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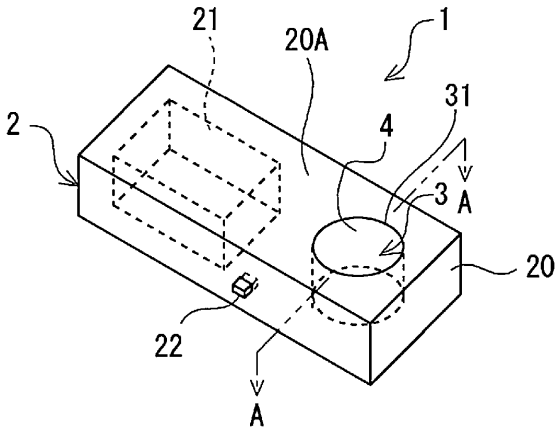
(54) **LIGHTER AND SMOKING SYSTEM FOR CARBON HEAT SOURCE TYPE FLAVOR INHALER**

(57) Provided is an invention pertaining to a lighter capable of improving the sustainability of combustion of a carbon heat source of a carbon heat source type flavor inhaler. The lighter (1) is used for a carbon heat source type flavor inhaler (5). The carbon heat source type flavor inhaler (5) is equipped with a cylindrical holder (8) that contains a flavor source (7), and a carbon heat source (6) that is disposed at the end of the holder in the axial direction. The lighter (1) comprises: a lighter body (2) that has a cavity (3) provided therein, the cavity (3) having an insertion opening through which the carbon heat source can be inserted and removed, and which is capable of accommodating at least a portion of the carbon heat source; and a side circumferential heating unit (4) disposed in the cavity of the lighter body, for heating at least a portion of the side circumferential portion (62) of the carbon heat source when the carbon heat source is accommodated in the cavity.

FIG. 1



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Description

Technical Field

[0001] The present invention relates to a lighter for a carbon heat source type flavor inhaler, and a smoking system.

Background Art

[0002] Known carbon heat source type flavor inhalers include a tubular holder accommodating a flavor source, and a carbon heat source disposed in an axial end portion of the holder (see, for example, Patent document 1). With this type of carbon heat source type flavor inhalers, heat generated by combustion of the carbon heat source is used to heat the flavor source without combustion, and an aerosol containing flavor components generated from the flavor source is inhaled.

[0003] According to another proposed technique, a carbon heat source of a carbon heat source type flavor inhaler includes a combustion improver added to promote ignition (see, for example, Patent document 2).

Citation List

Patent document

[0004]

Patent document 1: Japanese Unexamined Patent Application Publication (Translation of PCT Application) No. 2015-509709

Patent document 2: Japanese Unexamined Patent Application Publication (Translation of PCT Application) No. 2015-507934

Summary of Invention

Technical Problem

[0005] Although the inclusion of the combustion improver in the carbon heat source of the carbon heat source type flavor inhaler facilitates ignition of the carbon heat source, unless combustion of the carbon heat source during ignition is controlled, the sustainability of combustion of the carbon heat source may become compromised.

[0006] The present invention has been made in view of the above-mentioned circumstances, and it is accordingly an object of the present invention to provide a technique pertaining to a lighter capable of improving the sustainability of combustion of the carbon heat source of the carbon heat source type flavor inhaler.

Solution to Problem

[0007] To address the above-mentioned problem, the present invention provides a lighter for a carbon heat source type flavor inhaler. The carbon heat source type flavor inhaler includes a holder and a carbon heat source, the holder containing a flavor source and having a tubular shape, the carbon heat source being disposed in an end portion of the holder in an axial direction of the holder. The lighter includes a lighter body, and a lateral-circumference heating part. The lighter body has a cavity, the cavity having an insertion opening through which the carbon heat source can be inserted and removed, the cavity being capable of accommodating at least a portion of the carbon heat source. The lateral-circumference heating part is disposed in the cavity of the lighter body. The lateral-circumference heating part heats at least a portion of a lateral circumferential part of the carbon heat source when the carbon heat source is accommodated in the cavity.

