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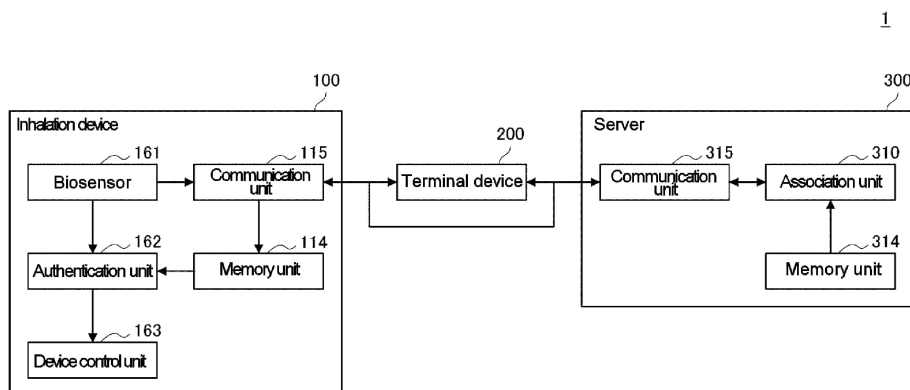
(54) **AEROSOL GENERATION APPARATUS AND METHOD FOR AUTHENTICATING AEROSOL GENERATION APPARATUS**

(57) **PROBLEM:**
To further improve user convenience while ensuring the correctness of authentication performed using biometric information.

SOLUTION:
An aerosol-generating device comprising: a biosensor for acquiring biometric information of a user; a communication unit for sending the biometric information to a server and for receiving, from the server, association

information indicating that the biometric information which was sent is associated with personal information of the user stored in the server; an authentication unit for authenticating the user by matching the biometric information of the user authenticated by the association information with the biometric information acquired by the biosensor; and a device control unit for unlocking an aerosol-generating function when the user has been successfully authenticated.

[Fig. 2]



Description

TECHNICAL FIELD

[0001] The present disclosure relates to an aerosol-generating device, and to an authentication method for an aerosol-generating device.

BACKGROUND ART

[0002] Inhalation devices such as e-cigarettes and nebulizers that generate substances to be inhaled by a user are in widespread use. Inhalation devices are capable of generating an aerosol by heating an aerosol source. This allows the user to inhale the aerosol generated by the inhalation device to enjoy the flavor of the aerosol.

[0003] Recent years have seen investigations into fitting inhalation devices with a biosensor capable of sensing biometric information. PTL 1 below, for example, discloses performing user authentication with a biosensor installed in an electronic cigarette device. Furthermore, PTL 2 below indicates that biometric information is acquired by a wearable terminal wirelessly connected to an inhalation device for generating an aerosol, and operation of the inhalation device is controlled on the basis of biometric authentication performed using the acquired biometric information.

CITATION LIST

PATENT LITERATURE

[0004]

PTL 1: US 2019/0175846 A1

PTL 2: WO 2023/026473 A1

SUMMARY OF INVENTION

TECHNICAL PROBLEM

[0005] In the invention disclosed in PTL 1 above, however, there is no guarantee that the biometric information acquired by the biosensor is the biometric information of the actual user, so it is difficult to ensure the correctness of the user authentication performed using the biometric information.

[0006] The invention disclosed in PTL 2 above employs biometric information acquired by a wearable terminal worn by the user, thereby guaranteeing that the biometric information acquired is the biometric information of the actual user. At the same time, the invention disclosed in PTL 2 requires connection of the wearable terminal, etc. to an external device when user authentication is performed using the biometric information.

[0007] The present disclosure therefore provides a novel and improved aerosol-generating device capable

of further improving user convenience while ensuring the correctness of authentication performed using biometric information, and also provides an authentication method for an aerosol-generating device.

SOLUTION TO PROBLEM

[0008] The present disclosure provides an aerosol-generating device comprising: a biosensor for acquiring biometric information of a user; a communication unit for sending the biometric information to a server and for receiving, from the server, association information indicating that the biometric information which was sent is associated with personal information of the user stored in the server; an authentication unit for authenticating the user by matching the biometric information of the user authenticated by the association information with the biometric information acquired by the biosensor; and a device control unit for unlocking an aerosol-generating function when the user has been successfully authenticated.

[0009] The aerosol-generating device may further comprise a non-volatile memory unit for storing the biometric information of the user authenticated by the association information, and the biometric information may be written to the memory unit only while there is a connection with the server.

[0010] The memory unit may store the biometric information of a plurality of individuals, including the user, who have each been authenticated by the association information, and the authentication unit may authenticate the plurality of individuals by using the biometric information of the plurality of individuals stored in the memory unit.

[0011] The device control unit may unlock the aerosol-generating function when each of the plurality of individuals including the user has been successfully authenticated.

[0012] The device control unit may output a notification to a terminal device in the possession of the user when a predetermined individual different from the user has been successfully authenticated.

[0013] When new biometric information is acquired by the biosensor in a state in which the user has been successfully authenticated, the authentication unit may treat the new biometric information as the biometric information of a temporarily authenticated individual, and the device control unit may unlock the aerosol-generating function when there has been successful authentication resulting from matching the biometric information of the temporarily authenticated individual with the biometric information acquired by the biosensor.

[0014] The authentication unit may treat the new biometric information as the biometric information of the temporarily authenticated individual only for a predetermined period of time starting from the time at which the new biometric information was acquired.

[0015] The authentication unit may treat the new bio-

metric information as the biometric information of the temporarily authenticated individual only within a predetermined range around a position at which the new biometric information was acquired.

[0016] The device control unit may lock the aerosol-generating function when the aerosol-generating function has not been used for a predetermined period of time.

[0017] The communication unit may send/receive data directly to/from the server.

[0018] The communication unit may send/receive data to/from the server via a terminal device in the possession of the user.

[0019] The biometric information may be information relating to a fingerprint.

[0020] The present disclosure furthermore provides an authentication method for an aerosol-generating device, the authentication method comprising: a step of acquiring biometric information of a user by means of a biosensor; a step of sending the biometric information to a server; a step of receiving, from the server, association information indicating that the biometric information which was sent is associated with personal information of the user stored in the server; a step of authenticating the user by matching the biometric information of the user authenticated by the association information with the biometric information acquired by the biosensor; and a step of unlocking an aerosol-generating function when the user has been successfully authenticated.

ADVANTAGEOUS EFFECTS OF INVENTION

[0021] The present disclosure makes it possible to further improve user convenience while ensuring the correctness of authentication performed using biometric information.

BRIEF DESCRIPTION OF DRAWINGS

[0022]

Fig. 1A is a schematic diagram schematically showing a first configuration example of an inhalation device.

Fig. 1B is a schematic diagram schematically showing a second configuration example of the inhalation device.

Fig. 2 is a block diagram showing a configuration example of a system according to a first embodiment of the present disclosure.

Fig. 3 is a sequence diagram showing an operating flow of the system according to the same embodiment.

Fig. 4 is an explanatory diagram illustrating a first example of an inhalation device according to a second embodiment of the present disclosure.

Fig. 5 is an explanatory diagram illustrating a second example of the inhalation device according to the same embodiment.

Fig. 6 is an explanatory diagram illustrating a third example of the inhalation device according to the same embodiment.

Fig. 7A is an explanatory diagram illustrating a fourth example of the inhalation device according to the same embodiment.

Fig. 7B is an explanatory diagram illustrating the fourth example of the inhalation device according to the same embodiment.

DESCRIPTION OF EMBODIMENTS

[0023] Preferred embodiments of the present disclosure will be described in detail below with reference to the appended drawings. It should be noted that components having substantially the same functional configuration will be assigned the same reference numbers in the description and drawings to avoid giving a duplicate description.

1. Configuration example of inhalation device

[0024] An inhalation device is a device for generating a substance to be inhaled by a user. Hereinafter, the substance generated by the inhalation device will be described as being an aerosol. Alternatively, the substance generated by the inhalation device may be a gas.

(1) First configuration example

[0025] Fig. 1A is a schematic diagram schematically showing a first configuration example of an inhalation device. As shown in fig. 1A, an inhalation device 100A according to this configuration example includes a power supply unit 110, a cartridge 120, and a flavoring cartridge 130. The power supply unit 110 comprises a power source unit 111A, a sensor unit 112A, a notification unit 113A, a memory unit 114A, a communication unit 115A, and a control unit 116A. The cartridge 120 includes a heating unit 121A, a liquid guiding portion 122, and a liquid storage portion 123. The flavoring cartridge 130 includes a flavor source 131 and a mouthpiece 124. An air flow path 180 is formed in the cartridge 120 and the flavoring cartridge 130.

[0026] The power source unit 111A stores electrical power. The power source unit 111A then supplies the electrical power to each component of the inhalation device 100A in accordance with control performed by the control unit 116A. The power source unit 111A may be configured, for example, by a rechargeable battery such as a lithium ion secondary battery.

[0027] The sensor unit 112A acquires various types of information relating to the inhalation device 100A. As an example, the sensor unit 112A is configured by a pressure sensor such as a condenser microphone, a flow rate sensor or a temperature sensor, etc., and acquires values associated with inhalation by a user. As another example, the sensor unit 112A is configured by an input

device, such as a button or switch, for accepting input of information from the user.

[0028] The notification unit 113A notifies the user of information. The notification unit 113A is configured by a light-emitting device which emits light, a display device which displays images, a sound output device which outputs sound, or a vibration device which vibrates, etc., for example.

[0029] The memory unit 114A stores various types of information for operation of the inhalation device 100A. The memory unit 114A is configured by a non-volatile storage medium such as a flash memory, for example.

