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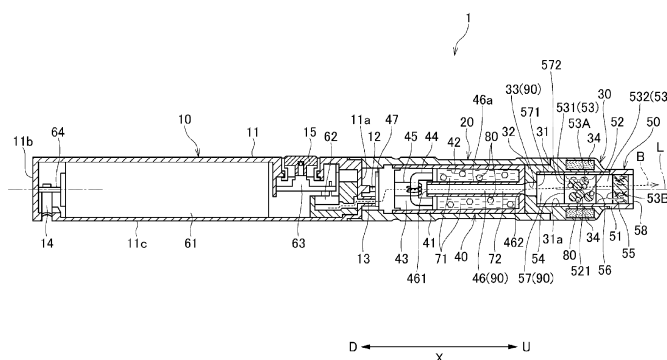
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(54) **AEROSOL GENERATOR**

(57) Provided is an aerosol generator capable of stably supplying an appropriate amount of menthol to a user. An aerosol aspirator (1) has a storage chamber (42) for storing an aerosol source (71), a heating chamber (43) for generating an aerosol (72), and a capsule (50) having an accommodation chamber (53) for accommodating a flavor source (52). The heating chamber (43) accommodates a wick (44) that is held in the heating chamber (43) and transports the aerosol source (71) stored in the storage chamber (42) to the heating chamber (43), and a

first load (45) that heats the aerosol source (71) held in the wick (44). The aerosol source (71) and the flavor source (52) both include menthol (80). The aerosol aspirator (1) is provided with an aerosol flow path (90) that connects the heating chamber (43) and the accommodation chamber (53) and transports the aerosol source (71) vaporized and/or atomized by the first load (45) in the heating chamber (43) to the accommodation chamber (53).

FIG. 3



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Description

TECHNICAL FIELD

[0001] The present invention relates to an aerosol generation device.

BACKGROUND ART

[0002] Patent Literature 1 discloses an aerosol delivery system 100 (aerosol generation device) that generates an aerosol by heating an aerosol source to vaporize and/or atomize the aerosol source. In the aerosol delivery system according to Patent Literature 1, the generated aerosol flows through a second aerosol generation device 400 (accommodation chamber) in which an aerosol generation element 425 (flavor source) is accommodated, whereby a flavor component contained in the flavor source is added to the aerosol, and a user can inhale the aerosol containing the flavor component.

[0003] The aerosol delivery system described in Patent Literature 1 includes a reservoir substrate 214, a space (heating chamber) in which a liquid transport element 238 and a heat generation element 240 are accommodated, and the second aerosol generation device 400 (accommodation chamber) in which the aerosol generation element 425 is accommodated. The reservoir substrate 214 is stored with an aerosol precursor composition. The liquid transport element 238 transports and holds the aerosol precursor composition from the reservoir substrate 214 to the heating chamber. The aerosol precursor composition held in the liquid transport element 238 is heated by the heat generation element 240 and is aerosolized, passes through the aerosol generation element 425 of the second aerosol generation device 400 to be added with the flavor component, and is then supplied to the user.

[0004] In addition, Patent Literature 1 discloses that menthol may be contained in both the aerosol precursor composition and the aerosol generation element of the second aerosol generation device.

CITATION LIST

PATENT LITERATURE

[0005] Patent Literature 1: JP2019-150031A

SUMMARY OF INVENTION

TECHNICAL PROBLEM

[0006] However, Patent Literature 1 does not disclose a temperature distribution of menthol, and adsorption and desorption of the menthol in a case where both the aerosol precursor composition and the aerosol generation element 425 of the second aerosol generation device 400 contain menthol.

[0007] In the aerosol delivery system described in Patent Literature 1, the space (heating chamber) in which the liquid transport element 238 and the heat generation element 240 are accommodated and the second aerosol generation device 400 (accommodation chamber) in which the aerosol generation element 425 is accommodated are disposed so as to be partitioned by a first separation element 450 and to be adjacent to each other, so that the aerosol generation element 425 of the second aerosol generation device 400 is easily affected by heat of the heat generation element 240 from the heating chamber.

[0008] Therefore, in the aerosol delivery system 100 described in Patent Literature 1, when both the aerosol precursor composition and the aerosol generation element 425 of the second aerosol generation device 400 contain menthol, the aerosol generation element 425 of the second aerosol generation device 400 is easily affected by the heat of the heat generation element 240. When the temperature of the aerosol generation element 425 of the second aerosol generation device 400 becomes high, desorption of the menthol contained in the aerosol generation element 425 proceeds. When the desorption of the menthol contained in the aerosol generation element proceeds, there is a problem that a supply of the menthol to the user becomes unstable.

[0009] On the other hand, in the aerosol delivery system 100 described in Patent Literature 1, when the aerosol precursor composition contains menthol and the aerosol generation element 425 does not contain menthol, the menthol contained in the aerosol precursor composition is adsorbed to the aerosol generation element 425. As a result, there is a problem that an amount of menthol to be supplied to the user is reduced.

[0010] The present invention is to provide an aerosol generation device capable of stably supplying an appropriate amount of menthol to a user.

SOLUTION TO PROBLEM

[0011] A first aspect of the invention relates to an aerosol generation device including:

a storage chamber storing an aerosol source;
a heating chamber configured to heat the aerosol source; and
an accommodation portion having an accommodation chamber accommodating a flavor source therein,
the heating chamber accommodating:

at least a part of a holding portion configured to transport the aerosol source stored in the storage chamber to the heating chamber and holds the aerosol source in the heating chamber, and
at least a part of a first load configured to heat the aerosol source held by the holding portion to vaporize and/or atomize the aerosol source,

in which

the aerosol source and the flavor source each contain menthol, and
the aerosol generation device further includes an aerosol flow path connecting the heating chamber and the accommodation chamber and configured to transport the aerosol source vaporized and/or atomized by the first load in the heating chamber to the accommodation chamber.

[0012] A second aspect of the invention relates to an aerosol generation device including:

a storage chamber storing an aerosol source;
a heating chamber configured to heat the aerosol source; and
an accommodation portion having an accommodation chamber accommodating a flavor source therein,
the heating chamber accommodating:

at least a part of a holding portion configured to transport the aerosol source stored in the storage chamber to the heating chamber and holds the aerosol source in the heating chamber; and
at least a part of a first load configured to heat the aerosol source held by the holding portion to vaporize and/or atomize the aerosol source,
in which

the aerosol source and the flavor source each contain menthol, and
the heating chamber and the accommodation chamber are disposed to be physically separated from each other and/or are thermally insulated from each other, and are communicated with each other.

ADVANTAGEOUS EFFECTS OF INVENTION

[0013] According to the first aspect of the invention, both the aerosol source and the flavor source contain menthol, so that the menthol derived from the aerosol source is less likely to be adsorbed by the flavor source. As a result, an appropriate amount of menthol can be supplied to the user. Further, the aerosol source vaporized and/or atomized by the first load in the heating chamber is transported to the accommodation chamber with the temperature thereof lowered when flowing through the aerosol flow path, so that the accommodation chamber is less likely to be affected by the heat of the first load from the heating chamber. Accordingly, a rapid desorption of the menthol adsorbed to the flavor source is prevented, and thus the menthol can be stably supplied to the user. In this way, a large amount of menthol can be stably supplied to the user.

[0014] According to the second aspect of the invention, both the aerosol source and the flavor source contain

menthol, so that the menthol derived from the aerosol source is less likely to be adsorbed by the flavor source. As a result, an appropriate amount of menthol can be supplied to the user. Further, the heating chamber and the accommodation chamber are disposed to be physically separated from each other and/or are thermally insulated from each other, and are in communication with each other, so that the accommodation chamber is less likely to be affected by the heat of the first load from the heating chamber. Accordingly, a rapid desorption of the menthol adsorbed to the flavor source is prevented, and thus the menthol can be stably supplied to the user. In this way, an appropriate amount of menthol can be stably supplied to the user.

BRIEF DESCRIPTION OF DRAWINGS

[0015]

Fig. 1 is a perspective view schematically illustrating a schematic configuration of an aerosol inhaler.

Fig. 2 is another perspective view of the aerosol inhaler in Fig. 1.

Fig. 3 is a cross-sectional view of the aerosol inhaler in Fig. 1.

Fig. 4 is a perspective view of a power supply unit in the aerosol inhaler in Fig. 1.

Fig. 5 is a diagram illustrating a state where capsules are accommodated in a capsule holder in the aerosol inhaler in Fig. 1.

Fig. 6 is a schematic diagram illustrating a hardware configuration of the aerosol inhaler in Fig. 1.

Fig. 7 is a diagram illustrating a specific example of a power supply unit in Fig. 6.

Fig. 8 is a diagram illustrating an aerosol temperature during use of the aerosol inhaler in Fig. 1.

DESCRIPTION OF EMBODIMENTS

[0016] Hereinafter, an aerosol inhaler 1, which is an embodiment of an aerosol generation device of the present invention, will be described with reference to Figs. 1 to 8. The drawings are viewed in a direction of a reference numeral.

(Overview of Aerosol Inhaler)

[0017] As illustrated in Figs. 1 to 3, the aerosol inhaler 1 is an instrument for generating an aerosol without combustion, adding a flavor component to the generated aerosol, and allowing a user to inhale the aerosol containing the flavor component. As an example, the aerosol inhaler 1 has a rod shape.

[0018] The aerosol inhaler 1 includes: a power supply unit 10; a cartridge cover 20 in which a cartridge 40 storing an aerosol source 71 is accommodated; and a capsule holder 30 in which a capsule 50 including an accommodation chamber 53 that accommodates a flavor source

52 is accommodated. The power supply unit 10, the cartridge cover 20, and the capsule holder 30 are provided in this order from one end side to the other end side in a longitudinal direction of the aerosol inhaler 1. The power supply unit 10 has a substantially cylindrical shape centered on a center line L extending in the longitudinal direction of the aerosol inhaler 1. The cartridge cover 20 and the capsule holder 30 have a substantially annular shape centered on the center line L extending in the longitudinal direction of the aerosol inhaler 1. An outer peripheral surface of the power supply unit 10 and an outer peripheral surface of the cartridge cover 20 have substantially annular shapes of which the diameters are substantially the same, and the capsule holder 30 has a substantially annular shape of which the diameter is slightly smaller than that of the power supply unit 10 and the cartridge cover 20.

[0019] Hereinafter, in order to simplify and clarify descriptions in the present description and the like, the longitudinal direction of the aerosol inhaler 1 having a rod shape is defined as a first direction X. In the first direction X, for convenience, a side of the aerosol inhaler 1 where the power supply unit 10 is disposed is defined as a bottom side, and a side of the aerosol inhaler 1 where the capsule holder 30 is disposed is defined as a top side. In the drawings, the bottom side of the aerosol inhaler 1 in the first direction X is denoted by D, and the top side of the aerosol inhaler 1 in the first direction X is denoted by U.

[0020] The cartridge cover 20 has a hollow and substantially annular shape of which both end surfaces at the bottom side and the top side are opened. The cartridge cover 20 is made of a metal such as stainless steel. An end portion at the bottom side of the cartridge cover 20 is coupled to an end portion at the top side of the power supply unit 10. The cartridge cover 20 is attachable to and detachable from the power supply unit 10. The capsule holder 30 has a hollow and substantially annular shape of which both end surfaces at the bottom side and the top side are opened. The end portion at the bottom side of the capsule holder 30 is coupled to the end portion at the top side of the cartridge cover 20. The capsule holder 30 is made of a metal such as aluminum. The capsule holder 30 is attachable to and detachable from the cartridge cover 20.

[0021] The cartridge 40 has a substantially cylindrical shape and is accommodated in the cartridge cover 20. In a state where the capsule holder 30 is removed from the cartridge cover 20, the cartridge 40 can be accommodated in the cartridge cover 20 and can be taken out from an inside of the cartridge cover 20. Therefore, the aerosol inhaler 1 can be used in a manner of replacing the cartridge 40.

[0022] The capsule 50 has a substantially cylindrical shape, and is accommodated in a hollow portion of the hollow and substantially annular capsule holder 30 such that an end portion at the top side of the capsule 50 in the first direction X is exposed in the first direction X from

an end portion at the top side of the capsule holder 30. The capsule 50 is attachable to and detachable from the capsule holder 30. Therefore, the aerosol inhaler 1 can be used in a manner of replacing the capsule 50.

(Power Supply Unit)

[0023] As illustrated in Figs. 3 and 4, the power supply unit 10 includes a power supply unit case 11 that has a hollow and substantially annular shape and is centered on the center line L extending in the first direction X. The power supply unit case 11 is made of a metal such as stainless steel. The power supply unit case 11 has a top surface 11a which is an end surface at the top side of the power supply unit case 11 in the first direction X, a bottom surface 11b which is an end surface at the bottom side of the power supply unit case 11 in the first direction X, and a side surface 11c which extends in the first direction X in a substantially annular shape centered on the center line L from the top surface 11a to the bottom surface 11b.

[0024] Discharge terminals 12 are provided on the top surface 11a of the power supply unit case 11. The discharge terminals 12 are provided so as to protrude from the top surface 11a of the power supply unit case 11 toward the top side in the first direction X.

[0025] An air supply portion 13 that supplies air to a heating chamber 43 of the cartridge 40 to be described later is provided on the top surface 11a in the vicinity of the discharge terminals 12. The air supply portion 13 is provided so as to protrude from the top surface 11a of the power supply unit case 11 toward the top side in the first direction X.

[0026] A charging terminal 14 that can be electrically connected to an external power supply (not illustrated) is provided on the side surface 11c of the power supply unit case 11. According to the present embodiment, the charging terminal 14 is provided on the side surface 11c in the vicinity of the bottom surface 11b, and is, for example, a receptacle to which a universal serial bus (USB) terminal, a micro USB terminal, or the like can be connected.

[0027] The charging terminal 14 may be a power receiving unit capable of receiving power transmitted from the external power supply in a wireless manner. In such a case, the charging terminal 14 (power receiving unit) may be implemented by a power receiving coil. A wireless power transfer (WPT) system may be an electromagnetic induction system, a magnetic resonance system, or a combination of an electromagnetic induction system and a magnetic resonance system. In addition, the charging terminal 14 may be a power receiving unit capable of receiving power transmitted from the external power supply in a contactless manner. As another example, the charging terminal 14 may include both the above-described power receiving unit and the receptacle to which a USB terminal, a micro USB terminal, or the like can be connected.

[0028] An operation unit 15 that can be operated by a user is provided on the side surface 11c of the power supply unit case 11. The operation unit 15 is provided on the side surface 11c in the vicinity of the top surface 11a. According to the present embodiment, the operation unit 15 is provided at a position about 180 degrees away from the charging terminal 14 centered on the center line L when viewed from the first direction X. According to the present embodiment, the operation unit 15 is a push button type switch having a circular shape when the side surface 11c of the power supply unit case 11 is viewed from the outside. The operation unit 15 may have a shape other than the circular shape, or may be implemented by a switch other than a push button type switch, a touch panel, or the like.

[0029] The power supply unit case 11 is provided with a notification unit 16 that notifies various kinds of information. The notification unit 16 includes a light emitting element 161 and a vibration element 162 (see Fig. 6). According to the present embodiment, the light emitting element 161 is provided inside the power supply unit case 11 of the operation unit 15. The periphery of the circular operation unit 15 is translucent when the side surface 11c of the power supply unit case 11 is viewed from the outside, and is implemented to be turned on by the light emitting element 161. According to the present embodiment, the light emitting element 161 is capable of emitting red light, green light, blue light, white light, and purple light.

[0030] The power supply unit case 11 is provided with an air intake port (not illustrated) through which outside air is taken into the power supply unit case 11. The air intake port may be provided around the charging terminal 14, may be provided in the periphery of the operation unit 15, or may be provided in the power supply unit case 11 at a position away from the charging terminal 14 and the operation unit 15. The air intake port may be provided in the cartridge cover 20. The air intake ports may be provided at two or more positions among the above-described positions.

