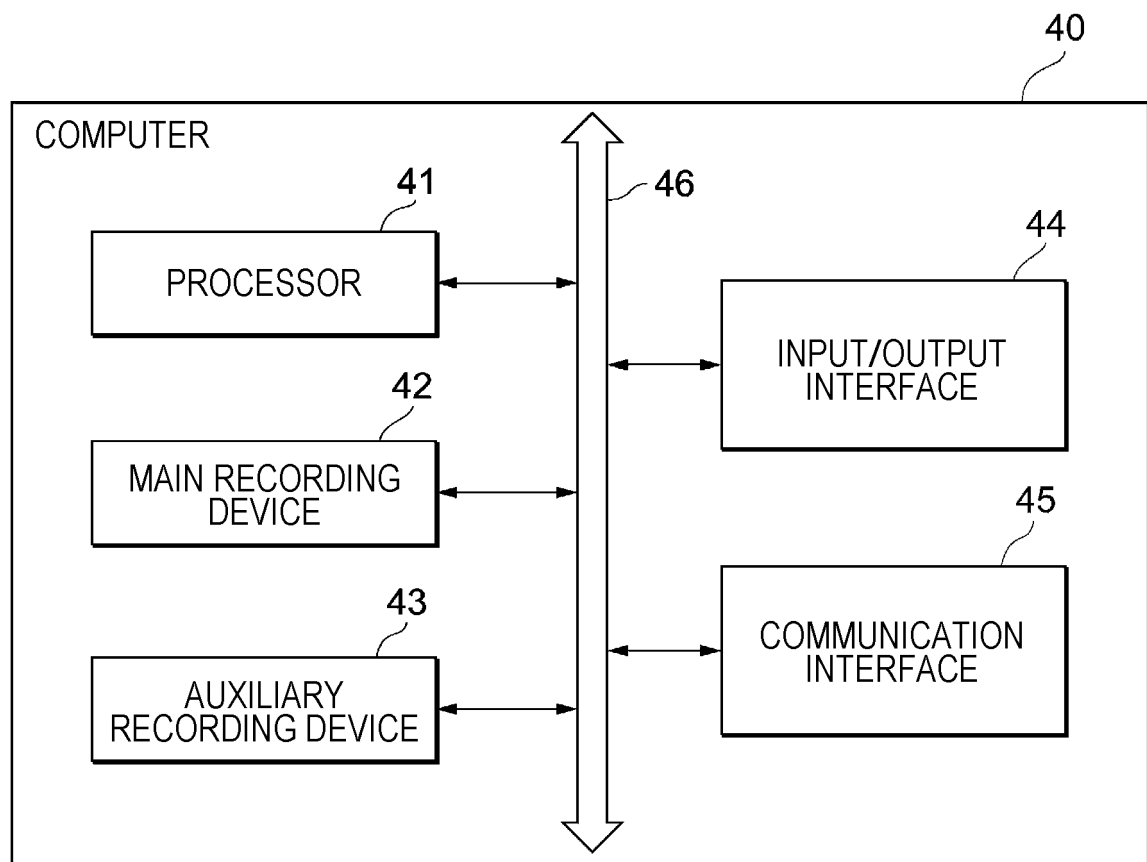


FIG. 14



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2019/037445

A. CLASSIFICATION OF SUBJECT MATTER

Int.Cl. A24F47/00 (2006.01) i

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. 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 1971-2019

Registered utility model specifications of Japan 1996-2019

Published registered utility model applications of Japan 1994-2019

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	JP 2018-533925 A (NICOVENTURES HOLDINGS LTD.) 22 November 2018, paragraphs [0014]-[0018], [0037]-[0039], [0046]-[0049], fig. 1-4	1-3, 8-9, 14-16
Y	& US 2018/0280640 A1, paragraphs [0025]-[0029], [0048]-[0050], [0057]-[0060], fig. 1-4 & WO 2017/055803 A1 & EP 3355733 A1 & KR 10-2018-0048847 A & CN 108135264 A	4-7, 10-13

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

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Date of the actual completion of the international search
04.12.2019Date of mailing of the international search report
17.12.2019Name and mailing address of the ISA/
Japan Patent Office
3-4-3, Kasumigaseki, Chiyoda-ku,
Tokyo 100-8915, Japan

Authorized officer

Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No. PCT/JP2019/037445
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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 2018-54512 A (OSAKA GAS CO., LTD.) 05 April 2018, paragraphs [0078]-[0081] (Family: none)	4-7, 10-13
Y	JP 2018-42579 A (MATSUYAMA KK) 22 March 2018, paragraphs [0089]-[0091] (Family: none)	10-13

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

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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