[0030] The communication unit 115A is a communication interface capable of performing communication conforming to any wired or wireless communication standard. Examples of communication standards which may be adopted include: Wi-Fi (registered trademark), Bluetooth (registered trademark), infrared communication, mobile communication such as 4G or 5G, or LPWA (Low Power Wide Area-network), etc.

[0031] The control unit 116A functions as an arithmetic processing device and a control device, and controls overall operation within the inhalation device 100A in accordance with various programs. The control unit 116A is realized by a CPU (central processing unit) and an electronic circuit such as a microprocessor, for example.

[0032] The liquid storage portion 123 stores an aerosol source. The aerosol source is atomized to generate an aerosol. The aerosol source is a polyhydric alcohol such as glycerol or propylene glycol, or a liquid such as water, for example. The aerosol source may include a tobacco-derived or non-tobacco-derived flavor component. If the inhalation device 100A is a medical inhaler such as a nebulizer, the aerosol source may include a drug.

[0033] The liquid guiding portion 122 guides the aerosol source, which is a liquid stored in the liquid storage portion 123, from the liquid storage portion 123, and holds the aerosol source. The liquid guiding portion 122 is, for example, a wick formed by twisting either a fibrous material such as glass fibers or a porous material such as a porous ceramic. In this case, the aerosol source stored in the liquid storage portion 123 is guided by the capillary effect of the wick.

[0034] The heating unit 121A heats the aerosol source to atomize the aerosol source, thereby generating the aerosol. In the example shown in fig. 1A, the heating unit 121A is configured as a coil wrapped around the liquid guiding portion 122. When the heating unit 121A generates heat, the aerosol source held in the liquid guiding portion 122 is heated and atomized, generating the aerosol. The heating unit 121A generates heat when supplied with electricity from the power source unit 111A. As an example, the heating unit 121A may be supplied with electricity from the power source unit 111A when the sensor unit 112A has detected that the user has started inhaling and/or that predetermined information has been input. Furthermore, the supply of electricity from the

power source unit 111A to the heating unit 121A may be stopped when the sensor unit 112A has detected that the user has finished inhaling and/or that predetermined information has been input.

[0035] The flavor source 131 is a component for imparting a flavor component to the aerosol. The flavor source 131 may include tobacco-derived or non-tobacco-derived flavor components.

[0036] The air flow path 180 is a flow path for air to be inhaled by the user. The air flow path 180 has a tubular structure with an air inflow hole 181, which is an inlet for air into the air flow path 180, and an air outflow hole 182, which is an outlet for air from the air flow path 180, at the two ends thereof. Part way along the air flow path 180, the liquid guiding portion 122 is disposed on the upstream side (the side closer to the air inflow hole 181), and the flavor source 131 is disposed on the downstream side (the side closer to the air outflow hole 182). Air that flows in through the air inflow hole 181 as the user inhales is mixed with the aerosol generated by the heating unit 121A and is transported through the flavor source 131 to the air outflow hole 182, as shown by the arrow 190. When the mixed fluid of aerosol and air passes through the flavor source 131, the flavor component contained in the flavor source 131 is added to the aerosol.

[0037] The mouthpiece 124 is a member that is held in the user's mouth during inhalation. The air outflow hole 182 is disposed in the mouthpiece 124. The user holds the mouthpiece 124 in their mouth and inhales, making it possible to draw the mixed fluid of aerosol and air into the oral cavity.

[0038] A configuration example of the inhalation device 100A has been described above. The inhalation device 100A is, of course, not limited to the configuration described above, and various configurations, such as those illustrated below by way of example, may be adopted.

[0039] As an example, the inhalation device 100A need not include the flavoring cartridge 130. In this case, the cartridge 120 is provided with the mouthpiece 124.

[0040] As another example, the inhalation device 100A may include a plurality of types of aerosol sources. A plurality of types of aerosol generated from the plurality of types of aerosol sources may be mixed within the air flow path 180 to cause a chemical reaction, thereby generating yet more other types of aerosol.

[0041] Furthermore, the means for atomizing the aerosol source is not limited to heating by the heating unit 121A. For example, the means for atomizing the aerosol source may be vibration atomization or induction heating.

(2) Second configuration example

[0042] Fig. 1B is a schematic diagram schematically showing a second configuration example of the inhalation device. As shown in fig. 1B, an inhalation device 100B according to this configuration example comprises a power source unit 111B, a sensor unit 112B, a notification unit 113B, a memory unit 114B, a communication unit

115B, a control unit 116B, a heating unit 121B, a holding portion 140, and a heat insulating portion 144.

[0043] The power source unit 111B, sensor unit 112B, notification unit 113B, memory unit 114B, communication unit 115B, and control unit 116B are each substantially the same as the corresponding component included in the inhalation device 100A of the first configuration example.

[0044] The holding portion 140 has an internal space 141, and holds a stick-type substrate 150 while accommodating a portion of the stick-type substrate 150 in the internal space 141. The holding portion 140 has an opening 142 allowing the internal space 141 to communicate with the outside, and holds the stick-type substrate 150 which has been inserted into the internal space 141 from the opening 142. For example, the holding portion 140 is a cylindrical body comprising the opening 142 and a bottom portion 143 serving as a bottom surface, and defines a columnar internal space 141. The holding portion 140 also has a function for defining a flow path for air supplied to the stick-type substrate 150. An air inflow hole which is an inlet for air to the flow path is disposed in the bottom portion 143, for example. Meanwhile, the opening 142 forms an air outflow hole, which is an outlet for air from the flow path.

[0045] The stick-type substrate 150 comprises a substrate portion 151 and a mouthpiece portion 152. The substrate portion 151 contains an aerosol source. It should be noted that the aerosol source is not limited to a liquid and may equally be a solid in this configuration example. In a state in which the stick-type substrate 150 is being held in the holding portion 140, at least a portion of the substrate portion 151 is accommodated in the internal space 141, and at least a portion of the mouthpiece portion 152 protrudes from the opening 142. Then, when the user holds the mouthpiece portion 152 protruding from the opening 142 in their mouth and inhales, air flows into the internal space 141 via inflow hole, which is not illustrated in the drawings, and reaches the inside of the user's mouth together with the aerosol generated from the substrate portion 151.

[0046] The heating unit 121B has the same configuration as the heating unit 121A according to the first configuration example. However, in the example illustrated in fig. 1B, the heating unit 121B is configured in a film shape and is disposed so as to cover the outer circumference of the holding portion 140. Then, when the heating unit 121B generates heat, the substrate portion 151 of the stick-type substrate 150 is heated from the outer periphery, generating the aerosol.

[0047] The heat insulating portion 144 prevents heat transfer from the heating unit 121B to other components. For example, the heat insulating portion 144 is configured from a vacuum heat insulating material or an aerogel heat insulating material, or the like.

[0048] A configuration example of the inhalation device 100B has been described above. The inhalation device 100B is, of course, not limited to the configuration de-

scribed above, and various configurations, such as those illustrated below by way of example, may be adopted.

[0049] As one example, the heating unit 121B may have a blade-like form and may be arranged so as to protrude into the internal space 141 from the bottom portion 143 of the holding portion 140. In that case, the blade-like heating unit 121B is inserted into the substrate portion 151 of the stick-type substrate 150 and heats the substrate portion 151 of the stick-type substrate 150 from the inside. As another example, the heating unit 121B may be arranged so as to cover the bottom portion 143 of the holding portion 140. Furthermore, the heating unit 121B may be configured by a combination of two or more from among a first heating unit covering the outer circumference of the holding portion 140, a blade-like second heating unit, and a third heating unit covering the bottom portion 143 of the holding portion 140.

[0050] As another example, the holding portion 140 may comprise an opening/closing mechanism such as a hinge for opening/closing part of a casing that forms the internal space 141. By opening/closing the casing, the holding portion 140 may then grip the stick-type substrate 150 which has been inserted into the internal space 141. In this case, the heating unit 121B may be provided on the gripping part of the holding portion 140, and may heat the stick-type substrate 150 while pressing same.

[0051] Furthermore, the means for atomizing the aerosol source is not limited to heating by the heating unit 121B. For example, the means for atomizing the aerosol source may be induction heating.

[0052] Furthermore, the inhalation device 100B may additionally include the heating unit 121A, the liquid guiding portion 122, the liquid storage portion 123, and the air flow path 180 according to the first configuration example, and the air outflow hole 182 of the air flow path 180 may also serve as the air inflow hole to the internal space 141. In this case, the mixed fluid of the aerosol generated by the heating unit 121A and air flows into the internal space 141 and is further mixed with the aerosol generated by the heating unit 121B, and reaches the oral cavity of the user.

2. First Embodiment

2.1. Configuration example

[0053] Fig. 2 is a block diagram showing a configuration example of a system 1 according to a first embodiment of the present disclosure. As shown in fig. 2, the system 1 according to this embodiment comprises at least an inhalation device 100 and a server 300. The inhalation device 100 and the server 300 can communicate directly or via a terminal device 200.

[0054] The inhalation device 100 is an aerosol-generating device which may adopt either the first configuration example or the second configuration example described above. The inhalation device 100 generates an aerosol by using a substrate containing at least either one of an

aerosol source, which is a source for generating an aerosol, and a flavor source, which is a source for generating a flavor imparted to the aerosol. For example, the cartridge 120, the flavoring cartridge 130, and the stick-type substrate 150 described above are each an example of the substrate of this embodiment. Moreover, a combination of the power supply unit 110, the cartridge 120, and the flavoring cartridge 130 of the first configuration example may be considered as one aerosol-generating system, because an aerosol can be generated by combining the power supply unit 110, the cartridge 120, and the flavoring cartridge 130. Similarly, a combination of the inhalation device 100 and the stick-type substrate 150 of the second configuration example may be considered as one aerosol-generating system, because an aerosol can be generated by combining the inhalation device 100 and the stick-type substrate 150. Furthermore, the system 1 overall may also be considered as an aerosol-generating system.