[0008] In one possible embodiment, the lighter body has a deformable part that allows the cavity to change in cross-sectional area.

[0009] In one possible embodiment, the lateral-circumference heating part includes two or more heating regions, and at least one of the two or more heating regions is movable in conjunction with deformation of the deformable part.

[0010] In one possible embodiment, the lighter body includes plural inner wall parts defining the cavity, the inner wall parts being movable relative to each other in conjunction with deformation of the deformable part to cause the cavity to change in cross-sectional area.

[0011] In one possible embodiment, the lighter body has a first body part and a second body part, the first body part including a first inner wall part defining the cavity, the second body part including a second inner wall part defining the cavity, the deformable part is an extensible component that is disposed between the first body part and the second body part and capable of elongation deformation and contraction deformation, contraction deformation of the extensible component causes the first inner wall part and the second inner wall part to move toward each other, and elongation deformation of the extensible component causes the first inner wall part and the second inner wall part to move away from each other.

[0012] In one possible embodiment, the first inner wall part and the second inner wall part each have a semi-cylindrical shape.

[0013] In one possible embodiment, the lateral-circumference heating part includes a first lateral-circumference heating part and a second lateral-circumference heating part, the first lateral-circumference heating part being disposed on the first inner wall part, the second lateral-circumference heating part being disposed on the second inner wall part.

[0014] In one possible embodiment, no heating part that heats a distal end face of the carbon heat source is

disposed at a location that faces the distal end when the carbon heat source is accommodated in the cavity.

[0015] In one possible embodiment, a distal-end-face heating part that heats a distal end face of the carbon heat source is disposed at a location that faces the distal end face when the carbon heat source is accommodated in the cavity, the distal-end-face heating part being integrated with or separate from the lateral-circumference heating part, and a heating temperature set for the distal-end-face heating part is lower than a heating temperature set for the lateral-circumference heating part.

[0016] In one possible embodiment, the cavity has a cavity length greater than a protrusion length by which the carbon heat source protrudes from the end portion of the holder, the cavity length being a length of the cavity extending in an axial direction of the cavity.

[0017] In one possible embodiment, the lateral-circumference heating part has a heating-part length greater than the protrusion length by which the carbon heat source protrudes from the end portion of the holder, the heating-part length being a length of the heating part extending in the axial direction of the cavity.

[0018] In one possible embodiment, the lateral-circumference heating part includes a flavor-source heating part and a carbon-heat-source heating part, the flavor-source heating part being disposed in a portion of the cavity near the insertion opening, the carbon-heat-source heating part being disposed farther from the insertion opening than the flavor-source heating part is.

[0019] In one possible embodiment, a heating temperature set for the carbon-heat-source heating part is higher than a heating temperature set for the flavor-source heating part.

[0020] In one possible embodiment, the cavity extends through the lighter body, and has a passage opening through which the carbon heat source can be passed, the passage opening being located at an end of the cavity different from the insertion opening.

[0021] In one possible embodiment, the lighter for a carbon heat source type flavor inhaler further includes positioning means for, when the carbon heat source is accommodated in the cavity, positioning the carbon heat source with respect to the cavity.

[0022] In one possible embodiment, the positioning means includes a stopper that, when the carbon heat source is accommodated in the cavity, contacts the carbon heat source to regulate an insertion depth to which the carbon heat source is inserted into the cavity.

[0023] In one possible embodiment, the cavity has a bottom part at an end different from the insertion opening, and the bottom part defines the stopper.

[0024] In one possible embodiment, the bottom part of the cavity is made of a heat-resistant material.

[0025] In one possible embodiment, the positioning means includes locking means for locking the holder in place to regulate an insertion depth to which the carbon heat source is inserted into the cavity.

[0026] In one possible embodiment, the insertion opening has an inner diameter less than an outer diameter of the holder, and an edge portion of the insertion opening defines the locking means.

[0027] According to the present invention, there may be provided a smoking system including a carbon heat source type flavor inhaler, and the lighter according to any one of the foregoing embodiments. The carbon heat source type flavor inhaler includes a holder and a carbon heat source, the holder containing a flavor source and having a tubular shape, the carbon heat source being disposed in an end portion of the holder in an axial direction of the holder.