[0031] In a hollow portion of the power supply unit case 11 having a hollow and substantially annular shape, a power supply 61, an inhalation sensor 62, a micro controller unit (MCU) 63, and a charging integrated circuit (IC) 64 are accommodated. Inside the power supply unit case 11, a low drop out (LDO) regulator 65, a DC/DC converter 66, a first temperature detection element 67 including a voltage sensor 671 and a current sensor 672, and a second temperature detection element 68 including a voltage sensor 681 and a current sensor 682 are further accommodated (see Figs. 6 and 7).

[0032] The power supply 61 is a chargeable and dischargeable power storage device such as a secondary battery or an electric double layer capacitor, and is preferably a lithium ion secondary battery. An electrolyte of the power supply 61 may include one of a gel-like electrolyte, an electrolytic solution, a solid electrolyte, and an ionic liquid, or a combination thereof.

[0033] The inhalation sensor 62 is provided in the vicinity of the operation unit 15. The inhalation sensor 62 is a pressure sensor that detects a puff (inhalation) operation. The inhalation sensor 62 is implemented to output a value of a change in pressure (internal pressure) inside the power supply unit 10, the change is caused by an inhalation of a user through an inhalation port 58 of the capsule 50 to be described later. The inhalation sensor 62 outputs, for example, an output value (for example, a voltage value or a current value) corresponding to the internal pressure that changes according to a flow rate (that is, the puff operation of the user) of the air inhaled from the air intake port toward the inhalation port 58 of the capsule 50. The inhalation sensor 62 may output an analog value, or may output a digital value converted from the analog value.

[0034] In order to compensate for a pressure to be detected, the inhalation sensor 62 may include a built-in temperature sensor that detects a temperature (outside air temperature) of an environment in which the power supply unit 10 is placed. The inhalation sensor 62 may be implemented by a condenser microphone, a flow rate sensor, or the like instead of a pressure sensor.

[0035] The MCU 63 is an electronic component that performs various controls of the aerosol inhaler 1. Specifically, the MCU 63 is mainly implemented by a processor, and further includes a memory 63a implemented by a storage medium such as a random access memory (RAM) necessary for an operation of the processor and a read only memory (ROM) for storing various kinds of information (see Fig. 6). Specifically, the processor in the present description is an electric circuit in which circuit elements such as semiconductor elements are combined.

[0036] When a puff operation is performed and an output value of the inhalation sensor 62 exceeds a threshold value, the MCU 63 determines that an aerosol generation request has been made, and thereafter, when the output value of the inhalation sensor 62 is smaller than the threshold value, the MCU 63 determines that the aerosol generation request has ended. In this way, the output value of the inhalation sensor 62 is used as a signal indicating an aerosol generation request. Therefore, the inhalation sensor 62 constitutes a sensor that outputs an aerosol generation request. The inhalation sensor 62 may perform the above-described determination instead of the MCU 63, and the MCU 63 may receive a digital value corresponding to a determination result from the inhalation sensor 62. As a specific example, the inhalation sensor 62 may output a high-level signal when it is determined that the aerosol generation request has been made, and the inhalation sensor 62 may output a low-level signal when it is determined that the aerosol generation request has ended. The threshold value for the MCU 63 or the inhalation sensor 62 to determine that the aerosol generation request has been made may be different from the threshold value for the MCU 63 or the inhalation sensor 62 to determine that the aerosol gen-

eration request has ended.

[0037] The MCU 63, instead of the inhalation sensor 62, may detect the aerosol generation request based on an operation of the operation unit 15. For example, the MCU 63 may be configured such that when the user performs a predetermined operation on the operation unit 15 in order to start inhalation of aerosol, the operation unit 15 outputs a signal indicating an aerosol generation request to the MCU 63. In this case, the operation unit 15 constitutes a sensor that outputs an aerosol generation request.

[0038] The charging IC 64 is provided in the vicinity of the charging terminal 14. The charging IC 64 performs charging control of the power supply 61 by controlling a power that is input from the charging terminal 14 and is charged into the power supply 61. The charging IC 64 may be disposed in the vicinity of the MCU 63.

(Cartridge)

[0039] As illustrated in Fig. 3, the cartridge 40 includes a cartridge case 41 having a substantially cylindrical shape whose longitudinal direction is an axial direction. The cartridge case 41 is made of a resin such as polycarbonate. A storage chamber 42 that stores the aerosol source 71 and the heating chamber 43 that heats the aerosol source 71 are formed inside the cartridge case 41. The heating chamber 43 accommodates a wick 44 that transports the aerosol source 71 stored in the storage chamber 42 to the heating chamber 43 and holds the aerosol source 71 in the heating chamber 43, and a first load 45 that heats the aerosol source 71 held in the wick 44 to vaporize and/or atomize the aerosol source 71. The cartridge 40 further includes a first aerosol flow path 46 through which the aerosol source 71 that is vaporized and/or atomized by being heated by the first load 45 is aerosolized and then is transported from the heating chamber 43 toward the capsule 50.

[0040] The storage chamber 42 and the heating chamber 43 are formed adjacent to each other in the longitudinal direction of the cartridge 40. The heating chamber 43 is formed on one end side in the longitudinal direction of the cartridge 40, and the storage chamber 42 is formed to be adjacent to the heating chamber 43 in the longitudinal direction of the cartridge 40 and to extend to an end portion on the other end side in the longitudinal direction of the cartridge 40. A connection terminal 47 is provided on an end surface on one end side in the longitudinal direction of the cartridge case 41, that is, an end surface of the cartridge case 41 on a side where the heating chamber 43 is disposed in the longitudinal direction of the cartridge 40.

[0041] The storage chamber 42 has a hollow and substantially annular shape with the longitudinal direction of the cartridge 40 as the axial direction, and stores the aerosol source 71 in an annular portion. A porous body such as a resin web or cotton may be accommodated in the storage chamber 42, and the aerosol source 71 may

be impregnated in the porous body. The storage chamber 42 may store only the aerosol source 71 without accommodating the porous body such as a resin web or cotton. The aerosol source 71 contains a liquid such as glycerin and/or propylene glycol. Further, the aerosol source 71 contains menthol 80. In Fig. 3, for easy understanding of the description, the menthol 80 is illustrated in a form of particles, and in the present embodiment, the menthol 80 is dissolved in a liquid such as glycerin and/or propylene glycol. It should be noted that the menthol 80 illustrated in Fig. 3 and the like is merely a simulation, and positions and quantities of the menthol 80 in the storage chamber 42, positions and quantities of the menthol 80 in the capsule 50, and a positional relationship between the menthol 80 and the flavor source 52 do not necessarily coincide with actual ones.

[0042] The wick 44 is a liquid holding member that draws the aerosol source 71 stored in the storage chamber 42 from the storage chamber 42 into the heating chamber 43 utilizing a capillary action and holds the aerosol source 71 in the heating chamber 43. The wick 44 is made of, for example, glass fiber or porous ceramic. The wick 44 may extend into the storage chamber 42.

[0043] The first load 45 is electrically connected to the connection terminal 47. According to the present embodiment, the first load 45 is implemented by an electric heating wire (coil) wound around the wick 44 at a predetermined pitch. The first load 45 may be an element that can heat the aerosol source 71 held by the wick 44 to vaporize and/or atomize the aerosol source 71. The first load 45 may be, for example, a heat generating element such as a heat generating resistor, a ceramic heater, or an induction heating type heater. As the first load 45, a load whose temperature and electric resistance value have a correlation is used. As the first load 45, for example, a load having a positive temperature coefficient (PTC) characteristic in which an electric resistance value increases as a temperature increases is used. Alternatively, as the first load 45, for example, a load having a negative temperature coefficient (NTC) characteristic in which an electric resistance value decreases as a temperature increases may be used. A part of the first load 45 may be provided outside the heating chamber 43.

[0044] The first aerosol flow path 46 is formed in a hollow portion of the storage chamber 42 having a hollow and substantially annular shape, and extends in the longitudinal direction of the cartridge 40. The first aerosol flow path 46 is formed by a wall portion 46a that extends in a substantially annular shape in the longitudinal direction of the cartridge 40. The wall portion 46a of the first aerosol flow path 46 is also an inner peripheral side wall portion of the storage chamber 42 having a substantially annular shape. In the first aerosol flow path 46, a first end portion 461 in the longitudinal direction of the cartridge 40 is connected to the heating chamber 43, and a second end portion 462 in the longitudinal direction of the cartridge 40 is opened to an end surface at the other end side of the cartridge case 41.

[0045] The first aerosol flow path 46 is formed such that a cross-sectional area thereof remains unchanged or increases from the first end portion 461 toward the second end portion 462 in the longitudinal direction of the cartridge 40. From the first end portion 461 toward the second end portion 462, the cross-sectional area of the first aerosol flow path 46 may increase discontinuously, or may increase continuously as illustrated in Fig. 3.

[0046] The cartridge 40 is accommodated in a hollow portion of the hollow and substantially annular cartridge cover 20 such that the longitudinal direction of the cartridge 40 coincides with the first direction X, which is the longitudinal direction of the aerosol inhaler 1. Further, the cartridge 40 is accommodated in the hollow portion of the cartridge cover 20 such that the heating chamber 43 is at the bottom side (that is, a power supply unit 10 side) of the aerosol inhaler 1 and the storage chamber 42 is at the top side (that is, a capsule 50 side) of the aerosol inhaler 1 in the first direction X.

[0047] The first aerosol flow path 46 of the cartridge 40 is formed so as to extend in the first direction X on the center line L of the aerosol inhaler 1 in a state where the cartridge 40 is accommodated inside the cartridge cover 20.

[0048] The cartridge 40 is accommodated in the hollow portion of the cartridge cover 20 so as to maintain a state where the connection terminal 47 comes into contact with the discharge terminal 12 provided on the top surface 11a of the power supply unit case 11 during use of the aerosol inhaler 1. When the discharge terminal 12 of the power supply unit 10 and the connection terminal 47 of the cartridge 40 come into contact with each other, the first load 45 of the cartridge 40 is electrically connected to the power supply 61 of the power supply unit 10 via the discharge terminal 12 and the connection terminal 47.

[0049] Further, the cartridge 40 is accommodated in the hollow portion of the cartridge cover 20 such that during use of the aerosol inhaler 1, air flowing in from the air intake port (not illustrated) provided in the power supply unit case 11 is taken into the heating chamber 43 from the air supply portion 13 provided on the top surface 11a of the power supply unit case 11 as indicated by an arrow B in Fig. 3. The arrow B is inclined with respect to the center line L in Fig. 3, but may be in the same direction as the center line L. In other words, the arrow B may be parallel to the center line L.

[0050] The first load 45 heats the aerosol source 71 held by the wick 44 without combustion using a power supplied from the power supply 61 via the discharge terminal 12 provided in the power supply unit case 11 and the connection terminal 47 provided in the cartridge 40, during use of the aerosol inhaler 1. In the heating chamber 43, the aerosol source 71 heated by the first load 45 is vaporized and/or atomized. In this case, the vaporized and/or atomized aerosol source 71 contains vaporized and/or atomized menthol 80 as well as vaporized and/or atomized glycerin and/or propylene glycol.

[0051] The aerosol source 71 vaporized and/or atomized in the heating chamber 43 aerosolizes the air taken into the heating chamber 43 from the air supply portion 13 of the power supply unit case 11 as a dispersion medium. Further, the aerosol source 71 vaporized and/or atomized in the heating chamber 43 and the air taken into the heating chamber 43 from the air supply portion 13 of the power supply unit case 11 flow through, while being further aerosolized, the first aerosol flow path 46 from the first end portion 461 of the first aerosol flow path 46 communicating with the heating chamber 43 to the second end portion 462 of the first aerosol flow path 46. A temperature of the aerosol source 71 vaporized and/or atomized in the heating chamber 43 decreases in the process of flowing through the first aerosol flow path 46, thereby promoting the aerosolization. In this way, the aerosol source 71 vaporized and/or atomized in the heating chamber 43 and the air taken into the heating chamber 43 from the air supply portion 13 of the power supply unit case 11 are used to generate an aerosol 72 in the heating chamber 43 and the first aerosol flow path 46. The aerosol 72 in the heating chamber 43 and the first aerosol flow path 46 also contains aerosolized menthol 80 derived from the aerosol source 71.

(Capsule Holder)

[0052] The capsule holder 30 includes a side wall 31 extending in the first direction X in a substantially annular shape, and has a hollow and substantially annular shape of which both end surfaces at the bottom side and the top side are opened. The side wall 31 is made of a metal such as aluminum. The end portion at the bottom side of the capsule holder 30 is coupled to an end portion at the top side of the cartridge cover 20 by screwing, engagement, or the like, and the capsule holder 30 is attachable to and detachable from the cartridge cover 20. An inner peripheral surface 31a of the substantially annular side wall 31 has an annular shape centered on the center line L of the aerosol inhaler 1, and has a diameter larger than that of the first aerosol flow path 46 of the cartridge 40 and smaller than that of the cartridge cover 20.

[0053] The capsule holder 30 includes a bottom wall 32 provided at an end portion at the bottom side of the side wall 31. The bottom wall 32 is made of, for example, a resin. The bottom wall 32 is fixed to the end portion at the bottom side of the side wall 31, and closes a hollow portion surrounded by the inner peripheral surface of the side wall 31 at the end portion at the bottom side of the side wall 31 excluding a communication hole 33 to be described later.

[0054] The bottom wall 32 is provided with the communication hole 33 penetrating the bottom wall 32 in the first direction X. The communication hole 33 is formed at a position overlapping the center line L when viewed from the first direction. In a state where the cartridge 40 is accommodated in the cartridge cover 20 and the capsule holder 30 is mounted on the cartridge cover 20, the com-

munication hole 33 is formed such that the first aerosol flow path 46 of the cartridge 40 is located inside the communication hole 33 when viewed from the top side in the first direction X.

[0055] A second load 34 may be provided on the side wall 31 of the capsule holder 30. The second load 34 may be provided at a position separated from both the end portion on the bottom side and the end portion on the top side of the side wall 31. The second load 34 may be provided on the bottom side of the side wall 31. In other words, the second load 34 may not be provided on the top side of the side wall 31 in contact with the capsule 50. The second load 34 has an annular shape along the substantially annular side wall 31, and extends in the first direction X. The second load 34 heats the accommodation chamber 53 of the capsule 50 to heat the flavor source 52 accommodated in the accommodation chamber 53. The second load 34 may be an element capable of heating the flavor source 52 by heating the accommodation chamber 53 of the capsule 50. The second load 34 may be, for example, a heat generating element such as a heat generating resistor, a ceramic heater, or an induction heating type heater. As the second load 34, a load whose temperature and electric resistance value have a correlation is used. As the second load 34, for example, a load having a positive temperature coefficient (PTC) characteristic in which an electric resistance value increases as a temperature increases is used. Alternatively, as the second load 34, for example, a load having a negative temperature coefficient (NTC) characteristic in which an electric resistance value decreases as a temperature increases may be used. In a state where the cartridge cover 20 is mounted on the power supply unit 10 and the capsule holder 30 is mounted on the cartridge cover 20, the second load 34 is electrically connected to the power supply 61 of the power supply unit 10.

(Capsule)

[0056] The capsule 50 has a substantially cylindrical shape and includes a side wall 51 that is opened at both end surfaces and extends in a substantially annular shape. The side wall 51 is made of a resin such as plastic. The side wall 51 has a substantially annular shape having a diameter slightly smaller than that of the inner peripheral surface 31a of the side wall 31 of the capsule holder 30.

[0057] The capsule 50 includes the accommodation chamber 53 in which the flavor source 52 is accommodated. As illustrated in Fig. 3, the accommodation chamber 53 may be formed in an internal space of the capsule 50 surrounded by the side wall 51. Alternatively, the entire internal space of the capsule 50 excluding an outlet portion 55 to be described later may be the accommodation chamber 53.