[0055] The server 300 stores a database in which personal information of a user of the inhalation device 100 is registered. Examples of the personal information of the user registered in the database include: user identification information (name, date of birth, age, sex, and address, etc.) that enable an individual to be identified, and attribute information (information relating to preferences) relating to the individual.

[0056] The terminal device 200 is an information processing device in the possession of the user of the inhalation device 100. The terminal device 200 may be a smartphone or a tablet terminal, etc., for example. The terminal device 200 is capable of sending/receiving data between the inhalation device 100 and the server 300 via wireless communication.

[0057] The inhalation device 100 may send/receive data to/from the server 300 via the terminal device 200 by sending/receiving the data to/from the terminal device 200 via Bluetooth (registered trademark), BLE (Bluetooth Low Energy) (registered trademark), infrared communication, or Wi-Fi (registered trademark), etc. Alternatively, the inhalation device 100 may send/receive data directly to/from the server 300 via mobile communication such as 4G or 5G, or via wide area communication such as LPWA (Low Power Wide Area-network).

[0058] The inhalation device 100 according to this embodiment can send acquired biometric information of the user to the server 300, and can guarantee that the acquired biometric information is the biometric information of the user by associating the biometric information of the user with the personal information of the user registered in the server 300. By virtue of this, the inhalation device 100 is capable of authenticating the user by means of biometric information, by matching biometric information guaranteed as the user's biometric information, with the newly acquired biometric information.

[0059] The inhalation device 100 more specifically comprises: a biosensor 161, a communication unit 115, a memory unit 114, an authentication unit 162, and a

device control unit 163. It should be noted that the authentication unit 162 and the device control unit 163 may be provided as a single authentication control unit. In such a case, the authentication control unit can implement the processing of both the authentication unit 162 and the device control unit 163 which will be described below. Furthermore, when the inhalation device 100 is connected to the server 300 via the communication unit 115, the functions of the authentication unit 162 may be performed by the server 300.

[0060] The biosensor 161 is a sensor capable of sensing biometric information of the user. For example, the biosensor 161 may be a sensor for sensing biometric information from a fingerprint, etc. that enables an individual to be identified. Furthermore, the biosensor 161 may equally be a sensor for sensing biometric information from a palm print, veins, a voice print, the iris, or face shape, etc.

[0061] The communication unit 115 is a communication interface for sending/receiving data to/from the terminal device 200 or the server 300. As an example, the communication unit 115 may be a communication interface capable of sending/receiving data to/from the terminal device 200, employing a wired or wireless LAN (Local Area Network), Wi-Fi (registered trademark), Bluetooth (registered trademark), BLE (registered trademark), infrared communication, or WUSB (Wireless USB), etc. As another example, the communication unit 115 may be a communication interface capable of sending/receiving data to/from the server 300, employing mobile communication such as 4G or 5G, or wide area communication such as LPWA (Low Power Wide Area-network), etc. The communication unit 115 sends to the server 300 the biometric information of the user acquired by the biosensor 161, while also receiving from the server 300 association information indicating that the biometric information which was sent is associated with personal information of the user.

[0062] The memory unit 114 stores biometric information guaranteed as the biometric information of the user as a result of being associated with personal information of the user by the server 300. For example, the memory unit 114 may be a non-volatile semiconductor storage device such as a flash memory. The biometric information stored in the memory unit 114 is used to authenticate the user of the inhalation device 100. The memory unit 114 is therefore preferably capable of writing in biometric information only while the inhalation device 100 is connected to the server 300.

[0063] The authentication unit 162 authenticates the user by matching the biometric information acquired by the biosensor 161 with the biometric information stored in the memory unit 114. Specifically, the authentication unit 162 matches the biometric information stored in the memory unit 114 after being associated with the personal information of the user in the server 300, with the biometric information acquired by the biosensor 161, and when the two sets of information are consistent, the user

is judged to have been successfully authenticated. Note that authentication of the biometric information by means of the authentication unit 162 may be carried out using a well-known means in accordance with the type of biometric information. For example, if the biometric information is information relating to a fingerprint, then the authentication unit 162 can judge whether or not the fingerprints are consistent by comparing feature points present on each fingerprint.

[0064] The authentication unit 162 is capable of performing authentication with a high degree of correctness by performing the match using biometric information which is associated with the personal information of the user and guaranteed as the biometric information of the user. Furthermore, the authentication unit 162 is capable of performing authentication with a high degree of correctness even while there is no connection to the server 300, by storing biometric information associated with personal information of the user in the memory unit 114.

[0065] The device control unit 163 controls operation of the inhalation device 100 on the basis of an authentication result from the authentication unit 162. Specifically, the device control unit 163 locks an aerosol-generating function of the inhalation device 100 when the aerosol-generating function has not been used for a predetermined period of time, and unlocks the aerosol-generating function when the user has been successfully authenticated by the authentication unit 162. By virtue of this, the inhalation device 100 is capable of preventing another person from using the aerosol-generating function by locking the aerosol-generating function when the user has finished inhaling the aerosol. Meanwhile, the inhalation device 100 is capable of allowing the user to start inhaling the aerosol by unlocking the aerosol-generating function when the user has been successfully authenticated by means of biometric information.

[0066] The server 300 more specifically comprises a communication unit 315, a memory unit 314, and an association unit 310.

[0067] The communication unit 315 is a communication interface for sending/receiving data to/from the inhalation device 100 or the terminal device 200. The communication unit 315 may be a communication interface capable of sending/receiving data to/from the inhalation device 100 or the terminal device 200 via wireless communication, for example. The communication unit 315 receives from the inhalation device 100 the biometric information of the user acquired by the biosensor 161, and sends to the inhalation device 100 the association information indicating that the received biometric information is associated with the personal information of the user.

[0068] The memory unit 314 is a data storage device in which a database having personal information of the user registered therein is created. That is to say, the memory unit 314 stores the personal information of the user. Specifically, user identification information (name, date

of birth, age, sex, and address, etc.) that enable an individual to be identified, and user attribute information (information relating to preferences) relating to the individual are registered in the database. The memory unit 314 may be configured by a magnetic memory device such as an HDD (Hard Disk Drive), a semiconductor memory device, an optical memory device, or a magneto-optical memory device, or the like.

[0069] The association unit 310 associates the biometric information of the user received from the inhalation device 100 with the personal information of the user stored in the memory unit 314. For example, the association unit 310 may have the user send biometric information from the inhalation device 100 to the server 300 while the user is logged in to the server 300, and may thereby associate the personal information of the logged-in user with the biometric information sent. Furthermore, the association unit 310 may have identification information of the inhalation device 100 used by the user registered in the database as personal information of the user, and may thereby associate the personal information of the user with the biometric information sent from the inhalation device 100 having the registered identification information.

[0070] When the personal information of the user and the biometric information sent have been associated by the association unit 310, the server 300 sends to the inhalation device 100 association information indicating that the personal information of the user has been associated with the biometric information which was sent. Furthermore, the server 300 may send to the inhalation device 100 the biometric information which has been associated with the personal information of the user, at the same time as the association information.

[0071] By virtue of the configuration above, the system 1 according to this embodiment is capable of guaranteeing that the biometric information acquired by the inhalation device 100 is the biometric information of the user, by associating the acquired biometric information with the personal information of the user stored in the server 300. Furthermore, the system 1 according to this embodiment is capable of performing user authentication using biometric information without a connection to the server 300, by causing the inhalation device 100 to store the biometric information guaranteed as the biometric information of the user by means of association with personal information of the user.

2.2. Operating example

[0072] Fig. 3 is a sequence diagram showing an operating flow of the system 1 according to this embodiment. As shown in fig. 3, the system 1 according to this embodiment is realized by collaboration of the inhalation device 100 and the server 300.

[0073] As shown in fig. 3, biometric information of a user U is first of all sensed by means of the biosensor 161 in the inhalation device 100 (S101). The biometric infor-

mation may be information relating to the fingerprint of the user U, for example. The biometric information which has been sensed is then sent to the server 300 from the inhalation device 100 (S103).

[0074] Next, the association unit 310 in the server 300 associates the biometric information which has been sent, with the personal information of the user U stored in the memory unit 314 (S105). For example, the server 300 may have the user U login, and may thereby associate the personal information of the user U currently logged in with the biometric information which has been sent. Association information indicating that the biometric information sent has been associated with the stored personal information of the user U is then sent from the server 300 to the inhalation device 100 (S107). As a result, the inhalation device 100 stores in the memory unit 114 biometric information guaranteed by the association information as the biometric information of the user U (S109).

[0075] When the inhalation device 100 subsequently performs authentication of the user U, the biometric information of the user U is sensed by the biosensor 161 in the inhalation device 100 (S111). The biometric information which has been sensed and the biometric information stored in the memory unit 114 are then matched by means of the authentication unit 162 in the inhalation device 100 (S113). When the biometric information which has been sensed and the biometric information stored in the memory unit 114 are consistent, the authentication unit 162 judges that the user U has been successfully authenticated (S115). As a result, the aerosol-generating function of the inhalation device 100 is unlocked by means of the device control unit 163 (S117). By notifying the user U of the unlocking (S119), the inhalation device 100 can allow the user U to start inhaling the aerosol using the inhalation device 100 (S121).