[0028] In one possible embodiment, when the carbon heat source is accommodated in the cavity, at least a portion of the lateral circumferential part of the carbon heat source, and at least a portion of the flavor source of the holder are both heated by the lateral-circumference heating part of the lighter.

[0029] In one possible embodiment, with the carbon heat source accommodated in the cavity, a rear end portion of at least the lateral circumferential part of the carbon heat source is heated by the lateral-circumference heating part of the lighter.

[0030] In one possible embodiment, the cavity has an inner diameter greater than or equal to an outer diameter of the carbon heat source.

[0031] In one possible embodiment, in a portion of the carbon heat source type flavor inhaler where the holder and the carbon heat source are connected to each other, the holder has an outer diameter greater than an outer diameter of the carbon heat source.

[0032] In one possible embodiment, at least one of the holder and the carbon heat source is provided with a mark that allows a smoker to identify whether the carbon heat source is inserted in the cavity to an appropriate depth.

[0033] In one possible embodiment, the carbon heat source includes a combustion improver.

[0034] In one possible embodiment, the combustion improver has an average weight concentration that varies in a radial direction of the carbon heat source.

[0035] In one possible embodiment, the combustion improver has an average weight concentration in the lateral circumferential part of the carbon heat source higher than an average weight concentration of the combustion improver in an inner layer part of the carbon heat source, the inner layer part being located inside the lateral circumferential part in the radial direction of the carbon heat source.

[0036] In one possible embodiment, the combustion improver has an average weight concentration in the lateral circumferential part of the carbon heat source higher than an average weight concentration of the combustion improver in an ignition end portion of the carbon heat source.

[0037] In one possible embodiment, the ignition end portion of the carbon heat source includes no combustion improver.

[0038] In one possible embodiment, the combustion improver has an average weight concentration in a rear end portion of the carbon heat source higher than an average weight concentration of the combustion improver in an ignition end portion of the carbon heat source.

[0039] In one possible embodiment, at least a portion of an inner wall surface of the cavity contacts the lateral circumferential part of the carbon heat source accommodated in the cavity.

[0040] In one possible embodiment, an outer surface of the carbon heat source has substantially no flow channel in ventilating communication with an internal space of the holder.

[0041] In one possible embodiment, the cavity has a bottom part at an end different from the insertion opening, the bottom part being capable of making close contact with a distal end face of the carbon heat source when the carbon heat source is accommodated in the cavity.

[0042] In one possible embodiment, the cavity is hermetically closed when the carbon heat source is accommodated in the cavity.

[0043] Various means for addressing problems to be overcome by the present invention may be used in combination as much as possible.

Advantageous Effects of Invention

[0044] The present invention makes it possible to provide a technique pertaining to a lighter capable of improving the sustainability of combustion of a carbon heat source of a carbon heat source type flavor inhaler.

Brief Description of Drawings

[0045]

[Fig. 1] Fig. 1 is an external view of a lighter for a carbon heat source type flavor inhaler in accordance with Embodiment 1.

[Fig. 2] Fig. 2 is a longitudinal sectional view of a carbon heat source type flavor inhaler in accordance with Embodiment 1.

[Fig. 3] Fig. 3 is a perspective view of a carbon heat source in accordance with Embodiment 1.

[Fig. 4] Fig. 4 is a sectional view of the vicinity of a cavity of a lighter in accordance with Embodiment 1.

[Fig. 5] Fig. 5 illustrates a lighter body with a carbon heat source inserted in a cavity of the lighter body in accordance with Embodiment 1.

[Fig. 6] Fig. 6 is a sectional view of the vicinity of a cavity of a lighter body in accordance with Embodiment 2.

[Fig. 7] Fig. 7 is a sectional view of the vicinity of a cavity of a lighter body in accordance with a modification of Embodiment 2.

[Fig. 8] Fig. 8 is a sectional view of the vicinity of a cavity of a lighter body in accordance with Embodiment 3.