[0058] The accommodation chamber 53 includes: an inlet portion 54 provided at one end side in a cylindrical axis direction of the capsule 50 extending in a substan-

tially cylindrical shape; and the outlet portion 55 provided at the other end side in the cylindrical axis direction of the capsule 50. According to the present embodiment, the flavor source 52 includes the menthol 80 and tobacco granules 521 obtained by molding a tobacco raw material into granules. Specifically, in the flavor source 52, the menthol 80 is adsorbed to the tobacco granules 521. The flavor source 52 may include cut tobacco instead of the tobacco granules 521. In addition, instead of the tobacco granules 521, the flavor source 52 may include a plant (for example, mint, Chinese herb, and herb) other than tobacco. The flavor source 52 may be added with another flavor in addition to the menthol 80.

[0059] As illustrated in Fig. 3, when the accommodation chamber 53 is formed in the internal space of the capsule 50, the inlet portion 54 may be a partition wall that partitions the internal space of the capsule 50 in the cylindrical axis direction of the capsule 50 at a position separated from a bottom portion of the capsule 50 in the cylindrical axis direction of the capsule 50. The inlet portion 54 may be a mesh-like partition wall through which the flavor source 52 cannot pass and through which the aerosol 72 can pass.

[0060] When the entire internal space of the capsule 50 excluding the outlet portion 55 is the accommodation chamber 53, the bottom portion of the capsule 50 also serves as the inlet portion 54.

[0061] The outlet portion 55 is a filter member that is filled in the internal space of the capsule 50 surrounded by the side wall 51 at an end portion at the top side of the side wall 51 in the cylindrical axis direction of the capsule 50. The outlet portion 55 is a filter member through which the flavor source 52 cannot pass and through which the aerosol 72 can pass. According to the present embodiment, the outlet portion 55 is provided in the vicinity of a top portion of the capsule 50, but the outlet portion 55 may be provided at a position separated from the top portion of the capsule 50.

[0062] The accommodation chamber 53 includes a first space 531 in which the flavor source 52 is present, and a second space 532 located between the first space 531 and the outlet portion 55, adjacent to the outlet portion 55, and in which the flavor source 52 is not present. According to the present embodiment, in the accommodation chamber 53, the first space 531 and the second space 532 are formed adjacent to each other in the cylindrical axis direction of the capsule 50. One end side of the first space 531 in the cylindrical axis direction of the capsule 50 is adjacent to the inlet portion 54, and the other end side of the first space 531 in the cylindrical axis direction of the capsule 50 is adjacent to the second space 532. One end side of the second space 532 in the cylindrical axis direction of the capsule 50 is adjacent to the first space 531, and the other end side of the second space 532 in the cylindrical axis direction of the capsule 50 is adjacent to the outlet portion 55. The first space 531 and the second space 532 may be partitioned by a mesh-like partition wall 56 through which the flavor

source 52 cannot pass and through which the aerosol 72 can pass. The first space 531 and the second space 532 may be formed without using such a partition wall 56. As a specific example, the first space 531 and the second space 532 may be formed by accommodating the flavor source 52 in a pressed state in a part of the accommodation chamber 53 and making it difficult for the flavor source 52 to move in the accommodation chamber 53. As another specific example, the first space 531 and the second space 532 may be formed by allowing the flavor source 52 to freely move in the accommodation chamber 53 and the flavor source 52 moving to a bottom side of the accommodation chamber 53 due to gravity when the user performs an inhaling operation through the inhalation port 58.

[0063] As illustrated in Fig. 3, when the accommodation chamber 53 is formed in the internal space of the capsule 50, a second aerosol flow path 57 may be formed in the capsule 50 between the bottom portion of the capsule 50 and the inlet portion 54 in the cylindrical axis direction of the capsule 50.

[0064] The second aerosol flow path 57 is formed by the internal space of the capsule 50 surrounded by the side wall 51 between the bottom portion of the capsule 50 and the inlet portion 54 in the cylindrical axis direction of the capsule 50. Therefore, in the second aerosol flow path 57, a first end portion 571 in the cylindrical axis direction of the capsule 50 is opened at the bottom portion of the capsule 50, and a second end portion 572 in the cylindrical axis direction of the capsule 50 is connected to the accommodation chamber 53 at the inlet portion 54 of the accommodation chamber 53.

[0065] An opening area of the communication hole 33 provided in the bottom wall 32 of the capsule holder 30 is larger than the cross-sectional area of the first aerosol flow path 46 of the cartridge 40, and a cross-sectional area of the second aerosol flow path 57 is larger than both the cross-sectional area of the first aerosol flow path 46 of the cartridge 40 and the opening area of the communication hole 33 provided in the bottom wall 32 of the capsule holder 30. Therefore, a cross-sectional area at the second end portion 572 of the second aerosol flow path 57 connected to the accommodation chamber 53 of the capsule 50 is larger than a cross-sectional area at the first end portion 461 of the first aerosol flow path 46 connected to the heating chamber 43 of the cartridge 40. An aerosol flow path 90 in the present embodiment includes the first aerosol flow path 46, the communication hole 33, and the second aerosol flow path 57. The cross-sectional area at the first end portion 461 of the first aerosol flow path 46 connected to the heating chamber 43 is smaller than the cross-sectional area at the second end portion 462 of the first aerosol flow path 46 connected to the communication hole 33. The cross-sectional area at the first end portion 461 of the first aerosol flow path 46 connected to the heating chamber 43 is smaller than the cross-sectional area of the communication hole 33. The cross-sectional area of the communication hole 33

is smaller than the cross-sectional area of the second aerosol flow path 57. That is, in the aerosol flow path 90, the cross-sectional area at the second end portion 572 of the second aerosol flow path 57 that constitutes a second end portion connected to the accommodation chamber 53 is larger than the cross-sectional area at the first end portion 461 of the first aerosol flow path 46 that constitutes a first end portion connected to the heating chamber 43. The aerosol flow path 90 is formed such that the cross-sectional area increases from the first end portion toward the second end portion.

[0066] When the entire internal space of the capsule 50 excluding the outlet portion 55 is the accommodation chamber 53, the bottom portion of the capsule 50 serves as the inlet portion 54, and thus the second aerosol flow path 57 described above is not formed. That is, the aerosol flow path 90 in the present embodiment includes the first aerosol flow path 46 and the communication hole 33. The cross-sectional area at the first end portion 461 of the first aerosol flow path 46 connected to the heating chamber 43 is smaller than the cross-sectional area at the second end portion 462 of the first aerosol flow path 46 connected to the communication hole 33. The cross-sectional area at the first end portion 461 of the first aerosol flow path 46 connected to the heating chamber 43 is smaller than the cross-sectional area of the communication hole 33. According to the present embodiment, in the aerosol flow path 90, the cross-sectional area at the communication hole 33 that constitutes the second end portion connected to the accommodation chamber 53 is also larger than the cross-sectional area at the first end portion 461 of the first aerosol flow path 46 that constitutes the first end portion connected to the heating chamber 43. The aerosol flow path 90 is formed such that the cross-sectional area increases from the first end portion toward the second end portion.

[0067] In a state where the capsule 50 is accommodated in the capsule holder 30, a space may be formed between the bottom wall 32 of the capsule holder 30 and a bottom portion of the capsule 50. That is, the aerosol flow path 90 in the present embodiment includes the first aerosol flow path 46, the communication hole 33, and the space formed between the bottom wall 32 of the capsule holder 30 and the bottom portion of the capsule 50. The cross-sectional area at the first end portion 461 of the first aerosol flow path 46 connected to the heating chamber 43 is smaller than the cross-sectional area at the second end portion 462 of the first aerosol flow path 46 connected to the communication hole 33. The cross-sectional area at the first end portion 461 of the first aerosol flow path 46 connected to the heating chamber 43 is smaller than the cross-sectional area of the communication hole 33. The cross-sectional area of the communication hole 33 is smaller than the cross-sectional area of the space formed between the bottom wall 32 of the capsule holder 30 and the bottom portion of the capsule 50. In this case, in the aerosol flow path 90, the cross-sectional area of the space that is formed between the

bottom wall 32 of the capsule holder 30 and the bottom portion of the capsule 50 and that constitutes the second end portion connected to the accommodation chamber 53 is also larger than the cross-sectional area at the first end portion 461 of the first aerosol flow path 46 that constitutes the first end portion connected to the heating chamber 43. The aerosol flow path 90 is formed such that the cross-sectional area increases from the first end portion toward the second end portion.

[0068] The capsule 50 is accommodated in the hollow portion of the hollow and substantially annular capsule holder 30 such that the cylindrical axis direction extending in a substantially cylindrical shape is the first direction X, which is the longitudinal direction of the aerosol inhaler 1. Further, the capsule 50 is accommodated in the hollow portion of the capsule holder 30 such that the inlet portion 54 is at the bottom side (that is, a cartridge 40 side) of the aerosol inhaler 1 and the outlet portion 55 is at the top side of the aerosol inhaler 1 in the first direction X. In a state of being accommodated in the hollow portion of the capsule holder 30, the capsule 50 is accommodated in the hollow portion of the capsule holder 30 such that an end portion at the other end side of the side wall 51 is exposed in the first direction X from an end portion at the top side of the capsule holder 30. The end portion at the other end side of the side wall 51 serves as the inhalation port 58 through which the user performs an inhaling operation during use of the aerosol inhaler 1. The end portion at the other end side of the side wall 51 may have a step so as to be easily exposed in the first direction X from the end portion at the top side of the capsule holder 30.

[0069] As illustrated in Fig. 5, in a state where the capsule 50 is accommodated in the hollow portion of the cartridge cover 20 having a hollow and substantially annular shape, a part of the accommodation chamber 53 is accommodated in a hollow portion of the annular second load 34 provided in the capsule holder 30.

[0070] Returning to Fig. 3, in a state of being accommodated in the hollow portion of the cartridge cover 20 in the cylindrical axis direction of the capsule 50, the accommodation chamber 53 includes a heating region 53A in which the second load 34 of the capsule holder 30 is disposed, and a non-heating region 53B located between the heating region 53A and the outlet portion 55, adjacent to the outlet portion 55, and in which the second load 34 of the capsule holder 30 is not disposed.

[0071] According to the present embodiment, in the cylindrical axis direction of the capsule 50, the heating region 53A overlaps at least a part of the first space 531, and the non-heating region 53B overlaps at least a part of the second space 532. According to the present embodiment, in the cylindrical axis direction of the capsule 50, the first space 531 and the heating region 53A substantially coincide with each other, and the second space 532 and the non-heating region 53B substantially coincide with each other.

(Configuration of Aerosol Inhaler During Use)

[0072] The aerosol inhaler 1 implemented as described above is used in a state where the cartridge cover 20, the capsule holder 30, the cartridge 40, and the capsule 50 are mounted on the power supply unit 10. In this state, the aerosol flow path 90 is formed in the aerosol inhaler 1 by at least the first aerosol flow path 46 provided in the cartridge 40 and the communication hole 33 provided in the bottom wall 32 of the capsule holder 30. When the accommodation chamber 53 is formed in the internal space of the capsule 50 as illustrated in Fig. 3, the second aerosol flow path 57 provided in the capsule 50 also constitutes a part of the aerosol flow path 90. In a case where a space is formed between the bottom wall of the capsule holder 30 and the bottom portion of the capsule 50 when the capsule 50 is accommodated in the capsule holder 30, the space formed between the bottom wall of the capsule holder 30 and the bottom portion of the capsule 50 also constitutes a part of the aerosol flow path 90. The aerosol flow path 90 connects the heating chamber 43 of the cartridge 40 and the accommodation chamber 53 of the capsule 50, and transports the aerosol 72 generated in the heating chamber 43 from the heating chamber 43 to the accommodation chamber 53.

[0073] When the user performs an inhaling operation through the inhalation port 58 during use of the aerosol inhaler 1, air flowing in from the air intake port (not illustrated) provided in the power supply unit case 11 is taken into the heating chamber 43 of the cartridge 40 from the air supply portion 13 provided on the top surface 11a of the power supply unit case 11, as indicated by the arrow B in Fig. 3. Further, the first load 45 generates heat, the aerosol source 71 held by the wick 44 is heated, and the aerosol source 71 heated by the first load 45 is vaporized and/or atomized in the heating chamber 43. The aerosol source 71 vaporized and/or atomized by the first load 45 aerosolizes the air taken into the heating chamber 43 from the air supply portion 13 of the power supply unit case 11 as a dispersion medium. The aerosol source 71 vaporized and/or atomized in the heating chamber 43 and the air taken into the heating chamber 43 from the air supply portion 13 of the power supply unit case 11 flow through, while being further aerosolized, the first aerosol flow path 46 from the first end portion 461 of the first aerosol flow path 46 communicating with the heating chamber 43 to the second end portion 462 of the first aerosol flow path 46. The aerosol 72 generated in this manner is introduced from the second end portion 462 of the first aerosol flow path 46 into the accommodation chamber 53 through the inlet portion 54 of the capsule 50 by passing through the communication hole 33 provided in the bottom wall 32 of the capsule holder 30. According to the embodiment, before being introduced into the accommodation chamber 53, the aerosol 72 flows through the second aerosol flow path 57 provided in the capsule 50 or flows through the space formed between the bottom wall of the capsule holder 30 and the

bottom portion of the capsule 50.

[0074] When flowing through the accommodation chamber 53 in the first direction X of the aerosol inhaler 1 from the inlet portion 54 to the outlet portion 55, the aerosol 72 introduced into the accommodation chamber 53 through the inlet portion 54 passes through the flavor source 52 accommodated in the first space 531 so as to be added with a flavor component from the flavor source 52.

[0075] In this way, the aerosol 72 flows through the accommodation chamber 53 in the first direction X of the aerosol inhaler 1 from the inlet portion 54 to the outlet portion 55. Therefore, according to the present embodiment, in the accommodation chamber 53, a flow direction of the aerosol 72 in which the aerosol 72 flows from the inlet portion 54 to the outlet portion 55 is the cylindrical axis direction of the capsule 50, and is the first direction X of the aerosol inhaler 1.

[0076] Further, during use of the aerosol inhaler 1, the second load 34 provided in the capsule holder 30 generates heat to heat the heating region 53A of the accommodation chamber 53. Accordingly, the flavor source 52 accommodated in the first space 531 of the accommodation chamber 53 and the aerosol 72 flowing through the heating region 53A of the accommodation chamber 53 are heated.

[0077] In order to increase an amount of the flavor component to be added to the aerosol in the aerosol inhaler 1, it is experimentally known that it is effective to increase an amount of aerosol generated from the aerosol source 71 and increase a temperature of the flavor source 52. A phenomenon that the amount of the flavor component to be added to the aerosol increases as the amount of the aerosol generated from the aerosol source 71 increases can be explained based on that the amount of the flavor component accompanying the aerosol passing through the flavor source 52 increases as the amount of the aerosol increases. A phenomenon that the amount of the flavor component to be added to the aerosol increases as the temperature of the flavor source 52 increases can be explained based on that the flavor source 52 and a flavor added to the flavor source 52 are more likely to be entrained by the aerosol as the temperature of the flavor source 52 increases.

[0078] Here, adsorption of the menthol 80 to the flavor source 52 inside the capsule 50 will be described in detail. The tobacco granules 521 constituting the flavor source 52 are fairly larger than molecules of the menthol 80, and function as an adsorbent of the menthol 80 which is an adsorbate. The menthol 80 is adsorbed to the tobacco granules 521 by chemical adsorption, and is also adsorbed to the tobacco granules 521 by physical adsorption. The chemical adsorption can be caused by covalent bonding between outermost shell electrons in molecules constituting the tobacco granules 521 and outermost shell electrons in molecules constituting the menthol 80. The physical adsorption may be caused by a van der Waals force acting between surfaces of the tobacco gran-

ules 521 and surfaces of the menthol 80. As an adsorption amount of the menthol 80 to the tobacco granules 521 increases, the tobacco granules 521 and the menthol 80 are brought into a state referred to as an adsorption equilibrium state. In the adsorption equilibrium state, an amount of the menthol 80 newly adsorbed to the tobacco granules 521 is equal to an amount of the menthol 80 desorbed from the tobacco granules 521. That is, even when the menthol 80 is newly supplied to the tobacco granules 521, an apparent adsorption amount does not change. Not only the tobacco granules 521 and the menthol 80, but also the adsorption amount in the adsorption equilibrium state decreases as temperatures of the adsorbent and the adsorbate increase. Both the chemical adsorption and the physical adsorption proceed in a manner in which adsorption sites at interfaces of the tobacco granules 521 are occupied by the menthol 80, and an adsorption amount of the menthol 80 when the adsorption sites are filled up is referred to as a saturated adsorption amount. It will be easily understood that the adsorption amount in the adsorption equilibrium state described above is less than the saturated adsorption amount.