[0076] According to the operating example above, the system 1 according to this embodiment can authenticate the user U by means of biometric information using only the inhalation device 100 and without a connection to the server 300, by associating the biometric information of the user U with the personal information of the user U stored in the server 300 in order to perform the authentication.

2.3. Variant Examples

[0077] A variant example of the system 1 according to the embodiment will be described next. In the variant example of the system 1 according to the embodiment, biometric information of a plurality of individuals including the user is stored in the memory unit 114 of the inhalation device 100. The inhalation device 100 is capable of performing various types of operations which will be described below, by authenticating the biometric information of a plurality of individuals including the user.

First Variant Example

[0078] For example, the device control unit 163 may unlock the aerosol-generating function when each of the plurality of individuals including the user has been successfully authenticated. Specifically, the biometric information of a plurality of individuals including the user is stored in the memory unit 114 of the inhalation device 100, and the authentication unit 162 matches the stored biometric information of the plurality of individuals including the user with the biometric information sensed by the biosensor 161. By this means, the device control unit 163 may unlock the aerosol-generating function when all of the plurality of individuals including the user have been successfully authenticated.

[0079] As an example, the biometric information of the plurality of individuals including the user, which is stored in the memory unit 114, may be associated with personal information of each of the plurality of individuals, which is stored in the memory unit 314 of the server 300. In such a case, the personal information of each of the plurality of individuals including the user is registered in the database created in the memory unit 314 of the server 300, and the biometric information of the plurality of individuals is associated with the registered personal information of the plurality of individuals, respectively.

[0080] As another example, the biometric information of the plurality of individuals including the user, which is stored in the memory unit 114, may be associated with the personal information of the user, which is stored in the memory unit 314 of the server 300. In such a case, the personal information of the user is registered in the database created in the memory unit 314 of the server 300, and the biometric information of an individual or individuals other than the user (e.g., members of the user's family, etc.) is associated with the registered personal information of the user.

[0081] According to the first variant example, the user and the other person or people (e.g., members of the user's family, etc.) whose biometric information is stored in the memory unit 114 must be successfully authenticated when the user inhales the aerosol. That is to say, the user needs to obtain consent from another person or other people when inhaling the aerosol. By virtue of this, the inhalation device 100 is capable of controlling how often the user inhales the aerosol by means of consent from others.

Second Variant Example

[0082] For example, when a predetermined individual different from the user has been successfully authenticated, the device control unit 163 may output a notification to a terminal device 200 in the possession of the user in order to inform the user that the predetermined individual has been authenticated. Specifically, the biometric information of a predetermined individual different from the user is stored in the memory unit 114 of the inhalation

device 100, and the authentication unit 162 matches the stored biometric information of the predetermined individual different from the user with the biometric information sensed by the biosensor 161. By this means, when a predetermined individual different from the user has been successfully authenticated, the device control unit 163 may output a notification to a terminal 200 in the possession of the user in order to inform the user that the predetermined individual has been authenticated. The aerosol-generating function of the inhalation device 100 remains locked at this point.

[0083] As an example, the biometric information of the predetermined individual different from the user, which is stored in the memory unit 114, may be associated with personal information of the relevant individual, which is stored in the memory unit 314 of the server 300. In such a case, the personal information of the relevant individual is registered in the database stored in the memory unit 314 of the server 300, and the biometric information of the predetermined individual is associated with the registered personal information of the relevant individual.

[0084] As another example, the biometric information of a predetermined individual different from the user, which is stored in the memory unit 114, may be associated with the personal information of the user, which is stored in the memory unit 314 of the server 300. In such a case, the personal information of the user is registered in the database created in the memory unit 314 of the server 300, and the biometric information of a predetermined individual different from the user (e.g., a member of the user's family, etc.) is associated with the registered personal information of the user.

[0085] According to the second variant example, when a member of the user's family, for instance, has touched the inhalation device 100, for example, it is possible to output a notification to the terminal device 200 of the user in order to inform the user that the relevant family member has been authenticated. By virtue of this, the inhalation device 100 is capable of warning the user to reconsider how the inhalation device 100 is being stored and managed, by providing a notification that a member of the user's family, for instance, has touched the inhalation device 100. Accordingly, the inhalation device 100 is capable of further improving safety for other people around the user.

Third Variant Example

[0086] For example, when new biometric information is sensed by the biosensor 161 in a state in which the user has been successfully authenticated, the authentication unit 162 may treat the new biometric information as the biometric information of a temporarily authenticated individual. The biometric information treated as the biometric information of a temporarily authenticated individual is temporarily stored in the memory unit 114. The inhalation device 100 may treat the biometric information temporarily stored in the memory unit 114 as biometric

information demonstrating the same validity as the biometric information associated with the personal information of the user in the server 300, on condition that this be within a predetermined period of time and/or within a predetermined positional range. By virtue of this configuration, the device control unit 163 can unlock the aerosol-generating function when there has been successful authentication resulting from matching the biometric information temporarily stored in the memory unit 114 with the biometric information acquired by the biosensor 161.

[0087] That is to say, the inhalation device 100 is capable of temporarily granting rights equivalent to those of the user to another person possessing the new biometric information sensed by the biosensor 161 in a state in which the user has been successfully authenticated. By virtue of this, the user can temporarily lend the inhalation device 100 to another person, on condition that this be within a predetermined period of time and/or within a predetermined positional range.

[0088] "Within a predetermined period of time" may be within a predetermined period of time (e.g., 2-3 hours) starting from the time at which the biosensor 161 acquired the new biometric information in a state in which the user had been successfully authenticated, for example. Furthermore, within a predetermined positional range may be within a predetermined range (e.g., within a diameter range of several tens of meters) around the position at which the new biometric information was acquired in a state in which the user had been successfully authenticated, for example.

[0089] According to the third variant example, the user can more easily share the experience of inhalation using the inhalation device 100 with another person, because the user can temporarily lend the inhalation device 100 to other people.

3. Second Embodiment

[0090] An example of an inhalation device 100 according to a second embodiment of the present disclosure will be described below. The inhalation device 100 according to this embodiment is capable of authenticating a user by means of biometric information, and also sending a result of the authentication to the outside.

First Example

[0091] Fig. 4 is an explanatory diagram illustrating a third example of the inhalation device 100 according to this embodiment. As shown in fig. 4, the inhalation device 100 is capable of intercommunication with a management server 300A via a terminal device 200 in the possession of the user of the inhalation device 100.

[0092] The management server 300A is a server for managing heating profiles of a substrate used for generating an aerosol. When the user is authenticated by means of biometric information using the inhalation device 100, and the inhalation device 100 is also connected

to the management server 300A, then the management server 300A may vary the heating profile of the substrate afforded by the inhalation device 100, depending on the user who has been authenticated.

[0093] Specifically, the management server 300A may acquire from the inhalation device 100 information such as substrate brand information, inhalation experience history information, or charging history information of the inhalation device 100, and may vary the heating profile of the substrate on the basis of this user-specific information which has been acquired. Furthermore, the management server 300A may vary the heating profile of the substrate on the basis of personal information of the user stored in the server 300.

[0094] It should be noted that the substrate brand information may be, for example, acquired by sensing the substrate by means of a sensor (a camera or the like) installed in the inhalation device 100. The substrate brand information may be information relating to the brand of substrate used most recently, or may be information obtained by counting up brands of substrate used within a predetermined past period of time. The inhalation experience history information may be, for example, information relating to intervals between inhalation experiences, inhalation (puffing) intervals during one inhalation experience, timings of inhalation experiences within one day, or duration of one inhalation experience, or the like. The charging history information of the inhalation device 100 may be, for example, information relating to charging intervals, duration of one charging session, or timings of charging within one day, or the like. The personal information of the user may be, for example, attribute information of the user such as sex or age of the user.

[0095] By taking account of this information, the management server 300A can generate, for the user authenticated by the biometric information, a more suitable substrate heating profile tailored to the user. The management server 300A is capable of providing the user with a more satisfying inhalation experience by using the generated heating profile in order to heat the substrate in the inhalation device 100.

Second Example

[0096] Fig. 5 is an explanatory diagram illustrating a second example of the inhalation device 100 according to this embodiment. As shown in fig. 5, the inhalation device 100 may send, to an external device, substrate brand information sensed from the substrate. For example, the inhalation device 100 may send brand information of the substrate to equipment 410A for selling substrates, or to a vending machine 410B.

[0097] Various brands of substrates are visibly displayed in the equipment 410A or the vending machine 410B. When the user is authenticated by means of biometric information using the inhalation device 100, and the inhalation device 100 is also connected to the equip-

ment 410A or the vending machine 410B, then the equipment 410A or the vending machine 410B may implement processing for purchase of the brand of substrate used most recently.

[0098] For example, the inhalation device 100 comprises: a sensor capable of acquiring substrate brand information by sensing the substrate; and a settlement function enabling goods or services to be purchased. By virtue of this, the inhalation device 100 is able to send, to the equipment 410A or the vending machine 410B, brand information sensed from the substrate used most recently, enabling the substrate indicated by the brand information which has been sent to be purchased from the equipment 410A or the vending machine 410B by means of the settlement function.

[0099] Furthermore, the inhalation device 100 may send the brand information sensed from the substrate used most recently to a cash processing apparatus, such as a cash register, by connecting to the cash processing apparatus. This enables the user to transmit, more efficiently, brand information of the substrate he or she wishes to purchase to a member of staff operating the cash processing apparatus.