[Fig. 9] Fig. 9 illustrates a carbon heat source type flavor inhaler with a carbon heat source inserted in a cavity.

[Fig. 10] Fig. 10 illustrates a carbon heat source type flavor inhaler in accordance with a modification.

[Fig. 11A] Fig. 11A is a longitudinal sectional view of a carbon heat source attached to the distal end of a carbon heat source type flavor inhaler in accordance with a modification.

[Fig. 11B] Fig. 11B illustrates a carbon heat source as viewed from the ignition side in accordance with a modification.

[Fig. 11C] Fig. 11C illustrates a carbon heat source as viewed from the side opposite to the ignition side in accordance with a modification.

[Fig. 12] Fig. 12 is a sectional view of the vicinity of a cavity of a lighter body in accordance with a modification of Embodiment 3.

[Fig. 13] Fig. 13 is a perspective view of a lighter body of a lighter in accordance with Embodiment 4.

[Fig. 14] Fig. 14 is a top view of a lighter body in accordance with Embodiment 4;

[Fig. 15] Fig. 15 illustrates a deformable part under elongation deformation.

[Fig. 16] Fig. 16 illustrates a lighter body with a deformable part deformed to contract after a carbon heat source is accommodated into a cavity of the lighter body.

Description of Embodiments

[0046] A lighter for a carbon heat source type flavor inhaler, and a smoking system according to embodiments of the present invention are described below with reference to the drawings. Details such as the dimensions, materials, shapes, and relative arrangement of components given in the following description of embodiments are, unless otherwise stated, not intended to limit the technical scope of the present invention to the particular details set forth.

<Embodiment 1>

[0047] Fig. 1 is an external view of a lighter 1 for a carbon heat source type flavor inhaler in accordance with Embodiment 1. The lighter 1 in Fig. 1 can be suitably used to, for example, ignite a carbon heat source of a carbon heat source type flavor inhaler 5 illustrated in Fig. 2. In Embodiment 1, the lighter 1 and the carbon heat source type flavor inhaler 5, which are illustrated in Fig. 1, constitute a smoking system SS.

[0048] First, a schematic configuration of the carbon heat source type flavor inhaler 5 is described. Fig. 2 is a longitudinal sectional view of the carbon heat source type flavor inhaler 5 in accordance with Embodiment 1.

[0049] As illustrated in Fig. 2, the carbon heat source type flavor inhaler 5 according to Embodiment 1 includes a flavor source 7, a carbon heat source 6, a holder 8 for

holding the flavor source 7 and the carbon heat source 6, a filter 9, and other components. The filter 9 is attached at a rear end 8B of the holder 8. The filter 9 also serves as a mouthpiece on which the smoker draws when smoking with the carbon heat source type flavor inhaler 5. The filter 9 is integrally connected with the holder 8 by being wrapped in, for example, tipping paper integrally with the holder 8. The filter 9 is not limited to a particular type. For example, various types of filters used for common cigarettes may be used.

[0050] The flavor source 7 is contained in the holder 8. The flavor source 7 releases flavor upon transfer of heat that the carbon heat source 6 generates when ignited.

[0051] As the flavor source 7, for example, tobacco leaves may be used. Examples of suitable tobacco materials include common shredded tobacco used for cigarettes (paper-wrapped tobacco), ground tobacco used for snuff, rolling tobacco, and molded tobacco. As the flavor source 7, a carrier made of a porous or non-porous material may be used. Rolling tobacco is made by forming sheet-like reconstituted tobacco into a roll, with a flow channel defined therein. Molded tobacco is made by molding ground tobacco. A tobacco material or carrier used as the flavor source 7 may contain a desired flavoring. The flavor source 7 includes an aerosol-source material used to generate an aerosol upon heating. Examples of aerosol-source materials include glycerol, propylene glycol, polyol such as 1, 3-butanediol, triglyceride fatty acid such as medium chain triglyceride (MCT), and mixtures thereof. The flavor source 7 may be obtained by filling, with a filler such as a tobacco sheet or tobacco shreds, a cup produced by pulp injection molding, a cup made of a thermally stable material such as aluminum or stainless steel, or a tubular component.