[0079] As described above, in general, as the temperature of the flavor source 52 increases, the adsorption amount of the menthol 80 to the tobacco granules 521 in the adsorption equilibrium state between the tobacco granules 521 and the menthol 80 decreases. Therefore, when the flavor source 52 is heated by the second load 34 and the temperature thereof increases, the adsorption amount of the menthol 80 to be adsorbed to the tobacco granules 521 is reduced, and a part of the menthol 80 adsorbed to the tobacco granules 521 is desorbed.

[0080] The aerosol 72 containing the aerosolized menthol 80 derived from the aerosol source 71 and the aerosolized menthol 80 derived from the flavor source 52 flows through the second space 532, is discharged to the outside of the accommodation chamber 53 from the outlet portion 55, and is supplied to a mouth of a user from the inhalation port 58.

[0081] In this case, in the flow direction of the aerosol 72 in the accommodation chamber 53, that is, the first direction X, the accommodation chamber 53 includes the first space 531 in which the flavor source 52 is present, and the second space 532 located between the first space 531 and the outlet portion 55, adjacent to the outlet portion 55, and in which the flavor source 52 is not present. The menthol 80 desorbed from the flavor source 52 in the first space 531 flows from the first space 531 to the second space 532 while being aerosolized together with the aerosol 72 containing the menthol 80 derived from the aerosolized aerosol source 71. The aerosolization of the menthol 80 derived from the flavor source 52 is promoted in the process of flowing through the second space 532 in which the flavor source 52 is not present. Accordingly, a more appropriate amount of the aerosolized menthol 80 derived from the flavor source 52 can be generated.

[0082] The menthol 80 heated in the heating region 53A and desorbed from the flavor source 52 flows from the heating region 53A to the non-heating region 53B while being aerosolized together with the aerosol 72 containing the aerosolized menthol 80 derived from the aerosol source 71. Since the temperature of the non-heating region 53B is lower than that of the heating region 53A, the temperature of the menthol 80 derived from the flavor source 52 decreases in the process of flowing through the non-heating region 53B, thereby promoting the aerosolization. Accordingly, a more appropriate amount of the aerosolized menthol 80 derived from the flavor source 52 can be generated.

[0083] According to the present embodiment, in the cylindrical axis direction of the capsule 50, at least a part of the first space 531 overlaps the heating region 53A, and at least a part of the second space 532 overlaps the non-heating region 53B. By being heated by the second load 34 at the portion of the first space 531 overlapping the heating region 53A, the menthol 80 desorbed from the flavor source 52 flows to the second space 532, and the temperature thereof decreases in the process of flowing through the portion of the second space 532 overlapping the non-heating region 53B, thereby promoting the aerosolization.

[0084] Since the aerosol inhaler 1 of the present embodiment includes the second load 34 that heats the flavor source 52, an appropriate amount of flavor component can be added to the aerosol 72 and supplied to the user by heating the flavor source 52. By heating the flavor source 52, an amount of the menthol 80 that can be adsorbed to the flavor source 52 is reduced, a part of the menthol 80 adsorbed to the flavor source 52 is desorbed, and at the same time, the menthol 80 derived from the aerosol source 71 can be prevented from being adsorbed to the flavor source 52, so that a more appropriate amount of the menthol 80 can be supplied to the user.

[0085] Further, the second load 34 has an annular shape along the substantially annular side wall 31 and extends in the first direction X, and the capsule 50 is configured such that a part of the accommodation chamber 53 is accommodated in the hollow portion of the annular second load 34 provided in the capsule holder 30. Therefore, when the second load 34 generates heat to heat the heating region 53A of the accommodation chamber 53, the flavor source 52 accommodated in the first space 531 can be uniformly heated. Thus, an appropriate amount of flavor component can be added to the aerosol 72 from the flavor source 52 and supplied into the mouth of the user. Further, the flavor source 52 is locally heated, and the menthol 80 contained in a part of the flavor source 52, which is locally heated to a high temperature, can be prevented from being vaporized and/or atomized due to rapid desorption. As a result, the menthol 80 contained in the part of the flavor source 52, which is locally heated to a high temperature, can be prevented from being rapidly supplied into the mouth of the user, and the menthol 80 can be stably supplied to the user.

[0086] As described above, in the aerosol inhaler 1 of the present embodiment, both the aerosol source 71 and the flavor source 52 contain the menthol 80, so that the menthol 80 derived from the aerosol source 71 is less likely to be adsorbed to the flavor source 52. Thus, an appropriate amount of the menthol 80 can be supplied to the user. Further, the aerosol source 71 vaporized and/or atomized by the first load 45 in the heating chamber 43 is transported to the accommodation chamber 53 with the temperature thereof lowered when flowing through the aerosol flow path 90, so that the accommodation chamber 53 is less likely to be affected by the heat of the first load 45 from the heating chamber 43. Accordingly, the rapid desorption of the menthol 80 from the flavor source 52 is prevented, and thus the menthol 80 can be stably supplied to the user. In this way, the aerosol inhaler 1 of the present embodiment can stably supply an appropriate amount of menthol 80 to the user.

[0087] Further, in a state where the cartridge cover 20, the capsule holder 30, the cartridge 40, and the capsule 50 are mounted on the power supply unit 10, the aerosol flow path 90 extends in the first direction X, and in the first direction X, the storage chamber 42 is disposed between the heating chamber 43 and the accommodation chamber 53.

[0088] In this way, the heating chamber 43 of the cartridge 40 and the accommodation chamber 53 of the capsule 50 are disposed to be physically separated from each other, and are in communication with each other by the aerosol flow path 90.

[0089] Therefore, the heating chamber 43 and the accommodation chamber 53 can be disposed to be separated from each other without increasing a dimension of the aerosol inhaler 1 in the first direction X, so that it is possible to make it difficult for the accommodation chamber 53 to be affected by heat of the first load 45 from the heating chamber 43 without increasing the dimension of the aerosol inhaler 1 in the first direction X. Accordingly, the rapid desorption of the menthol 80 from the flavor source 52 is prevented, and thus the menthol 80 can be stably supplied to the user. In this way, the aerosol inhaler 1 of the present embodiment can stably supply an appropriate amount of menthol 80 to the user.

[0090] Since the first aerosol flow path 46 is formed in the hollow portion of the hollow and substantially annular storage chamber 42 and extends in the longitudinal direction of the cartridge 40, the first aerosol flow path 46 and the storage chamber 42 are disposed so as to at least partially overlap each other in the first direction X.

[0091] As a result, it is possible to increase a length of the aerosol flow path 90 while preventing an increase in the dimension of the aerosol inhaler 1 in the first direction X. Therefore, it is possible to make it difficult for the accommodation chamber 53 to be affected by heat of the first load 45 from the heating chamber 43 while preventing an increase in the dimension of the aerosol inhaler 1 in the first direction X.

[0092] In general, in the flavor source 52, the lower a

concentration and/or a pressure of the menthol 80, the smaller the adsorption amount of the menthol 80 to the tobacco granules 521 in the adsorption equilibrium state between the tobacco granules 521 and the menthol 80.

[0093] As described above, the first aerosol flow path 46 is formed such that the cross-sectional area thereof increases from the first end portion 461 toward the second end portion 462 in the longitudinal direction of the cartridge 40. In a state where the cartridge 40 is accommodated inside the cartridge cover 20 and the capsule holder 30 is mounted on the cartridge cover 20, the communication hole 33 is formed such that the first aerosol flow path 46 of the cartridge 40 is located inside the communication hole 33 when viewed from the top side in the first direction X.

[0094] Therefore, the aerosol flow path 90 of the present embodiment is formed such that the cross-sectional area at the second end portion connected to the accommodation chamber 53 is larger than the cross-sectional area at the first end portion 461 of the first aerosol flow path 46 that constitutes the first end portion connected to the heating chamber 43, and the cross-sectional area increases from the first end portion connected to the heating chamber 43 toward the second end portion connected to the accommodation chamber 53. According to the embodiment, the second end portion of the aerosol flow path 90 connected to the accommodation chamber 53 is implemented by any one of the first end portion 571 of the capsule 50, the second end portion 572 of the second aerosol flow path 57, and the top portion of the communication hole 33.

[0095] Therefore, the temperature of the aerosol source 71 vaporized and/or atomized by the first load 45 in the heating chamber 43 decreases due to separation from the heating chamber 43 in the process of flowing through the aerosol flow path 90, and the pressure and temperature of the aerosol source 71 decrease due to an increase in the cross-sectional area of the aerosol flow path 90. Accordingly, the menthol 80 derived from the aerosol source 71 can be further prevented from being adsorbed to the flavor source 52, so that a more appropriate amount of menthol 80 can be supplied to the user.

(Details of Power Supply Unit)

[0096] As illustrated in Fig. 6, the DC/DC converter 66 is connected between the first load 45 and the power supply 61 in a state where the cartridge 40 is mounted on the power supply unit 10. The MCU 63 is connected between the DC/DC converter 66 and the power supply 61. The second load 34 is connected between the MCU 63 and the DC/DC converter 66 in a state where the cartridge 40 is mounted on the power supply unit 10. In this way, in the power supply unit 10, the second load 34 and a series circuit of the DC/DC converter 66 and the first load 45 are connected in parallel to the power supply 61 in a state where the cartridge 40 is mounted.

[0097] The DC/DC converter 66 is a booster circuit capable of boosting and outputting an input voltage, and can supply the input voltage or a voltage obtained by boosting the input voltage to the first load 45. Since a power to be supplied to the first load 45 can be adjusted by the DC/DC converter 66, an amount of the aerosol source 71 to be atomized by the first load 45 can be controlled. As the DC/DC converter 66, for example, a switching regulator that converts an input voltage into a desired output voltage by controlling an on/off time of a switching element while monitoring an output voltage can be used. When a switching regulator is used as the DC/DC converter 66, by controlling the switching element, an input voltage can be directly output without being boosted. The DC/DC converter 66 is not limited to the step-up type converter (boost converter) described above, and may be a step-down type converter (buck converter) or a step-up/step-down type converter.

[0098] The processor of the MCU 63 can acquire the temperature of the flavor source 52 in order to control the discharge to the second load 34 to be described later using a switch (not illustrated). In addition, the processor of the MCU 63 is preferably able to acquire the temperature of the first load 45. The temperature of the first load 45 can be used to prevent overheating of the first load 45 and the aerosol source 71 and to highly control an amount of the aerosol source 71 atomized by the first load 45.

[0099] The voltage sensor 671 measures a voltage value to be applied to the first load 45 and outputs the voltage value. The current sensor 672 measures a current value flowing through the first load 45 and outputs the current value. An output of the voltage sensor 671 and an output of the current sensor 672 are input to the MCU 63, respectively. The processor of the MCU 63 acquires a resistance value of the first load 45 based on the output of the voltage sensor 671 and the output of the current sensor 672, and acquires a temperature of the first load 45 based on the acquired resistance value of the first load 45. Specifically, for example, the voltage sensor 671 and the current sensor 672 may be implemented by an operational amplifier and an analog-to-digital converter. At least a part of the voltage sensor 671 and/or at least a part of the current sensor 672 may be provided inside the MCU 63.

[0100] In a configuration in which a constant current flows through the first load 45 when the resistance value of the first load 45 is acquired, the current sensor 672 is unnecessary in the first temperature detection element 67. Similarly, in a configuration in which a constant voltage is applied to the first load 45 when the resistance value of the first load 45 is acquired, the voltage sensor 671 is unnecessary in the first temperature detection element 67.

[0101] The voltage sensor 681 measures a voltage value to be applied to the second load 34 and outputs the voltage value. The current sensor 682 measures a current value flowing through the second load 34 and outputs

the current value. An output of the voltage sensor 681 and an output of the current sensor 682 are input to the MCU 63, respectively. The processor of the MCU 63 acquires a resistance value of the second load 34 based on the output of the voltage sensor 681 and the output of the current sensor 682, and acquires a temperature of the second load 34 based on the acquired resistance value of the second load 34. The temperature of the second load 34 does not strictly coincide with the temperature of the flavor source 52 heated by the second load 34, but can be regarded as substantially the same as the temperature of the flavor source 52. In addition, the temperature of the second load 34 does not strictly coincide with the temperature of the accommodation chamber 53 of the capsule 50 heated by the second load 34, but can be regarded as substantially the same as the temperature of the accommodation chamber 53 of the capsule 50. Therefore, the second temperature detection element 68 may be used as a temperature detection element for detecting the temperature of the flavor source 52 or the temperature of the accommodation chamber 53 of the capsule 50. Specifically, for example, the voltage sensor 681 and the current sensor 682 may be implemented by an operational amplifier and an analog-to-digital converter. At least a part of the voltage sensor 681 and/or at least a part of the current sensor 682 may be provided inside the MCU 63.

[0102] In a configuration in which a constant current flows through the second load 34 when the resistance value of the second load 34 is acquired, the current sensor 682 is unnecessary in the second temperature detection element 68. Similarly, in a configuration in which a constant voltage is applied to the second load 34 when the resistance value of the second load 34 is acquired, the voltage sensor 681 is unnecessary in the second temperature detection element 68.

[0103] When the temperature of the second load 34, the temperature of the flavor source 52, or the temperature of the accommodation chamber 53 of the capsule 50 is acquired using the second temperature detection element 68, the second temperature detection element 68 can be provided in the power supply unit 10 having the lowest replacement frequency in the aerosol inhaler 1. In this way, the manufacturing cost of the capsule holder 30 and the cartridge 40 can be reduced.

[0104] Fig. 7 is a diagram illustrating a specific example of the power supply unit 10 illustrated in Fig. 6. Fig. 7 illustrates a specific example of a configuration in which the current sensor 682 is not provided as the second temperature detection element 68 and the current sensor 672 is not provided as the first temperature detection element 67.

[0105] As illustrated in Fig. 7, the power supply unit 10 includes: the power supply 61; the MCU 63; the LDO regulator 65; a parallel circuit C1 including a switch SW1 and a series circuit of a resistance element R1 and a switch SW2 connected in parallel to the switch SW1; a parallel circuit C2 including a switch SW3 and a series

circuit of a resistance element R2 and a switch SW4 connected in parallel to the switch SW3; an operational amplifier OP1 and an analog-to-digital converter ADC1 that constitute the voltage sensor 671; and an operational amplifier OP2 and an analog-to-digital converter ADC2 that constitute the voltage sensor 681. At least one of the operational amplifier OP1 and the operational amplifier OP2 may be provided inside the MCU 63.

[0106] The resistance element described in the present description may be an element having a fixed electric resistance value, for example, a resistor, a diode, or a transistor. In the example of Fig. 7, each of the resistance element R1 and the resistance element R2 is a resistor.

[0107] The switch described in the present description is a switching element such as a transistor that switches between disconnection and conduction of a wiring path. In the example of Fig. 7, each of the switches SW1 to SW4 is a transistor.