[0100] The inhalation device 100 may also send brand information of the substrate used most recently to the terminal device 200 in the possession of the user. In such a case, the user can use the terminal device 200 in order to acquire, via the Internet, etc. stock information of substrates at a nearby sales outlet, or list information of brands of substrates on sale, or the like. By virtue of this, the user can easily ascertain the brand of substrate used by the user him or herself, and can more easily be made aware of a sales outlet selling the brand of substrate used by the user him or herself, and the stock status at the sales outlet.

Third Example

[0101] Fig. 6 is an explanatory diagram illustrating a third example of the inhalation device 100 according to this embodiment. As shown in fig. 6, the inhalation device 100 is capable of intercommunication with a storage case 420 for storing substrates.

[0102] The storage case 420 is a container for storing substrates used in the inhalation device 100. The storage case 420 is provided in such a way that it can be locked to prevent a person other than the user from removing substrates. For example, the storage case 420 may be unlocked by intercommunication with the inhalation device 100 which has authenticated the user by means of biometric information.

[0103] Alternatively, the storage case 420 may be provided so as to be capable of authenticating the user by means of biometric information using a biosensor, similarly to the inhalation device 100. In such a case, the storage case 420 may be unlocked by successful authentication of the user by means of biometric information using the storage case 420. At this time, the storage case

420 may send to the inhalation device 100 the fact that the user has been successfully authenticated by the biometric information, whereby user authentication by means of biometric information in the inhalation device 100 may be omitted.

[0104] By virtue of this, the user can store the substrates used with the inhalation device 100 more securely in the lockable storage case 420. This enables the user to more reliably prevent the substrates used with the inhalation device 100 from being handled by another person, or accidentally ingested, etc.

Fourth Example

[0105] Fig. 7A and 7B are explanatory diagrams illustrating a fourth example of the inhalation device 100 according to this embodiment. As shown in fig. 7A and 7B, the inhalation device 100 is capable of intercommunication with a device for managing entry to/exit from a managed space 430 inside which permission to inhale an aerosol is controlled.

[0106] The managed space 430 is an indoor space in an eatery, a store, a rest area, a dining hall, or a meeting room, etc., and permission to inhale an aerosol inside is controlled by time slot, by attributes of the user entering, or by administrator settings, or the like. User entry and exit to and from the managed space 430 is managed by authentication using a key card, for example. Furthermore, the managed space 430 is also capable of managing user entry and exit for a user possessing an inhalation device 100, by means of intercommunication with the inhalation device 100 which has authenticated the user by means of biometric information.

[0107] As shown in fig. 7A, for example, it is assumed that aerosol inhalation inside the managed space 430 is set to disabled. At this time, if authentication is performed by using the inhalation device 100 on entering the managed space 430, then the device for managing entry to/exit from the managed space 430 may lock the aerosol-generating function of the inhalation device 100. Furthermore, if authentication is performed by using the inhalation device 100 on exiting the managed space 430, then the device for managing entry to/exit from the managed space 430 may unlock the aerosol-generating function of the inhalation device 100. Furthermore, as another example, if authentication is performed by using the inhalation device 100 on entering the managed space 430, then the device for managing entry to/exit from the managed space 430 may deny entry to an inhaling person S who is the user of the inhalation device 100.

[0108] By virtue of this, the device for managing entry to/exit from the managed space 430 is capable of physically preventing aerosol inhalation inside the managed space 430. The device for managing entry to/exit from the managed space 430 can therefore put into effect a setting to disable aerosol inhalation inside the managed space 430.

[0109] Meanwhile, as shown in fig. 7B, it is assumed

that aerosol inhalation inside the managed space 430 is set to enabled. At this time, if authentication is performed by using the inhalation device 100 on entering the managed space 430, then the device for managing entry to/exit from the managed space 430 may permit entry to the inhaling person S who is the user of the inhalation device 100, without locking the aerosol-generating function of the inhalation device 100. Meanwhile, if a user who does not wish to inhale an aerosol has been authenticated to enter the managed space 430, then the device for managing entry to/exit from the managed space 430 may notify the relevant user that the managed space 430 is set so that aerosol inhalation is allowed inside. Furthermore, as another example, if a user who does not wish to inhale an aerosol has been authenticated to enter the managed space 430, then the device for managing entry to/exit from the managed space 430 may deny entry to the managed space 430 to the relevant user.

[0110] By virtue of this, the device for managing entry to/exit from the managed space 430 is capable of suitably managing entry and exit of the inhaling person S who is the user of the inhalation device 100, when permission to inhale an aerosol inside the managed space 430 is controlled. The device for managing entry to/exit from the managed space 430 can therefore prevent persons not wishing to inhale an aerosol from unintentionally passively inhaling the aerosol inside the managed space 430.

[0111] Preferred embodiments of the present disclosure were described in detail above with reference to the appended drawings, but the technical scope of the present disclosure is not limited to such examples. It is obvious that a person having ordinary knowledge in the technical field of the present disclosure will be able to conceive of a number of variant examples or modified examples within the scope of the technical concept disclosed in the claims, and any such variant examples or modified examples are naturally understood to fall within the technical scope of the present disclosure.

[0112] Furthermore, the series of processes performed by each device described in the present description may be realized by using software, hardware, or any combination of software and hardware. Programs constituting the software are prestored on a recording medium (non-transitory medium) provided internally or externally to each device, for example. When the programs constituting the software are executed by computer, for example, the programs are read into a RAM and executed by means of a processor such as a CPU. The recording medium in which the programs are stored may be, for example, a magnetic disk, an optical disk, a magneto-optical disk, or a flash memory, etc. Furthermore, the programs may be distributed via a network, for example, rather than being stored on a recording medium.

[0113] The following configurations also fall within the technical scope of the present disclosure.

(1) An aerosol-generating device comprising:

a biosensor for acquiring biometric information of a user;
 a communication unit for sending the biometric information to a server and for receiving, from the server, association information indicating that the biometric information which was sent is associated with personal information of the user stored in the server;
 an authentication unit for authenticating the user by matching the biometric information of the user authenticated by the association information with the biometric information acquired by the biosensor; and
 a device control unit for unlocking an aerosol-generating function when the user has been successfully authenticated.

(2) The aerosol-generating device as disclosed in (1) above,

further comprising a non-volatile memory unit for storing the biometric information of the user authenticated by the association information, wherein the biometric information is written to the memory unit only while there is a connection with the server.

(3) The aerosol-generating device as disclosed in (2) above, wherein

the memory unit stores the biometric information of a plurality of individuals, including the user, who have each been authenticated by the association information, and the authentication unit authenticates the plurality of individuals by using the biometric information of the plurality of individuals stored in the memory unit.

(4) The aerosol-generating device as disclosed in (3) above, wherein the device control unit unlocks the aerosol-generating function when each of the plurality of individuals including the user has been successfully authenticated.

(5) The aerosol-generating device as disclosed in (3) or (4) above, wherein the device control unit outputs a notification to a terminal device in the possession of the user when a predetermined individual different from the user has been successfully authenticated.

(6) The aerosol-generating device as disclosed in any one of (1) to (5) above, wherein, when new biometric information is acquired by the biosensor in a state in which the user has been successfully authenticated, the authentication unit treats the new biometric information as the biometric information of

a temporarily authenticated individual, and the device control unit unlocks the aerosol-generating function when there has been successful authentication resulting from matching the biometric information of the temporarily authenticated individual with the biometric information acquired by the biosensor.

(7) The aerosol-generating device as disclosed in (6) above, wherein the authentication unit treats the new biometric information as the biometric information of the temporarily authenticated individual only for a predetermined period of time starting from the time at which the new biometric information was acquired.

(8) The aerosol-generating device as disclosed in (6) or (7) above, wherein the authentication unit treats the new biometric information as the biometric information of the temporarily authenticated individual only within a predetermined range around a position at which the new biometric information was acquired.

(9) The aerosol-generating device as disclosed in any one of (1) to (8) above, wherein the device control unit locks the aerosol-generating function when the aerosol-generating function has not been used for a predetermined period of time.

(10) The aerosol-generating device as disclosed in any one of (1) to (9) above, wherein the communication unit sends/receives data directly to/from the server.

(11) The aerosol-generating device as disclosed in any one of (1) to (10) above, wherein the communication unit sends/receives data to/from the server via a terminal device in the possession of the user.

(12) The aerosol-generating device as disclosed in any one of (1) to (11) above, wherein the biometric information is information relating to a fingerprint.

(13) An authentication method for aerosol-generating device, the authentication method comprising:

a step of acquiring biometric information of a user by means of a biosensor;
 a step of sending the biometric information to a server;
 a step of receiving, from the server, association information indicating that the biometric information which was sent is associated with personal information of the user stored in the server;
 a step of authenticating the user by matching the biometric information of the user authenticated by the association information with the biometric information acquired by the biosensor; and
 a step of unlocking an aerosol-generating function when the user has been successfully authenticated.

REFERENCE SIGNS LIST

[0114]

1 System
 100 Inhalation device
 114 Memory unit
 115 Communication unit
 161 Biosensor
 162 Authentication unit
 163 Device control unit
 200 Terminal device
 300 Server
 310 Association unit
 314 Memory unit
 315 Communication unit
 300A Management server
 410A Equipment
 410B Vending machine
 420 Storage case
 430 Management space

Claims

1. An aerosol-generating device comprising:

a biosensor for acquiring biometric information of a user;
 a communication unit for sending the biometric information to a server and for receiving, from the server, association information indicating that the biometric information which was sent is associated with personal information of the user stored in the server;
 an authentication unit for authenticating the user by matching the biometric information of the user authenticated by the association information with the biometric information acquired by the biosensor; and
 a device control unit for unlocking an aerosol-generating function when the user has been successfully authenticated.