[0052] The holder 8 is in the form of, for example, a paper tube formed as a hollow cylinder that is obtained by curving a sheet of rectangular cardboard into a cylindrical shape and joining the opposite edge portions together. Alternatively, however, the holder 8 may be made of other materials. As illustrated in Fig. 2, the carbon heat source 6 is fit in a distal end 8a of the holder 8 such that a portion of the carbon heat source 6 is exposed from the distal end 8a, and the flavor source 7 is accommodated downstream of the carbon heat source 6.

[0053] Inside the holder 8, a non-combustible component with air gaps or air-permeability may be disposed between the carbon heat source 6 and the flavor source 7 such that the carbon heat source 6 and the flavor source 7 do not adjoin each other. Exposing at least a portion of the carbon heat source 6 from the holder 8 as illustrated in Fig. 2 facilitates viewing of the combustion of the carbon heat source 6. Reference numeral 10 in Fig. 2 denotes a heat-resistant component disposed on the inner face of the paper tube defining the holder 8. The heat-resistant component 10 may be made of, for example, aluminum-laminated paper stuck on the inner face of the paper tube.

[0054] Fig. 3 is a perspective view of the carbon heat source 6 attached to the distal end of the carbon heat source type flavor inhaler 5 in accordance with Embodiment 1. In Embodiment 1, the carbon heat source 6 has a cylindrical shape. The carbon heat source 6 may be formed by, for example, compression molding or extrusion molding of a mixture containing high-purity carbon particles, a non-combustible additive, an organic or inorganic binder, and water. Alternatively, the carbon heat source 6 may be made of the above-mentioned materials formed into a sheet and folded up to be accommodated inside a tubular component. The holder 8 is of somewhat greater diameter than the carbon heat source 6.

[0055] The carbon heat source 6 according to Embodiment 1 has an inner layer part 61, and a lateral circumferential part 62. The inner layer part 61 is a cylindrical region including a central axis 60A of the carbon heat source 6. The inner layer part 61 is located inside the lateral circumferential part 62 in the radial direction of the carbon heat source 6. The lateral circumferential part 62 is a cylindrical region disposed outside the inner layer part 61 in the radial direction of the carbon heat source 6. The lateral circumferential part 62 includes a lateral face 62A of the carbon heat source 6. The lateral circumferential part 62 of the carbon heat source 6 surrounds and is in contact with the outer circumference of the inner layer part 61. The lateral circumferential part 62 has an inner diameter substantially equal to the outer diameter of the inner layer part 61. Reference sign 63 in Fig. 3 denotes an ignition end portion of the carbon heat source 6. The ignition end portion 63 of the carbon heat source 6 refers to an end portion of the carbon heat source 6 that is located remote from the distal end 8A of the holder 8 with the carbon heat source 6 fit in the holder 8. The ignition end portion 63 includes a distal end face 63A.

[0056] The carbon heat source 6 may include a combustion improver in the inner layer part 61 and in the lateral circumferential part 62. A combustion improver is a material for facilitating the combustion of carbon contained in the carbon heat source. A combustion improver may be, for example, a material that, during burning of carbon contained in the carbon heat source, releases one or both of energy and oxygen. Examples of combustion improvers may include: nitrates such as potassium nitrate, calcium nitrate, strontium nitrate, sodium nitrate, barium nitrate, lithium nitrate, aluminum nitrate, and iron nitrate; nitrites; other organic or inorganic nitro-compounds; chlorates such as sodium chlorate and potassium chlorate; perchlorates such as sodium perchlorate; chlorites; bromates such as sodium bromate and potassium bromate; perbromates; bromites; borates such as sodium borate and potassium borate; ferrates such as barium ferrate; ferrites; manganates such as potassium manganate; permanganates such as potassium permanganate; organic peroxides such as benzoyl peroxide and acetone peroxide; inorganic peroxides such as hydrogen peroxide, strontium peroxide, magnesium peroxide, calcium peroxide, barium peroxide, zinc peroxide, and lith-

ium peroxide; superoxides such as potassium superoxide and sodium superoxide; iodates; periodates; iodites; sulfates; sulfites; other sulfoxides; phosphates; phosphonates; phosphites; and phosphinites.