[0108] The LDO regulator 65 is connected to a main positive bus LU connected to a positive electrode of the power supply 61. The MCU 63 is connected to the LDO regulator 65 and a main negative bus LD connected to a negative electrode of the power supply 61. The MCU 63 is also connected to each of the switches SW1 to SW4, and controls opening and closing of the switches SW1 to SW4. The LDO regulator 65 steps down the voltage from the power supply 61 and outputs the stepped-down voltage. An output voltage V0 of the LDO regulator 65 is also used as an operation voltage of each of the MCU 63, the DC/DC converter 66, the operational amplifier OP1, the operational amplifier OP2, and the notification unit 16. Alternatively, at least one of the MCU 63, the DC/DC converter 66, the operational amplifier OP1, the operational amplifier OP2, and the notification unit 16 may use the output voltage of the power supply 61 as the operation voltage. Alternatively, at least one of the MCU 63, the DC/DC converter 66, the operational amplifier OP1, the operational amplifier OP2, and the notification unit 16 may use a voltage output from a regulator (not illustrated) that is separate from the LDO regulator 65 as the operation voltage. The output voltage of the regulator may be different from V0 or may be the same as V0.

[0109] The DC/DC converter 66 is connected to the main positive bus LU. The first load 45 is connected to the main negative bus LD. The parallel circuit C1 is connected to the DC/DC converter 66 and the first load 45.

[0110] The parallel circuit C2 is connected to the main positive bus LU. The second load 34 is connected to the parallel circuit C2 and the main negative bus LD.

[0111] A non-inverting input terminal of the operational amplifier OP1 is connected to a connection node between the parallel circuit C1 and the first load 45. An inverting input terminal of the operational amplifier OP1 is connected to each of an output terminal of the operational amplifier OP1 and the main negative bus LD via a resistance element.

[0112] A non-inverting input terminal of the operational amplifier OP2 is connected to a connection node between the parallel circuit C2 and the second load 34. An inverting input terminal of the operational amplifier OP2 is connected to each of an output terminal of the operational amplifier OP2 and the main negative bus LD via a resistance element.

[0113] The analog-to-digital converter ADC1 is connected to the output terminal of the operational amplifier OP1. The analog-to-digital converter ADC2 is connected to the output terminal of the operational amplifier OP2. The analog-to-digital converter ADC1 and the analog-to-digital converter ADC2 may be provided outside the MCU 63.

[0114] Fig. 7 is a diagram illustrating a specific example of the power supply unit 10 illustrated in Fig. 6. Fig. 7 illustrates a specific example of a configuration in which the current sensor 682 is not provided as the second temperature detection element 68 and the current sensor 672 is not provided as the first temperature detection element 67.

(MCU)

[0115] Next, a function of the MCU 63 will be described. The MCU 63 includes a temperature detection unit, a power control unit, and a notification control unit as functional blocks implemented by a processor executing a program stored in the ROM.

[0116] The temperature detection unit acquires a first temperature T1 as the temperature of the first load 45 based on an output of the first temperature detection element 67. In addition, the temperature detection unit acquires a second temperature T2 as the temperature of the second load 34, the temperature of the flavor source 52, or the temperature of the accommodation chamber 53 of the capsule 50 based on an output of the second temperature detection element 68.

[0117] In a case of the circuit example illustrated in Fig. 7, the temperature detection unit controls the switch SW1, the switch SW3, and the switch SW4 to be in a disconnection state, and controls the DC/DC converter 66 to output a predetermined constant voltage. Further, the temperature detection unit acquires an output value (a voltage value to be applied to the first load 45) of the analog-to-digital converter ADC1 in a state where the switch SW2 is controlled to be in a conductive state, and acquires the first temperature T1 as the temperature of the first load 45 based on the output value.

[0118] The non-inverting input terminal of the operational amplifier OP1 may be connected to a terminal of the resistance element R1 on a DC/DC converter 66 side, and the inverting input terminal of the operational amplifier OP1 may be connected to a terminal of the resistance element R1 on a switch SW2 side. In this case, the temperature detection unit controls the switch SW1, the switch SW3, and the switch SW4 to be in a disconnection state, and controls the DC/DC converter 66 to output a

predetermined constant voltage. Further, the temperature detection unit can acquire the output value of the analog-to-digital converter ADC1 (the voltage value to be applied to the resistance element R1) in a state where the switch SW2 is controlled to be in a conductive state, and acquire the first temperature T1 as the temperature of the first load 45 based on the output value.

[0119] In the case of the circuit example illustrated in Fig. 7, the temperature detection unit controls the switch SW1, the switch SW2, and the switch SW3 to be in a disconnection state, and controls an element such as a DC/DC converter (not illustrated) so as to output a predetermined constant voltage. Further, the temperature detection unit acquires an output value (a voltage value to be applied to the second load 34) of the analog-to-digital converter ADC2 in a state where the switch SW4 is controlled to be in a conductive state, and acquires, based on the output value, the second temperature T2 as the temperature of the second load 34, the temperature of the flavor source 52, or the temperature of the accommodation chamber 53 of the capsule 50.

[0120] The non-inverting input terminal of the operational amplifier OP2 may be connected to a terminal of the resistance element R2 on a main positive bus LU side, and the inverting input terminal of the operational amplifier OP2 may be connected to a terminal of the resistance element R2 on a switch SW4 side. In this case, the temperature detection unit controls the switch SW1, the switch SW2, and the switch SW3 to be in a disconnection state, and controls the above-described element so as to output a predetermined constant voltage. Further, the temperature detection unit can acquire the output value of the analog-to-digital converter ADC2 (the voltage value to be applied to the resistance element R2) in a state where the switch SW4 is controlled to be in a conductive state, and acquire, based on the output value, the temperature of the second load 34, the temperature of the flavor source 52, or the temperature of the accommodation chamber 53 of the capsule 50.

[0121] The notification control unit controls the notification unit 16 so as to notify various kinds of information. For example, the notification control unit controls the notification unit 16 to make a notification of prompting replacement of the capsule 50 in response to detection of a replacement timing of the capsule 50. The notification control unit is not limited to make the notification of prompting the replacement of the capsule 50, and may make a notification of prompting replacement of the cartridge 40, a notification of prompting replacement of the power supply 61, a notification of prompting charging of the power supply 61, or the like.

[0122] The power control unit controls discharge from the power supply 61 to the first load 45 (discharge necessary for heating the load) and discharge from the power supply 61 to the second load 34 (discharge necessary for heating the load) in response to a signal indicating the aerosol generation request output from the inhalation sensor 62.

[0123] The power control unit controls the discharge for heating from the power supply 61 to the second load 34 based on the output of the first temperature detection element 67 such that the first temperature T1, which is the temperature of the first load 45, converges to the target temperature.

[0124] In addition, the power control unit controls the discharge for heating from the power supply 61 to the second load 34 based on the output of the second temperature detection element 68 such that the second temperature T2, which is the temperature of the second load 34, the temperature of the flavor source 52, or the temperature of the accommodation chamber 53 of the capsule 50, converges to the target temperature.

[0125] The power control unit controls the discharge from the power supply 61 to the first load 45 and the discharge from the power supply 61 to the second load 34 such that a unit flavor amount, which is an amount of a flavor component to be added from the flavor source 52 to the aerosol 72 generated for each aerosol generation request, converges to a target amount. The target amount is a value determined as appropriate. For example, a target range of the unit flavor amount may be appropriately determined, and a median in the target range may be set as the target amount. Accordingly, by converging the unit flavor amount to the target amount, it is possible to converge the unit flavor amount also to a target range having a certain width. Weight may be used as a unit of the unit flavor amount and the target amount.

[0126] In the case of the circuit example illustrated in Fig. 7, the power control unit controls the switch SW2, the switch SW3, and the switch SW4 to be in a disconnection state, and controls the DC/DC converter 66 to output an appropriate voltage. Further, the power control unit controls the switch SW1 to be in a conductive state, thereby performing discharge for atomizing the aerosol source 71 from the power supply 61 to the first load 45. In addition, the power control unit controls the switch SW1, the switch SW2, and the switch SW4 to be in a disconnection state, and controls the switch SW3 to be in a conductive state, thereby performing discharge for heating the second load 34 from the power supply 61.

(Function of Power Control Unit of MCU During Aerosol Supply)

[0127] Next, a function of the power control unit of the MCU 63 during aerosol supply will be described with reference to Fig. 8. The expression "during aerosol supply" refers to a time period in which the aerosol source 71 held by the wick 44 is heated by the first load 45 in the heating chamber 43 of the cartridge 40, and the vaporized and/or atomized aerosol source 71 is aerosolized and supplied to the accommodation chamber 53 of the capsule 50.

[0128] As illustrated in Fig. 8, the power control unit of the MCU 63 controls, during aerosol supply, the discharge from the power supply 61 to the first load 45 such

that the first temperature T1, which is the temperature of the first load 45 acquired based on the output of the first temperature detection element 67, becomes a temperature equal to or higher than the boiling point of the menthol and the boiling point of glycerin and/or propylene glycol. For example, the power control unit of the MCU 63 controls, during aerosol supply, the discharge from the power supply 61 to the first load 45 such that the first temperature T1, which is the temperature of the first load 45 acquired based on the output of the first temperature detection element 67, becomes a temperature of about 215 [°C] or higher.

[0129] Therefore, in the heating chamber 43 of the cartridge 40, the aerosol source 71 held by the wick 44 is heated at a temperature higher than the boiling point of the menthol and the boiling point of glycerin and/or propylene glycol, and is vaporized and/or atomized more reliably. As a result, an appropriate amount of the aerosol source 71 corresponding to the aerosol generation request can be held by the wick 44, and the menthol and glycerin and/or propylene glycol of the aerosol source 71 held by the wick 44 can be reliably vaporized and/or atomized, so that an appropriate amount of the aerosol 72 containing the menthol 80 can be more reliably generated.

[0130] The power control unit of the MCU 63 controls, during aerosol supply, the discharge from the power supply 61 to the second load 34 such that the second temperature T2, which is the temperature of the second load 34, the temperature of the flavor source 52, or the temperature of the accommodation chamber 53 of the capsule 50 and is acquired based on the output of the second temperature detection element 68, becomes a temperature lower than the temperature of the first load 45. Specifically, the temperature lower than the first temperature T1, which is the temperature of the first load 45, is controlled to be equal to or higher than a predetermined temperature as described above, and thus the discharge from the power supply 61 to the second load 34 is controlled such that the second temperature T2 is lower than the predetermined temperature.

[0131] Therefore, the second temperature T2, which is the temperature of the second load 34, the temperature of the flavor source 52, or the temperature of the accommodation chamber 53 of the capsule 50, is a temperature lower than the first temperature T1 which is the temperature of the first load 45, so that the menthol 80 contained in the flavor source 52 can be prevented from being vaporized and/or atomized due to rapid desorption in the accommodation chamber 53. As a result, the menthol 80 contained in the flavor source 52 can be prevented from being rapidly supplied into the mouth of the user, and the menthol 80 can be stably supplied to the user.

[0132] Further, the power control unit of the MCU 63 controls, during aerosol supply, the discharge from the power supply 61 to the second load 34 such that the second temperature T2, which is the temperature of the second load 34, the temperature of the flavor source 52,

or the temperature of the accommodation chamber 53 of the capsule 50 and is acquired based on the output of the second temperature detection element 68, becomes a temperature higher than the melting point of the menthol and lower than the boiling point of the menthol. In general, the melting point of the menthol is about 42 [°C] to 45 [°C], and the boiling point of the menthol is about 212 [°C].

[0133] Therefore, the second temperature T2, which is the temperature of the second load 34, the temperature of the flavor source 52, or the temperature of the accommodation chamber 53 of the capsule 50, is higher than the melting point of the menthol, so that the adsorption amount of the menthol 80 to the tobacco granules 521 in the adsorption equilibrium state between the tobacco granules 521 and the menthol 80 decreases. Accordingly, the menthol 80 derived from the aerosol source 71 is prevented from being adsorbed to the flavor source 52, and a part of the menthol 80 of the flavor source 52 is desorbed and vaporized and/or atomized. On the other hand, the second temperature T2, which is the temperature of the second load 34, the temperature of the flavor source 52, or the temperature of the accommodation chamber 53 of the capsule 50, is a temperature lower than the boiling point of the menthol, so that the menthol 80 contained in the flavor source 52 is prevented from being vaporized and/or atomized due to rapid desorption. Accordingly, a more appropriate amount of menthol 80 can be stably supplied to the user.

[0134] Further, the power control unit of the MCU 63 controls, during aerosol supply, the discharge from the power supply 61 to the second load 34 such that the second temperature T2, which is the temperature of the second load 34, the temperature of the flavor source 52, or the temperature of the accommodation chamber 53 of the capsule 50 and is acquired based on the output of the second temperature detection element 68, becomes a temperature higher than the melting point of the menthol and is 90 [°C] or lower.

[0135] Since the second temperature T2, which is the temperature of the second load 34, the temperature of the flavor source 52, or the temperature of the accommodation chamber 53 of the capsule 50, is higher than the melting point of the menthol and is 90 [°C] or lower, the menthol 80 derived from the aerosol source 71 can be prevented from being adsorbed to the flavor source 52. At the same time, the temperature of the menthol 80 desorbed from the flavor source 52 and vaporized and/or atomized can be set to a temperature at which the menthol 80 is easily aerosolized. Accordingly, a larger amount of menthol 80 can be stably supplied to the user in a form of aerosol.

[0136] Although an embodiment of the present invention has been described above with reference to the accompanying drawings, it is needless to say that the present invention is not limited to the embodiment. It will be apparent to those skilled in the art that various changes and modifications may be conceived within the scope

of the claims, and it is understood that such changes and modifications naturally fall within the technical scope of the present invention. Further, respective constituent elements in the embodiment described above may be combined as desired without departing from the gist of the present invention.

[0137] For example, according to the present embodiment, the heating chamber 43 of the cartridge 40 and the accommodation chamber 53 of the capsule 50 are disposed to be physically separated from each other, and are in communication with each other by the aerosol flow path 90, but the heating chamber 43 and the accommodation chamber 53 may not necessarily be disposed to be physically separated from each other. The heating chamber 43 and the accommodation chamber 53 may be thermally insulated from each other and may be in communication with each other. In this case, the heating chamber 43 and the accommodation chamber 53 are also thermally insulated from each other, so that it is possible to make it difficult for the accommodation chamber 53 to be affected by heat of the first load 45 from the heating chamber 43. Accordingly, the rapid desorption of the menthol 80 from the flavor source 52 is prevented, and thus the menthol 80 can be stably supplied to the user. The heating chamber 43 and the accommodation chamber 53 may be disposed to be physically separated from each other, may be thermally insulated from each other, and may be in communication with each other.

[0138] For example, an overall shape of the aerosol inhaler 1 is not limited to a shape in which the power supply unit 10, the cartridge 40, and the capsule 50 are arranged in a line as illustrated in Fig. 1. The aerosol inhaler 1 may be implemented such that the cartridge 40 and the capsule 50 can be replaced with respect to the power supply unit 10, and may adopt any shape such as a substantially box shape.

[0139] For example, the cartridge 40 may be integrated with the power supply unit 10.

[0140] For example, the capsule 50 may be implemented to be replaceable with respect to the power supply unit 10, and may be attachable to and detachable from the power supply unit 10.

[0141] For example, according to the present embodiment, the first load 45 and the second load 34 are heaters that generate heat by a power discharged from the power supply 61, but the first load 45 and the second load 34 may be Peltier elements that can perform both heat generating and cooling by the power discharged from the power supply 61. When the first load 45 and the second load 34 are configured in such manner, the degree of freedom in controlling the temperature of the aerosol source 71 and the temperature of the flavor source 52 is improved, and thus the unit flavor amount can be controlled at a higher level.

[0142] In addition, for example, according to the present embodiment, the MCU 63 controls the discharge from the power supply 61 to the first load 45 and the second load 34 such that the amount of the flavor com-

ponent converges to the target amount, but the target amount is not limited to a specific value and may be a range having a certain width.

[0143] In addition, for example, according to the present embodiment, the MCU 63 controls the discharge from the power supply 61 to the second load 34 such that the temperature of the flavor source 52 converges to the target temperature, but the target temperature is not limited to a specific value and may be a range having a certain width.