2. The aerosol-generating device as claimed in claim 1,

further comprising a non-volatile memory unit for storing the biometric information of the user authenticated by the association information, wherein
 the biometric information is written to the memory unit only while there is a connection with the server.

3. The aerosol-generating device as claimed in claim 2, wherein

the memory unit stores the biometric information of a plurality of individuals, including the user, who have each been authenticated by the association information, and
 the authentication unit authenticates the plural-

ity of individuals by using the biometric information of the plurality of individuals stored in the memory unit.

5 4. The aerosol-generating device as claimed in claim 3, wherein the device control unit unlocks the aerosol-generating function when each of the plurality of individuals including the user has been successfully authenticated.

10 5. The aerosol-generating device as claimed in claim 3 or 4, wherein the device control unit outputs a notification to a terminal device in the possession of the user when a predetermined individual different from the user has been successfully authenticated.

15 6. The aerosol-generating device as claimed in any one of claims 1 to 5, wherein, when new biometric information is acquired by the biosensor in a state in which the user has been successfully authenticated, the authentication unit treats the new biometric information as the biometric information of a temporarily authenticated individual, and
 the device control unit unlocks the aerosol-generating function when there has been successful authentication resulting from matching the biometric information of the temporarily authenticated individual with the biometric information acquired by the biosensor.

30 7. The aerosol-generating device as claimed in claim 6, wherein the authentication unit treats the new biometric information as the biometric information of the temporarily authenticated individual only for a predetermined period of time starting from the time at which the new biometric information was acquired.

35 8. The aerosol-generating device as claimed in claim 6 or 7, wherein the authentication unit treats the new biometric information as the biometric information of the temporarily authenticated individual only within a predetermined range around a position at which the new biometric information was acquired.

40 9. The aerosol-generating device as claimed in any one of claims 1 to 8, wherein the device control unit locks the aerosol-generating function when the aerosol-generating function has not been used for a predetermined period of time.

50 10. The aerosol-generating device as claimed in any one of claims 1 to 9, wherein the communication unit sends/receives data directly to/from the server.

55 11. The aerosol-generating device as claimed in any one of claims 1 to 10, wherein the communication unit sends/receives data to/from the server via a terminal device in the possession of the user.

12. The aerosol-generating device as claimed in any one of claims 1 to 11, wherein the biometric information is information relating to a fingerprint.

13. An authentication method for an aerosol-generating device, the authentication method comprising:

a step of acquiring biometric information of a user by means of a biosensor;
a step of sending the biometric information to a server;
a step of receiving, from the server, association information indicating that the biometric information which was sent is associated with personal information of the user stored in the server;
a step of authenticating the user by matching the biometric information of the user authenticated by the association information with the biometric information acquired by the biosensor; and
a step of unlocking an aerosol-generating function when the user has been successfully authenticated.

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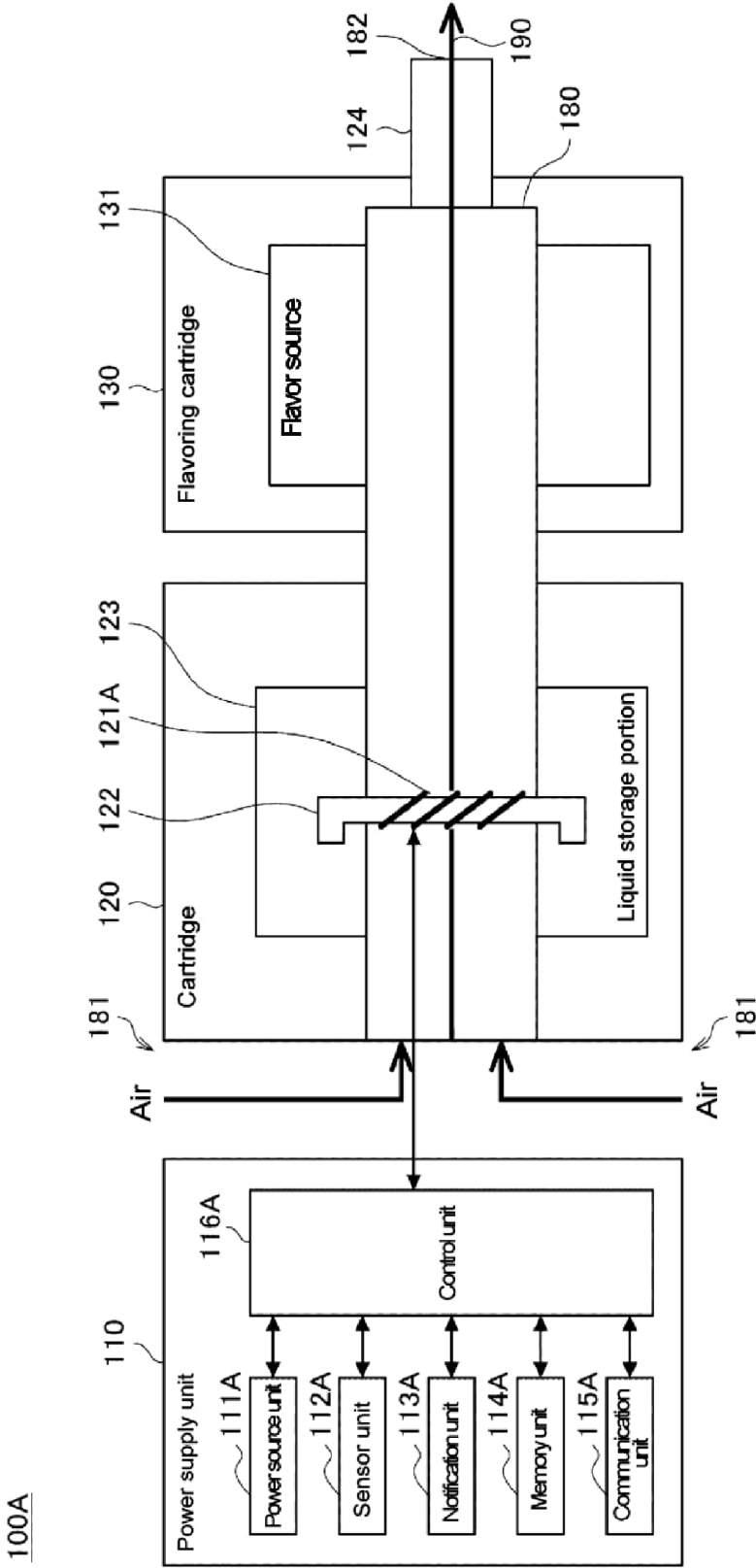
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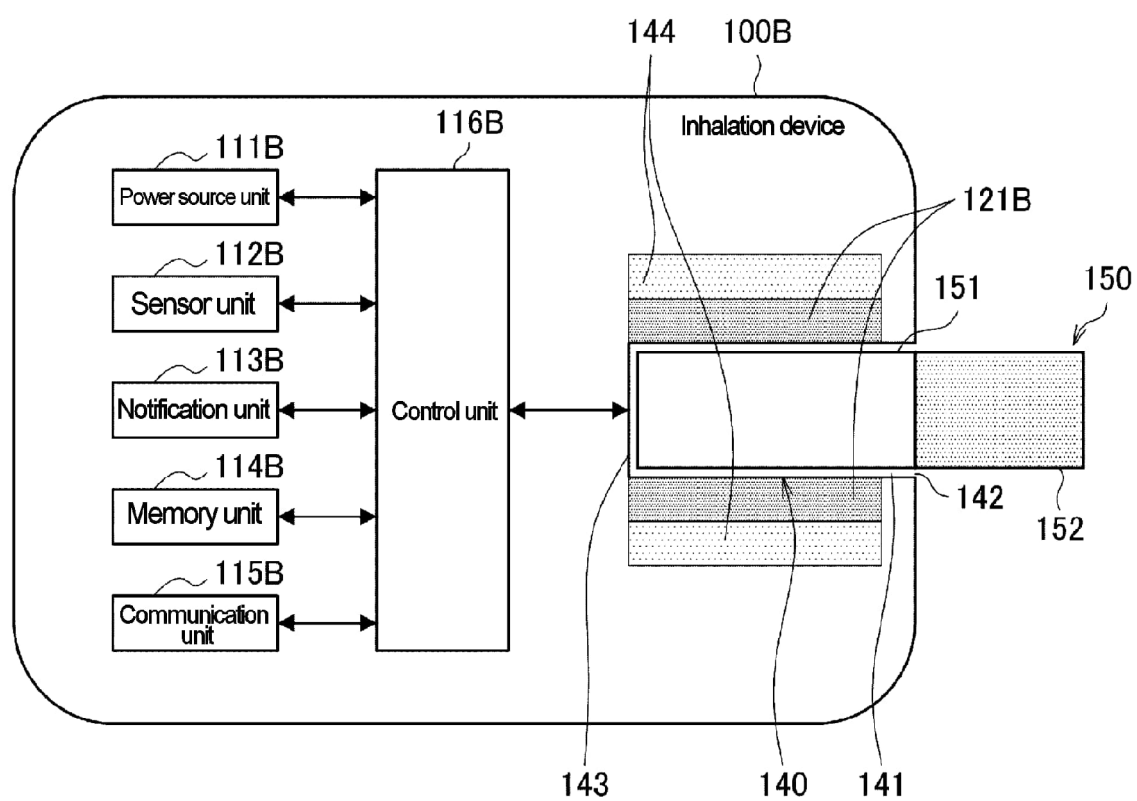
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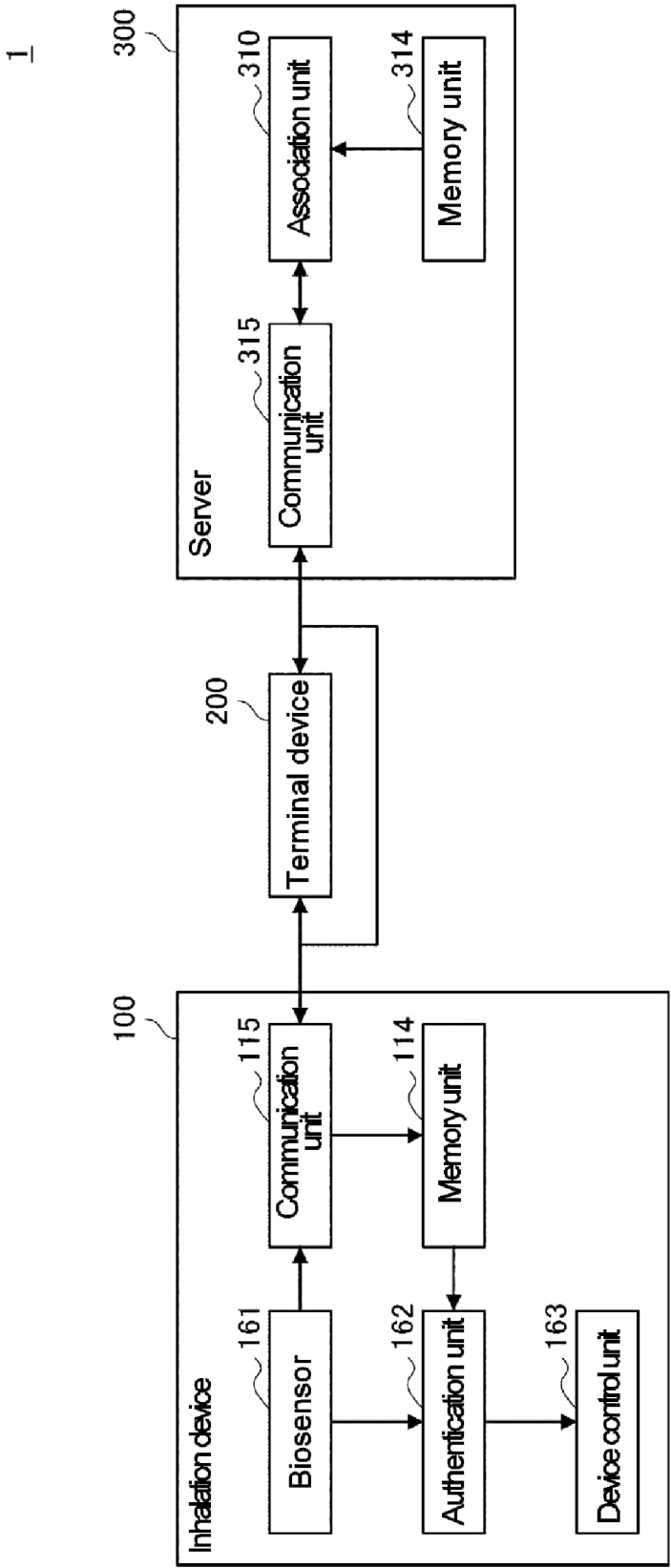
[Fig. 1]