[0144] In the present description, at least the following matters are described. Although corresponding constituent elements or the like in the above embodiments are shown in parentheses, the present invention is not limited thereto.

(1) An aerosol generation device (aerosol inhaler 1) including:

a storage chamber (storage chamber 42) storing an aerosol source (aerosol source 71);
a heating chamber (heating chamber 43) configured to heat the aerosol source; and
an accommodation portion (capsule 50) having an accommodation chamber (accommodation chamber 53) accommodating a flavor source (flavor source 52) therein,
the heating chamber accommodating:

at least a part of a holding portion (wick 44) configured to transport the aerosol source stored in the storage chamber to the heating chamber and holds the aerosol source in the heating chamber; and
at least a part of a first load (first load 45) configured to heat the aerosol source held by the holding portion to vaporize and/or atomize the aerosol source, in which

the aerosol source and the flavor source each contain menthol (menthol 80), and
the aerosol generation device further includes an aerosol flow path (aerosol flow path 90) connecting the heating chamber and the accommodation chamber and configured to transport the aerosol source vaporized and/or atomized by the first load in the heating chamber to the accommodation chamber.

According to (1), both the aerosol source and the flavor source contain menthol, so that the menthol derived from the aerosol source is less likely to be adsorbed by the flavor source. As a result, an appropriate amount of menthol can be supplied to the user. Further, the aerosol source vaporized and/or atomized by the first load in the heating chamber is transported to the accommodation chamber with the temperature thereof lowered when flowing through the aerosol

flow path, so that the accommodation chamber is less likely to be affected by the heat of the first load from the heating chamber. Accordingly, a rapid desorption of the menthol adsorbed to the flavor source is prevented, and thus the menthol can be stably supplied to the user. In this way, an appropriate amount of menthol can be stably supplied to the user.

(2) The aerosol generation device according to (1), in which

the aerosol flow path has a shape extending in a first direction (first direction X), and
the storage chamber is disposed between the heating chamber and the accommodation chamber in the first direction.

According to (2), the storage chamber is disposed between the heating chamber and the accommodation chamber in the first direction in which the aerosol flow path extends, so that the heating chamber and the accommodation chamber can be disposed to be separated from each other without increasing the dimension of the aerosol generation device in the first direction. In other words, the aerosol generation device can make it difficult for the accommodation chamber to be affected by heat of the first load from the heating chamber without increasing the dimension in the first direction. Accordingly, a rapid desorption of the menthol adsorbed to the flavor source is prevented, and thus the menthol can be stably supplied to the user.

(3) The aerosol generation device according to (2), in which

the aerosol flow path and the storage chamber are disposed so as to at least partially overlap with each other in the first direction.

According to (3), the aerosol flow path and the storage chamber are disposed so as to at least partially overlap each other in the first direction, so that it is possible to increase a length of the aerosol flow path in the first direction while preventing an increase in the dimension of the aerosol generation device in the first direction. In other words, the aerosol generation device can make it difficult for the accommodation chamber to be affected by heat of the first load from the heating chamber while preventing an increase in the dimension in the first direction. Accordingly, a rapid desorption of the menthol adsorbed to the flavor source is prevented, and thus the menthol can be stably supplied to the user.

(4) The aerosol generation device according to (3), in which

the aerosol flow path is formed such that a cross-sectional area at a second end portion (the second end portion 572 of the second aerosol flow path 57) connected to the accommodation chamber is larger

than a cross-sectional area at a first end portion (the first end portion 461 of the first aerosol flow path 46) connected to the heating chamber, and increases in cross-sectional area from the first end portion toward the second end portion.

According to (4), the temperature of the aerosol source vaporized and/or atomized by the first load in the heating chamber decreases due to separation from the heating chamber in the process of flowing through the aerosol flow path, and the pressure and temperature of the aerosol source decrease due to an increase in the cross-sectional area of the aerosol flow path. Accordingly, the menthol derived from the aerosol source can be further prevented from being adsorbed to the flavor source, so that a more appropriate amount of menthol can be supplied to the user. (5) The aerosol generation device according to any one of (1) to (4), further including:

a second load (second load 34) that heats the flavor source.

According to (5), the aerosol generation device further includes the second load that heats the flavor source, so that an appropriate amount of flavor component can be added to the aerosol and supplied to the user by heating the flavor source. In addition, by heating the flavor source, the amount of the menthol derived from the aerosol source that can be adsorbed to the flavor source is reduced, a part of the menthol adsorbed to the flavor source is desorbed, and at the same time, the menthol derived from the aerosol source can be prevented from being adsorbed to the flavor source, so that a more appropriate amount of menthol can be supplied to the user. (6) The aerosol generation device according to (5), further including:

a power supply (power supply 61);

a controller (MCU 63) that controls discharge from the power supply to the first load and discharge from the power supply to the second load,

in the aerosol generation device, the controller controls,

during aerosol supply in which the aerosol source held by the holding portion is heated by the first load, and the vaporized and/or atomized aerosol source is aerosolized and supplied to the accommodation chamber,

the discharge from the power supply to the second load such that a temperature of the second load, a temperature of the accommodation chamber, or a temperature of the flavor source becomes a temperature lower than a temperature of the first load.

According to (6), during aerosol supply, the temperature of the second load, the temperature of the accommodation chamber, or the temperature of the

flavor source becomes a temperature lower than the temperature of the first load, so that the menthol contained in the flavor source can be prevented from being vaporized and/or atomized due to rapid desorption in the accommodation chamber. As a result, the menthol contained in the flavor source can be prevented from being rapidly supplied into the mouth of the user, and the menthol can be stably supplied to the user.

(7) The aerosol generation device according to (6), in which

the controller controls, during the aerosol supply, the discharge from the power supply to the second load such that the temperature of the second load, the temperature of the accommodation chamber, or the temperature of the flavor source becomes a temperature higher than a melting point of the menthol and lower than a boiling point of the menthol.

According to (7), the temperature of the second load, the temperature of the flavor source, or the temperature of the accommodation chamber is a temperature lower than the boiling point of the menthol, so that the menthol contained in the flavor source is prevented from being vaporized and/or atomized due to rapid desorption. At the same time, the temperature of the second load, the temperature of the flavor source, or the temperature of the accommodation chamber is higher than the boiling point of the menthol, so that an adsorption amount of the menthol to the flavor source in an adsorption equilibrium state between the flavor source and the menthol can be reduced, and the menthol derived from the aerosol source can be prevented from being adsorbed to the flavor source. Accordingly, a more appropriate amount of menthol can be stably supplied to the user. (8) The aerosol generation device according to (7), in which

the controller controls, during the aerosol supply, the discharge from the power supply to the first load such that the temperature of the first load is equal to or higher than the boiling point of the menthol.

According to (8), the temperature of the first load is equal to or higher than the boiling point of the menthol during aerosol supply, so that the aerosol source held by the holding portion can be reliably vaporized and/or atomized. Accordingly, the menthol contained in the aerosol source held by the holding portion can be reliably vaporized and/or atomized in response to the aerosol generation request, and thus an appropriate amount of menthol can be more reliably generated.

(9) The aerosol generation device according to (6), in which

the controller controls, during the aerosol supply, the discharge from the power supply to the second load such that the temperature of the second load, the temperature of the accommodation chamber, or the temperature of the flavor source is higher than the

melting point of the menthol and is 90 [°C] or lower. According to (9), the temperature of the second load, the temperature of the accommodation chamber, or the temperature of the flavor source is higher than the melting point of the menthol and is 90 [°C] or lower during aerosol supply, so that the temperature of the menthol desorbed from the flavor source and vaporized and/or atomized can be set to a temperature at which the menthol is easily aerosolized while preventing the menthol derived from the aerosol source from being adsorbed to the flavor source. Accordingly, a more appropriate amount of menthol can be stably supplied to the user in a form of aerosol. (10) The aerosol generation device according to (5), in which

the second load has an annular shape, and at least a part of the accommodation chamber is accommodated in a hollow portion of the annular second load.

According to (10), the second load has an annular shape and at least a part of the accommodation chamber is accommodated in a hollow portion of the annular second load, so that the flavor source can be uniformly heated when the second load generates heat to heat the accommodation chamber. Thus, an appropriate amount of flavor component can be added to the aerosol from the flavor source and supplied into the mouth of the user. Further, the flavor source is locally heated, and the menthol contained in a part of the flavor source, which is locally heated to a high temperature, can be prevented from being vaporized and/or atomized due to rapid desorption. As a result, the menthol contained in a part of the flavor source, which is locally heated to a high temperature, can be prevented from being rapidly supplied into the mouth of the user, and the menthol can be stably supplied to the user.

(11) The aerosol generation device according to (5), in which

the aerosol source vaporized and/or atomized by the first load is aerosolized in the heating chamber and the aerosol flow path to generate an aerosol (aerosol 72), and the accommodation chamber includes:

an inlet portion (inlet portion 54) for introducing the aerosol from the aerosol flow path into the accommodation chamber; and an outlet portion (outlet portion 55) for discharging the aerosol introduced into the accommodation chamber to an outside of the accommodation chamber, and

in a flow direction of the aerosol in the accommodation chamber in which the aerosol flows

from the inlet portion to the outlet portion, the accommodation chamber includes a first space (first space 531) in which the flavor source is present, and a second space (second space 532) located between the first space and the outlet portion, adjacent to the outlet portion, and in which the flavor source is not present.

According to (11), the menthol desorbed from the flavor source in the first space flows from the first space to the second space while being aerosolized together with the aerosol containing the menthol derived from the aerosolized aerosol source. The aerosolization of the menthol derived from the flavor source is promoted in the process of flowing through the second space in which the flavor source is not present. Accordingly, a more appropriate amount of the aerosolized menthol derived from the flavor source can be generated.

(12) The aerosol generation device according to (5), in which

the aerosol source vaporized and/or atomized by the first load is aerosolized in the heating chamber and the aerosol flow path to generate an aerosol (aerosol 72), and the accommodation chamber includes:

an inlet portion (inlet portion 54) for introducing the aerosol from the aerosol flow path into the accommodation chamber; and an outlet portion (outlet portion 55) for discharging the aerosol introduced into the accommodation chamber to an outside of the accommodation chamber, and

in a flow direction of the aerosol in the accommodation chamber in which the aerosol flows from the inlet portion to the outlet portion, the accommodation chamber includes a heating region (heating region 53A) in which the second load is disposed, and a non-heating region (non-heating region 53B) located between the heating region and the outlet portion, adjacent to the outlet portion, and in which the second load is not disposed.

According to (12), the menthol heated in the heating region and desorbed from the flavor source flows from the heating region to the non-heating region while being aerosolized together with the aerosol containing the aerosolized menthol derived from the aerosol source. The temperature of the menthol derived from the flavor source decreases in the process of flowing through the non-heating region, thereby promoting the aerosolization of the menthol. Accordingly, a more appropriate amount of the aerosolized menthol derived from the flavor source can be gen-

erated.

(13) An aerosol generation device (aerosol inhaler 1) including:

a storage chamber (storage chamber 42) storing an aerosol source (aerosol source 71); a heating chamber (heating chamber 43) configured to heat the aerosol source; and an accommodation portion (capsule 50) having an accommodation chamber (accommodation chamber 53) accommodating a flavor source (flavor source 52) therein, the heating chamber accommodating:

at least a part of a holding portion (wick 44) configured to transport the aerosol source stored in the storage chamber to the heating chamber and holds the aerosol source in the heating chamber; and at least a part of a first load (first load 45) configured to heat the aerosol source held by the holding portion to vaporize and/or atomize the aerosol source, in which

the aerosol source and the flavor source each contain menthol (menthol 80), and the heating chamber and the accommodation chamber are disposed to be physically separated from each other and/or are thermally insulated from each other, and are communicated with each other.

According to (13), both the aerosol source and the flavor source contain menthol, so that the menthol derived from the aerosol source is less likely to be adsorbed by the flavor source. As a result, an appropriate amount of menthol can be supplied to the user. Further, the heating chamber and the accommodation chamber are disposed to be physically separated from each other and/or are thermally insulated from each other, and are in communication with each other, so that the accommodation chamber is less likely to be affected by the heat of the first load from the heating chamber. Accordingly, a rapid desorption of the menthol adsorbed to the flavor source is prevented, and thus the menthol can be stably supplied to the user. In this way, an appropriate amount of menthol can be stably supplied to the user.

[0145] The present application is based on Japanese patent application (Japanese Patent Application No. 2020-193897) filed on November 20, 2020, and the contents thereof are incorporated herein by reference.

REFERENCE SIGNS LIST

[0146]

1: aerosol inhaler (aerosol generation device)

34: second load

42: storage chamber

43: heating chamber

44: wick (holding portion)

45: first load

46: first aerosol flow path (aerosol flow path)

461: first end portion

50: capsule (accommodation portion)

52: flavor source

53: accommodation chamber

53A: heating region

53B: non-heating region

531: first space

532: second space

54: inlet portion

55: outlet portion

57: second aerosol flow path (aerosol flow path)

572: second end portion

61: power supply

71: aerosol source

72: aerosol

80: menthol

90: aerosol flow path

63: MCU (controller)

X: first direction

Claims

1. An aerosol generation device comprising:

a storage chamber storing an aerosol source; a heating chamber configured to heat the aerosol source; and an accommodation portion having an accommodation chamber accommodating a flavor source therein, the heating chamber accommodating:

at least a part of a holding portion configured to transport the aerosol source stored in the storage chamber to the heating chamber and hold the aerosol source in the heating chamber; and at least a part of a first load configured to heat the aerosol source held by the holding portion to vaporize and/or atomize the aerosol source, wherein

the aerosol source and the flavor source each contain menthol, and the aerosol generation device further comprises an aerosol flow path connecting the heating chamber and the accommodation chamber and configured to transport the aerosol source vaporized and/or atomized by the first load in the heating chamber to the accommodation cham-

- ber.
2. The aerosol generation device according to claim 1, wherein
 - the aerosol flow path has a shape extending in a first direction, and
 - the storage chamber is disposed between the heating chamber and the accommodation chamber in the first direction.
 3. The aerosol generation device according to claim 2, wherein
 - the aerosol flow path and the storage chamber are disposed so as to at least partially overlap with each other in the first direction.
 4. The aerosol generation device according to claim 3, wherein
 - the aerosol flow path is formed such that a cross-sectional area at a second end portion connected to the accommodation chamber is larger than a cross-sectional area at a first end portion connected to the heating chamber, and increases in cross-sectional area from the first end portion toward the second end portion.
 5. The aerosol generation device according to any one of claims 1 to 4, further comprising:
 - a second load configured to heat the flavor source.
 6. The aerosol generation device according to claim 5, further comprising:
 - a power supply; and
 - a controller configured to control discharge from the power supply to the first load and discharge from the power supply to the second load, wherein
 - the controller is configured to control, during aerosol supply in which the aerosol source held by the holding portion is heated by the first load, and the vaporized and/or atomized aerosol source is aerosolized and supplied to the accommodation chamber,
 - the discharge from the power supply to the second load such that a temperature of the second load, a temperature of the accommodation chamber, or a temperature of the flavor source becomes a temperature lower than a temperature of the first load.
 7. The aerosol generation device according to claim 6, wherein
 - the controller is configured to control, during the aerosol supply, the discharge from the power supply to the second load such that the temperature of the second load, the temperature of the accommodation
 - chamber, or the temperature of the flavor source becomes a temperature higher than a melting point of the menthol and lower than a boiling point of the menthol.
 8. The aerosol generation device according to claim 7, wherein
 - the controller is configured to control, during the aerosol supply, the discharge from the power supply to the first load such that the temperature of the first load is equal to or higher than the boiling point of the menthol.
 9. The aerosol generation device according to claim 6, wherein
 - the controller is configured to control, during the aerosol supply, the discharge from the power supply to the second load such that the temperature of the second load, the temperature of the accommodation chamber, or the temperature of the flavor source is higher than the melting point of the menthol and is 90 [°C] or lower.
 10. The aerosol generation device according to claim 5, wherein
 - the second load has an annular shape, and
 - at least a part of the accommodation chamber is accommodated in a hollow portion of the annular second load.
 11. The aerosol generation device according to claim 5, wherein
 - the aerosol source vaporized and/or atomized by the first load is aerosolized in the heating chamber and the aerosol flow path to generate an aerosol, and
 - the accommodation chamber includes:
 - an inlet portion for introducing the aerosol from the aerosol flow path into the accommodation chamber; and
 - an outlet portion for discharging the aerosol introduced into the accommodation chamber to an outside of the accommodation chamber, and
 - in a flow direction of the aerosol in the accommodation chamber in which the aerosol flows from the inlet portion to the outlet portion, the accommodation chamber includes a first space in which the flavor source is present, and a second space located between the first space and the outlet portion, adjacent to the outlet portion, and in which the flavor source is not present.

12. The aerosol generation device according to claim 5, wherein

the aerosol source vaporized and/or atomized by the first load is aerosolized in the heating chamber and the aerosol flow path to generate an aerosol, and the accommodation chamber includes:

an inlet portion for introducing the aerosol from the aerosol flow path into the accommodation chamber; and an outlet portion for discharging the aerosol introduced into the accommodation chamber to an outside of the accommodation chamber, and

in a flow direction of the aerosol in the accommodation chamber in which the aerosol flows from the inlet portion to the outlet portion, the accommodation chamber includes a heating region in which the second load is disposed, and a non-heating region located between the heating region and the outlet portion, adjacent to the outlet portion, and in which the second load is not disposed.

13. An aerosol generation device comprising:

a storage chamber storing an aerosol source; a heating chamber configured to heat the aerosol source; and an accommodation portion having an accommodation chamber accommodating a flavor source therein, the heating chamber being configured to accommodate:

at least a part of a holding portion configured to transport the aerosol source stored in the storage chamber to the heating chamber and hold the aerosol source in the heating chamber; and at least a part of a first load configured to heat the aerosol source held by the holding portion to vaporize and/or atomize the aerosol source, wherein

the aerosol source and the flavor source each contain menthol, and the heating chamber and the accommodation chamber are disposed to be physically separated from each other and/or are thermally insulated from each other, and are communicated with each other.