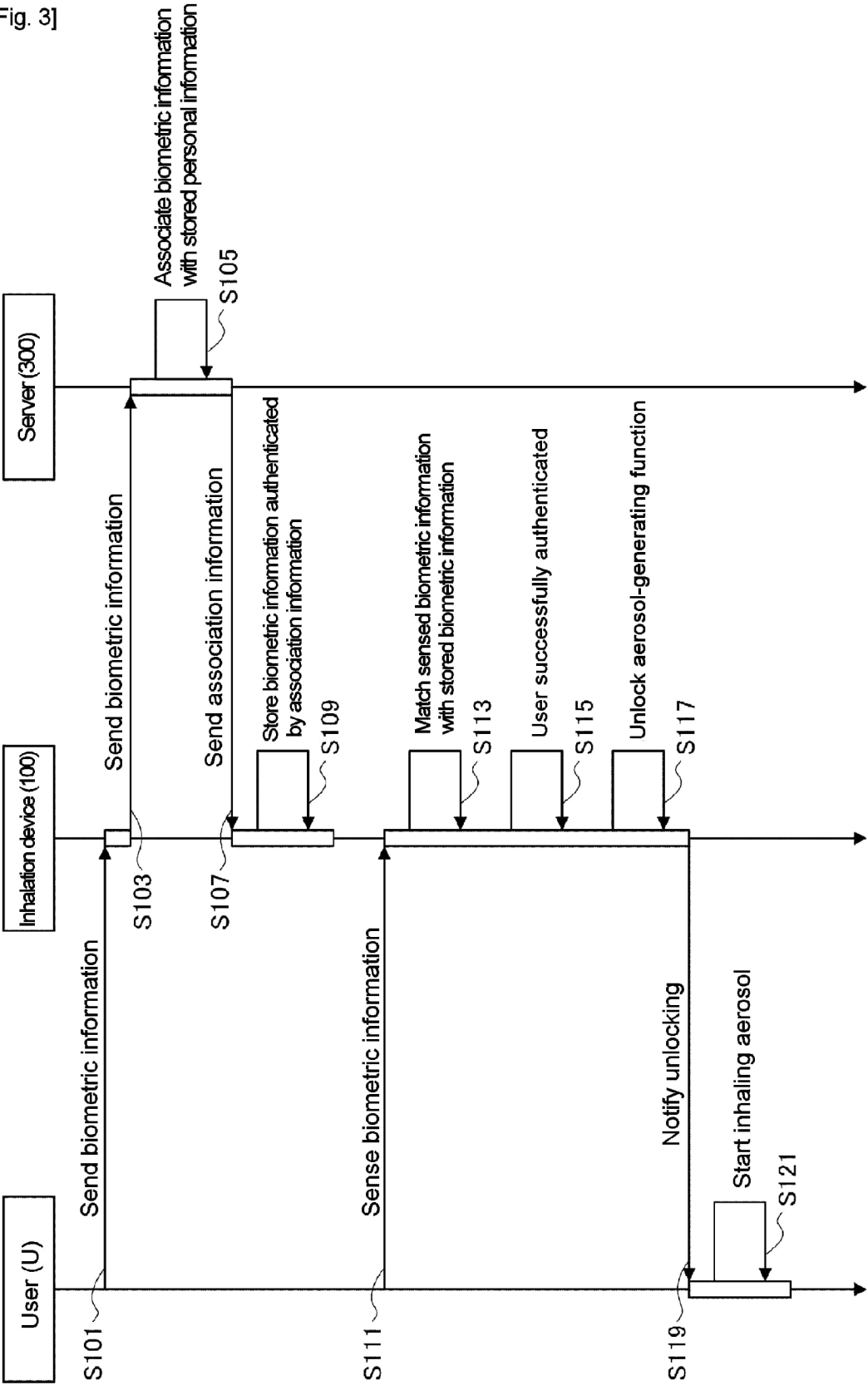
[Fig. 1B]



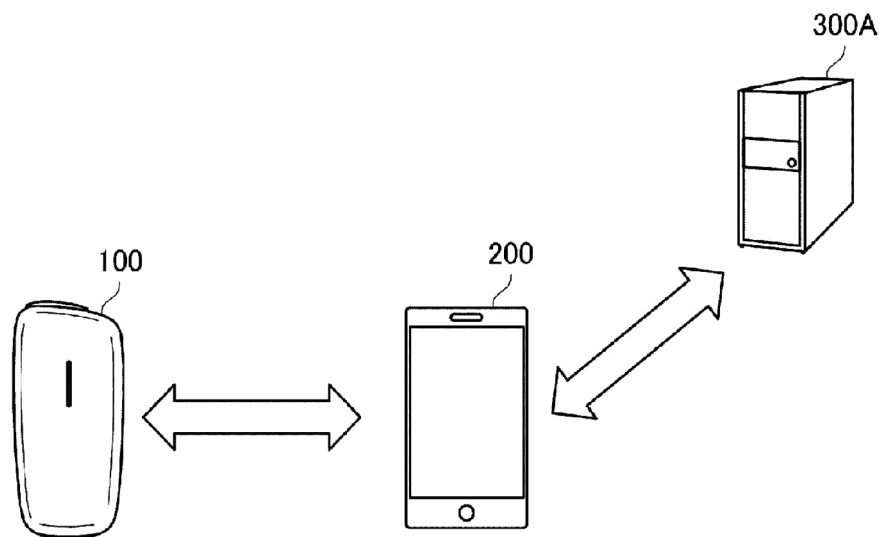
[Fig. 2]