FIG. 1

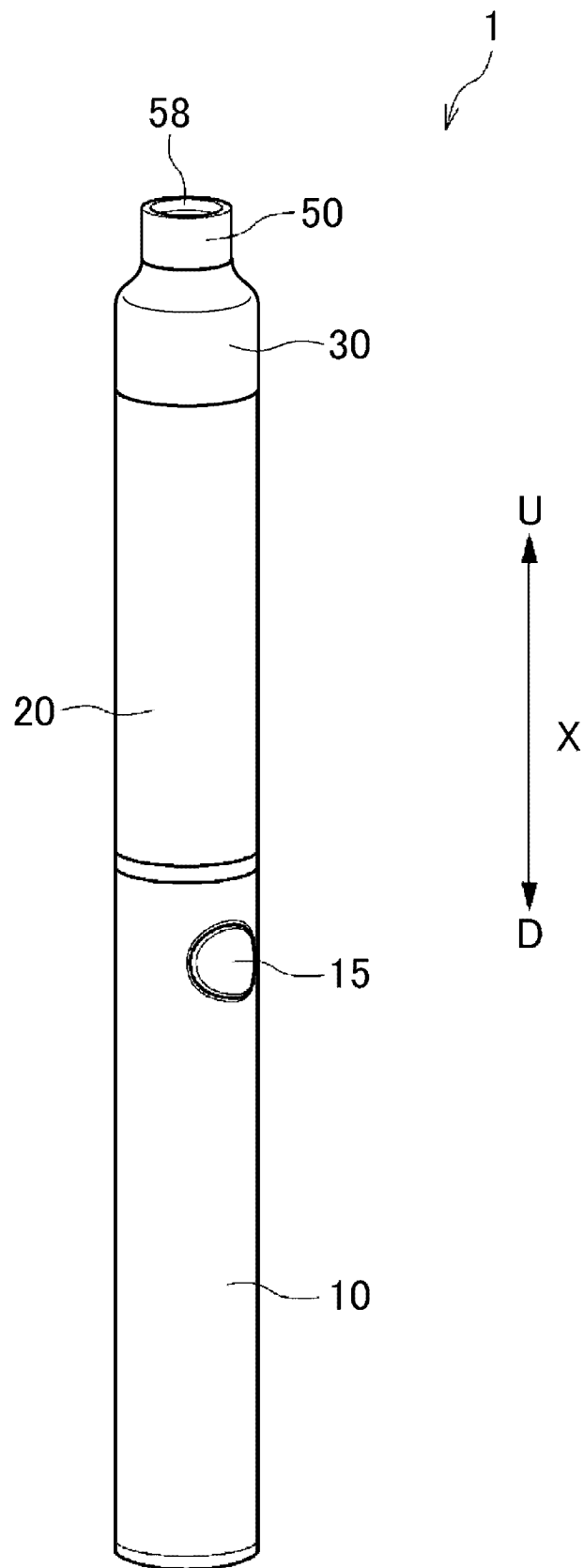


FIG. 2

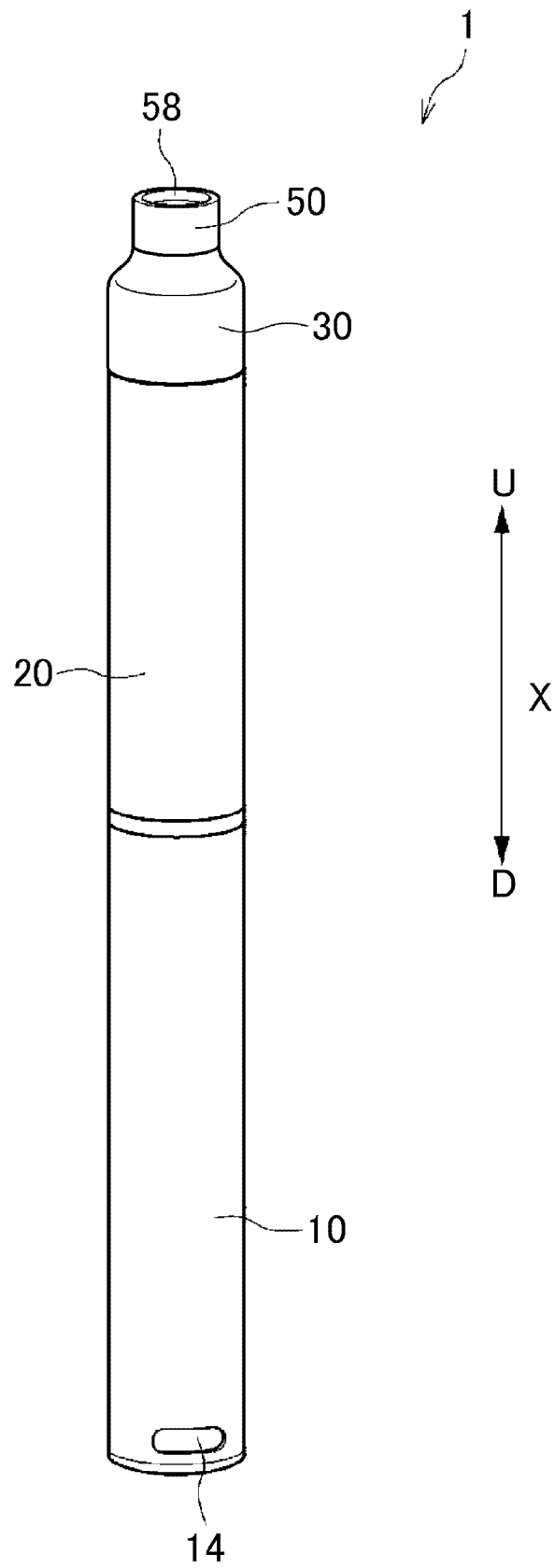


FIG. 3

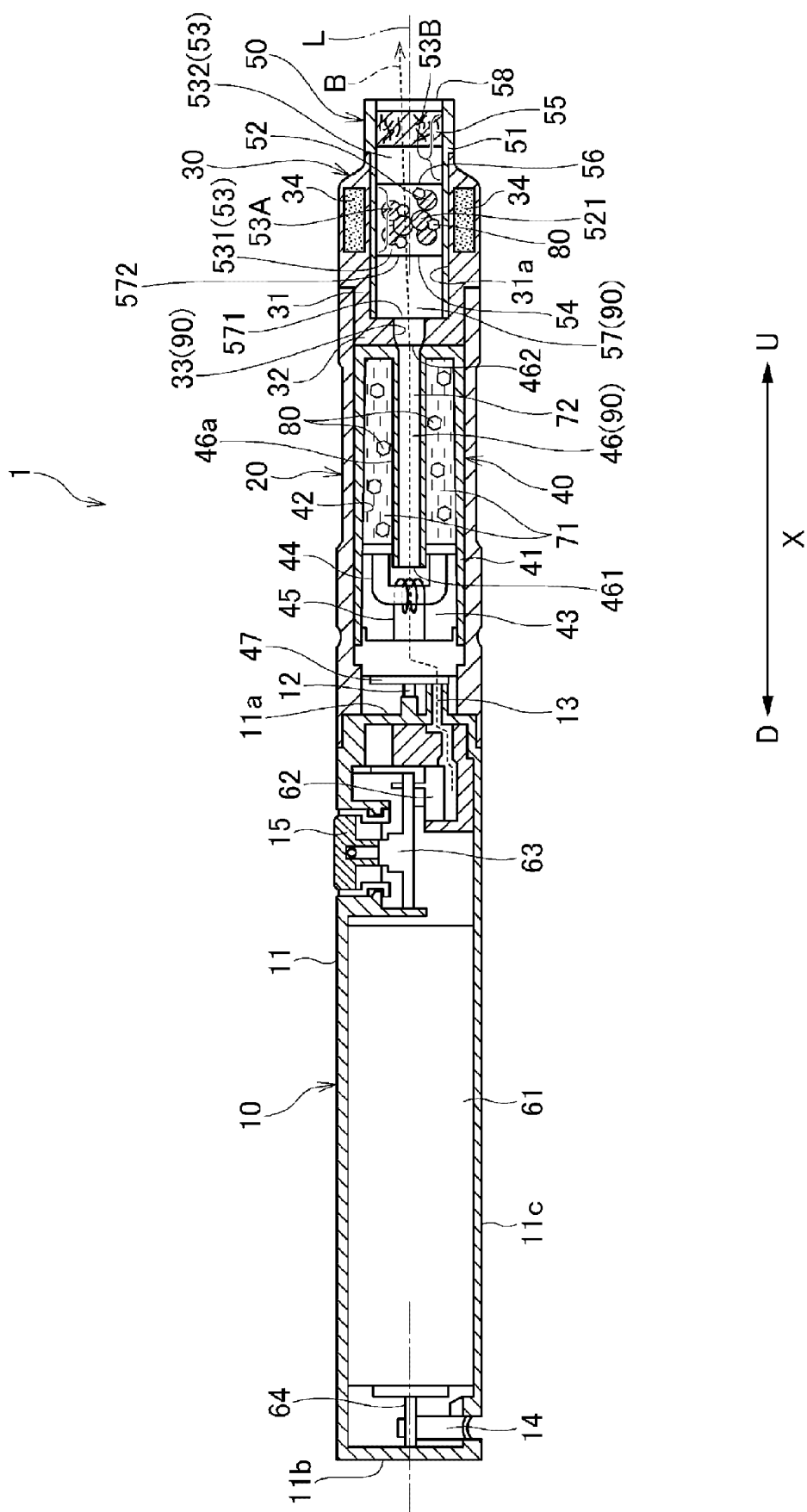


FIG. 4

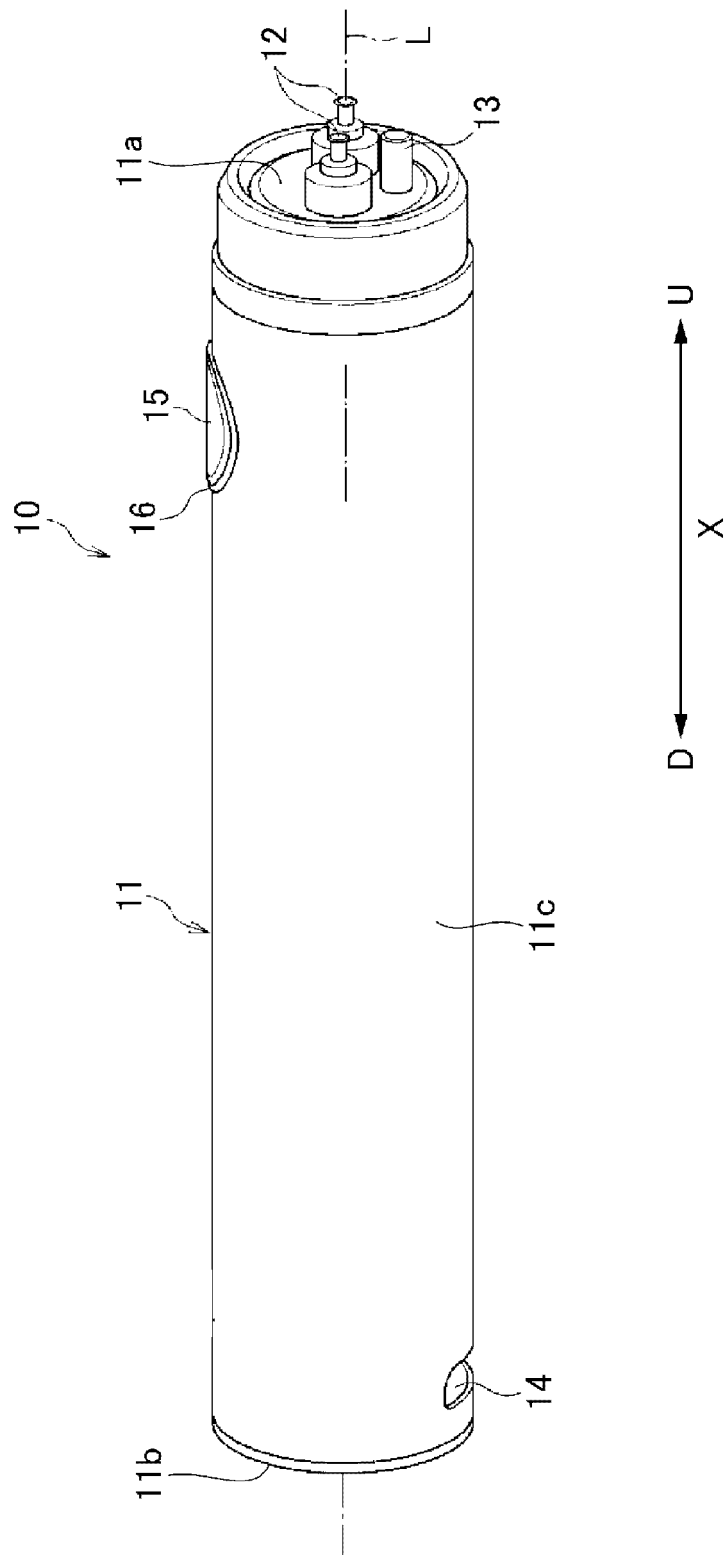


FIG. 5

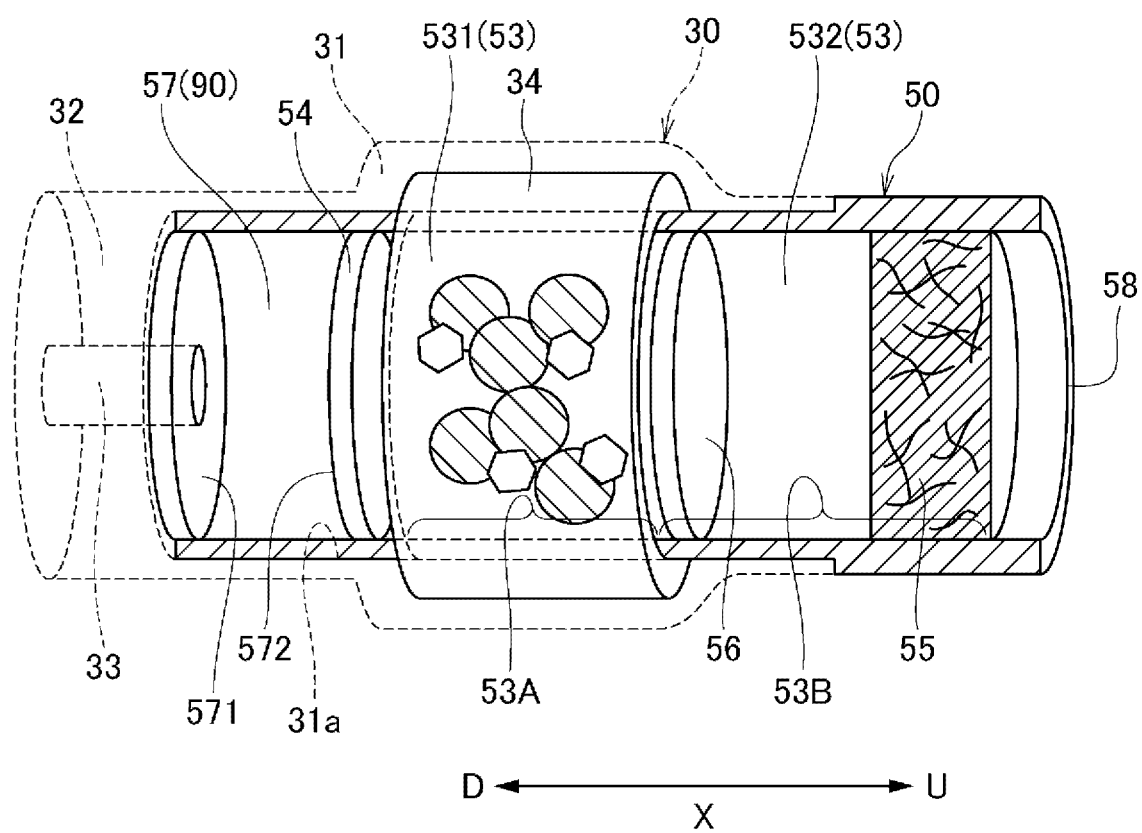


FIG. 6

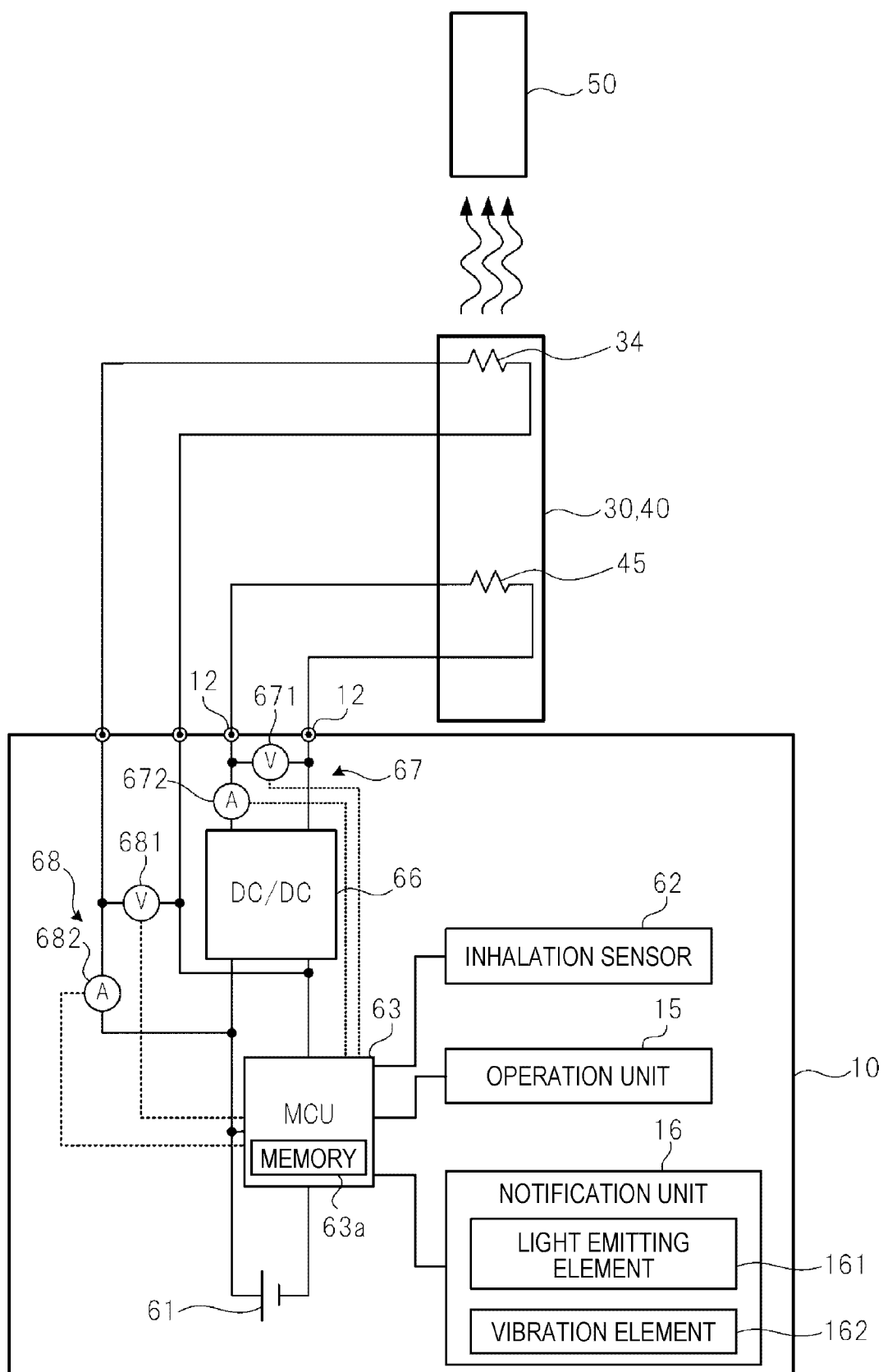


FIG. 7

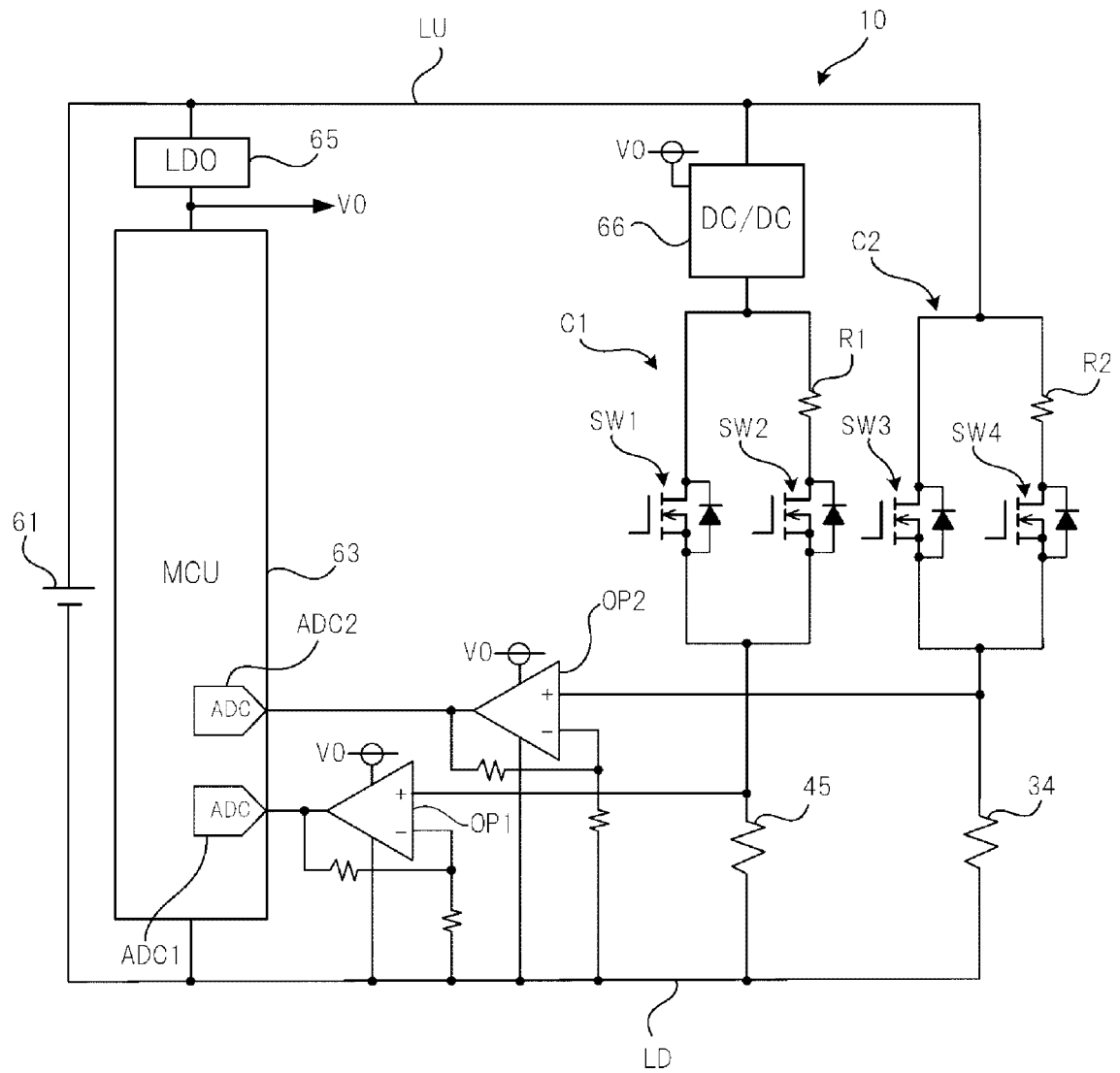
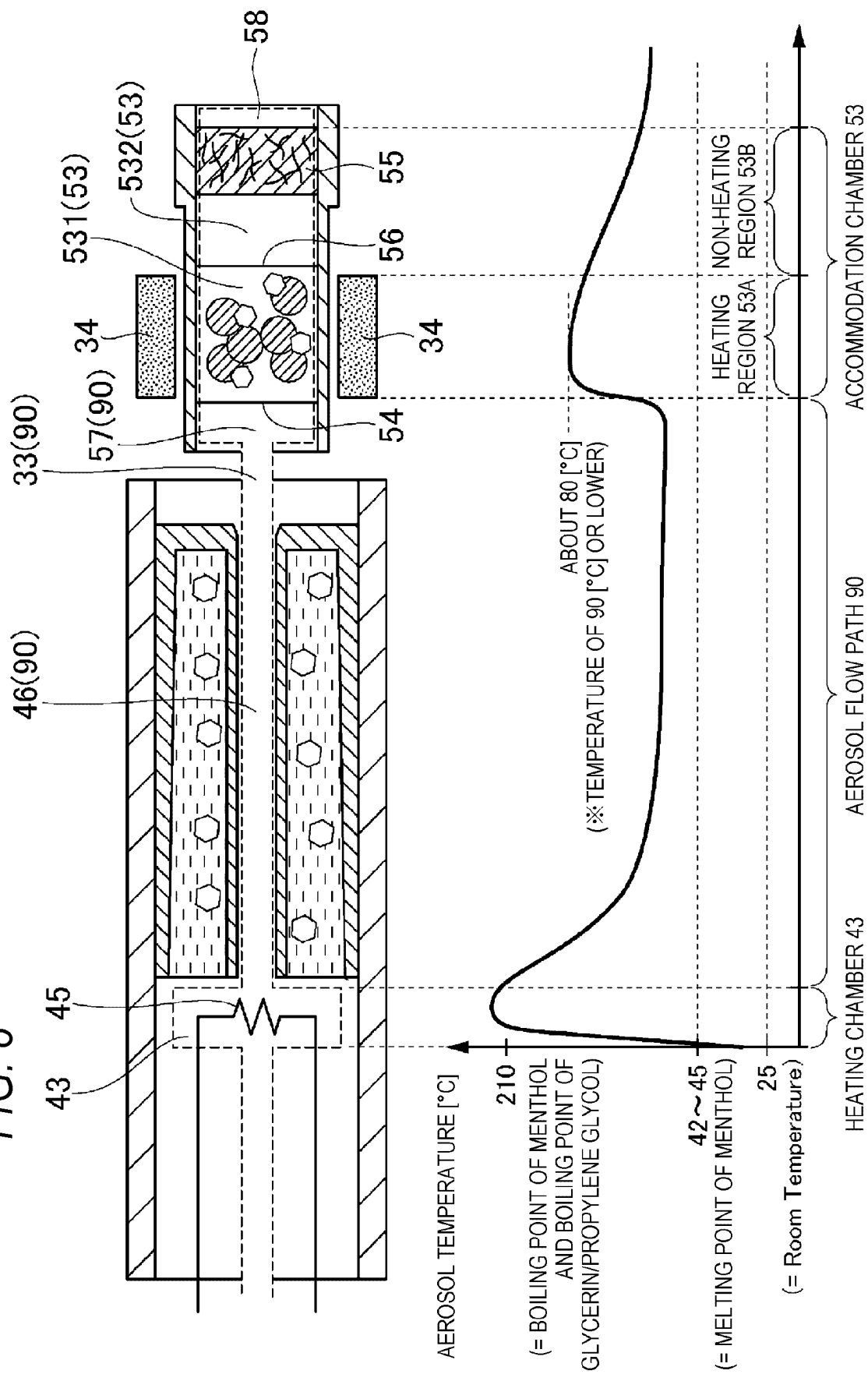


FIG. 8



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2021/034885

A. CLASSIFICATION OF SUBJECT MATTER

A24F 40/30(2020.01)i; **A24F 40/40**(2020.01)i; **A24F 40/46**(2020.01)i; **A24F 40/57**(2020.01)i
 FI: A24F40/30; A24F40/40; A24F40/57; A24F40/46

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)

A24F40/30; A24F40/40; A24F40/46; A24F40/57

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 1971-2021
 Registered utility model specifications of Japan 1996-2021
 Published registered utility model applications of Japan 1994-2021

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 2019-533454 A (BRITISH AMERICAN TOBACCO (INVESTMENTS) LTD.) 21 November 2019 (2019-11-21) paragraphs [0007]-[0034], [0059], fig. 1	1-4, 13
Y		5, 10
A		6-9,11-12
Y	JP 2019-534023 A (BRITISH AMERICAN TOBACCO (INVESTMENTS) LTD.) 28 November 2019 (2019-11-28) paragraphs [0110], [0112], [0113], fig. 2	5, 10

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

* Special categories of cited documents:

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“Y” document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

“&” document member of the same patent family

Date of the actual completion of the international search

18 October 2021

Date of mailing of the international search report

02 November 2021

Name and mailing address of the ISA/JP

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Authorized officer

Telephone No.

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/JP2021/034885

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
JP 2019-533454 A	21 November 2019	US 2019/0320718 A1 paragraphs [0009]-[0036], [0061], fig. 1 WO 2018/083037 A1 EP 3534731 A1 KR 10-2019-0065463 A CN 109952035 A	
JP 2019-534023 A	28 November 2019	US 2019/0289901 A1 paragraphs [0163], [0165]- [0166], fig. 2 WO 2018/087164 A1 EP 3537899 A1 KR 10-2019-0058657 A CN 109922673 A	

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

REFERENCES CITED IN THE DESCRIPTION

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- JP 2020193897 A [0145]