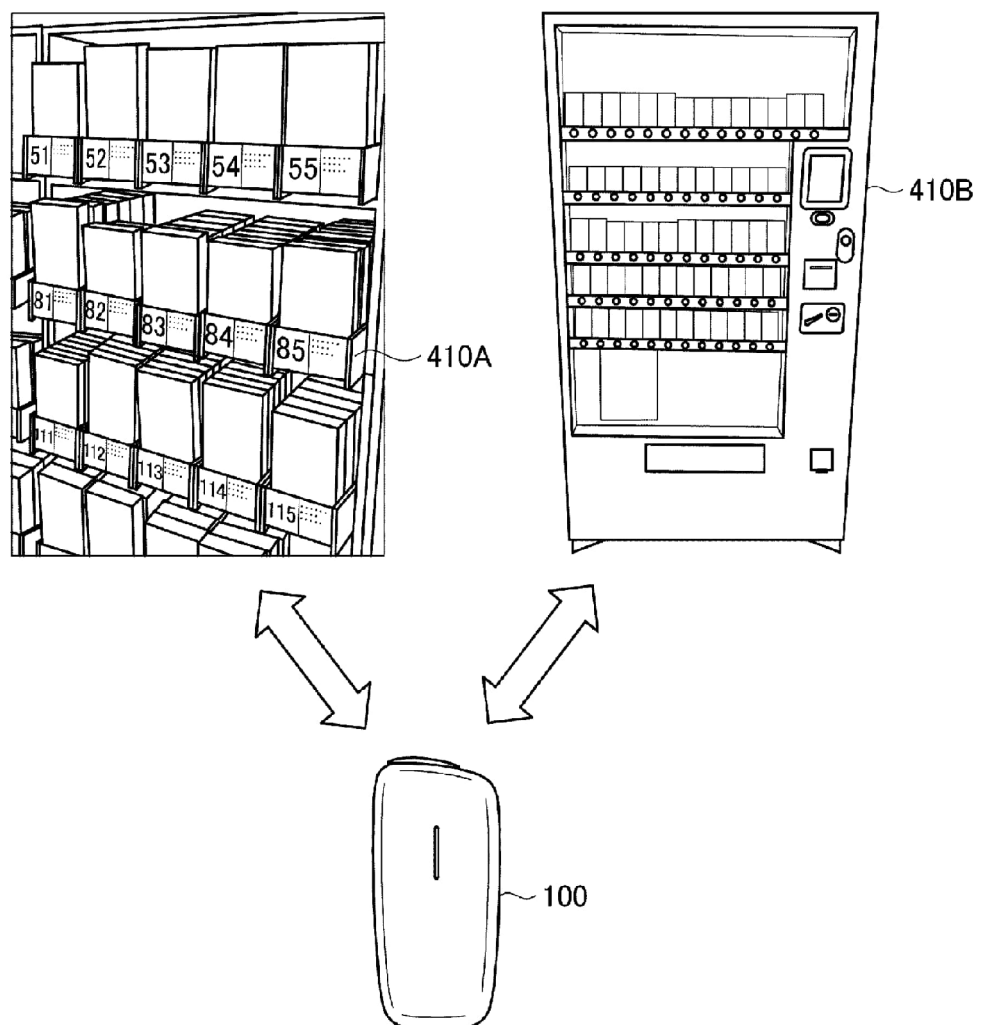
[Fig. 3]



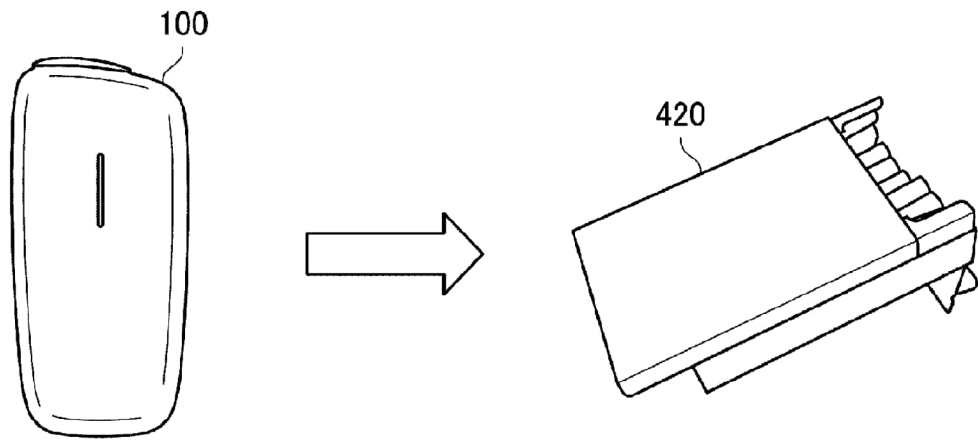
[Fig. 4]



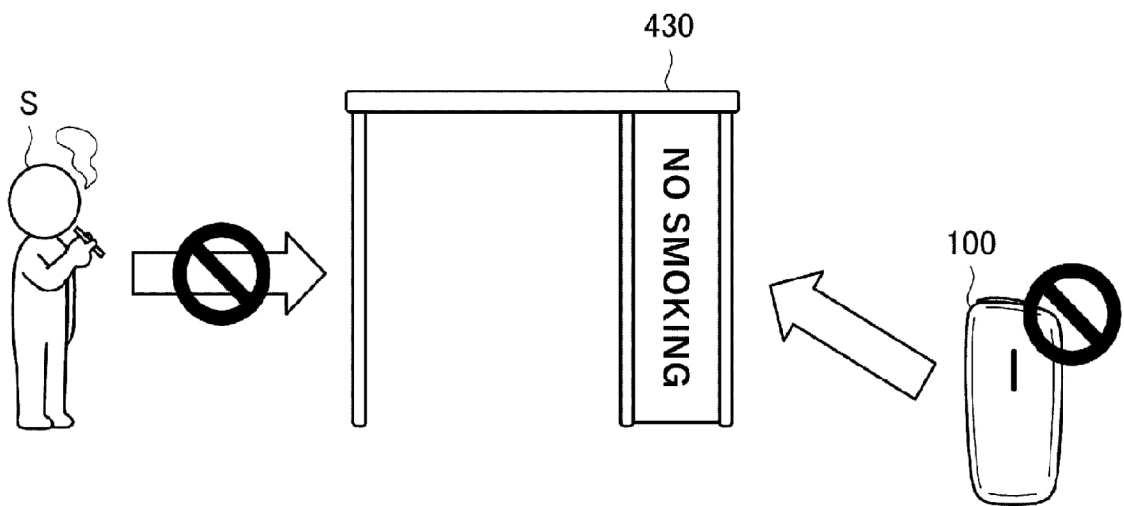
[Fig. 5]



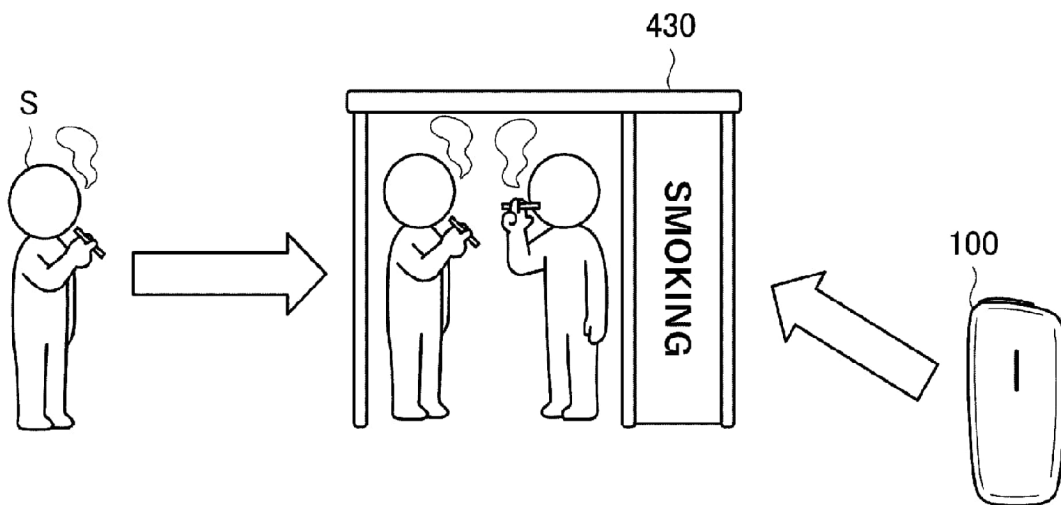
[Fig. 6]



[Fig. 7A]



[Fig. 7B]



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2023/031291

A. CLASSIFICATION OF SUBJECT MATTER

A24F 40/65(2020.01)i; A24F 40/50(2020.01)i

FI: A24F40/65; A24F40/50

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A24F40/65; A24F40/50

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

Published examined utility model applications of Japan 1922-1996

Published unexamined utility model applications of Japan 1971-2023

Registered utility model specifications of Japan 1996-2023

Published registered utility model applications of Japan 1994-2023

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 2020-195347 A (SMK K.K.) 10 December 2020 (2020-12-10) paragraphs [0024]-[0111], fig. 1-7	1-2, 10-13
Y		3, 9
A		4-8
Y	JP 2023-521067 A (KT&G CORPORATION) 23 May 2023 (2023-05-23) paragraph [0095], fig. 4	3
Y	WO 2023/021567 A1 (JAPAN TOBACCO INC.) 23 February 2023 (2023-02-23) paragraphs [0029], [0046], fig. 5	9
A	JP 2023-524770 A (PHILIP MORRIS PRODUCTS S.A.) 13 June 2023 (2023-06-13) entire text, all drawings	1-13
A	JP 2018-520663 A (PHILIP MORRIS PRODUCTS S.A.) 02 August 2018 (2018-08-02) entire text, all drawings	1-13

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

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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"E" earlier application or patent but published on or after the international filing date	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
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"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

11 October 2023

Date of mailing of the international search report

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Japan Patent Office (ISA/JP)
3-4-3 Kasumigaseki, Chiyoda-ku, Tokyo 100-8915
Japan

Authorized officer

Telephone No.

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/JP2023/031291

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REFERENCES CITED IN THE DESCRIPTION

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