[0057] The carbon heat source 6 contains the combustion improver at an average weight concentration that varies in the radial direction of the carbon heat source. More specifically, the average weight concentration of the combustion improver in the lateral circumferential part 62 of the carbon heat source 6 is higher than the average weight concentration of the combustion improver in the inner layer part 61. The carbon heat source 6 may contain the combustion improver in the lateral circumferential part 62 at an average weight concentration higher than the average weight concentration of the combustion improver in the ignition end portion 63. The carbon heat source 6 according to Embodiment 1 contains no combustion improver in the ignition end portion 63. The carbon heat source 6 according to Embodiment 1 contains the combustion improver in a rear end portion 64 at an average weight concentration higher than the average weight concentration of the combustion improver in the ignition end portion 63. As used herein, the term "average weight concentration of the combustion improver" refers to the proportion in weight of the combustion improver to the carbon heat source 6 (the weight of the combustion improver/the weight of the carbon heat source). For example, the average weight concentration of the combustion improver in the inner layer part 61 of the carbon heat source 6 is the proportion of the weight of the combustion improver contained in the inner layer part 61 to the weight of the inner layer part 61. For example, the average weight concentration of the combustion improver in the lateral circumferential part 62 of the carbon heat source 6 is the proportion of the weight of the combustion improver contained in the lateral circumferential part 62 to the weight of the lateral circumferential part 62. The average weight concentration of the combustion improver in the rear end portion 64 of the carbon heat source 6 is the proportion of the weight of the combustion improver contained in the rear end portion 64 to the weight of the rear end portion 64. The average weight concentration of the combustion improver in the ignition end portion 63 of the carbon heat source 6 is the proportion of the weight of the combustion improver contained in the ignition end portion 63 relative to the weight of the ignition end portion 63.

[0058] As illustrated in Fig. 2, within the holder 8 of the carbon heat source type flavor inhaler 5, an airflow directing element 11 is disposed downstream of the flavor source 7. The airflow directing element 11 is of a double-tube structure with an inner tube 110 and an outer tube 111. The upstream end of the airflow directing element 11 is positioned in contact with the flavor source 7. The airflow directing element 11 is substantially closed at the downstream end with an air-impermeable seal 112, except at a location corresponding to the inner tube 110. The inner tube 110 is hollow. The annular region sandwiched by the outer tube 111 and the inner tube 110 may be hollow, or may be provided with a suitable air-permeable material (e.g., cellulose acetate tow or cotton) disposed therein.

[0059] The holder 8 of the carbon heat source type flavor inhaler 5 has an air hole 81. The number of air holes 81 is not particularly limited. The air hole 81 is provided at a position corresponding to the airflow directing element 11, more specifically, at a position near a rear portion of the airflow directing element 11. The air hole 81 extends not only through the paper tube defining the holder 8 but also through the outer tube 111. During smoking with the carbon heat source type flavor inhaler 5, as the smoker draws on the filter 9, air is drawn into a first passageway 113 through the air hole 81. The first passageway 113 is defined in a portion of the airflow directing element 11 between the inner tube 110 and the outer tube 111. The air drawn into the first passageway 113 of the airflow directing element 11 flows along the first passageway 113 toward the flavor source 7. As the flavor source 7 is heated with the heat from the carbon heat source 6 that has been ignited, a volatile compound and glycerol are released from the flavor source 7. As the volatile compound and the glycerol released from the flavor source 7 are mixed with air passing in the flavor source 7, an aerosol is formed. The aerosol generated in the flavor source 7 flows out into a second passageway 114 defined inside the inner tube 110. After passing through the second passageway 114, the aerosol passes through a chamber 82, which is defined in a portion of the holder 8 between the second passageway 114 and the filter 9. The aerosol then flows into the filter 9 for delivery to the smoker's mouth through the filter 9. Various modifications can be made to the carbon heat source type flavor inhaler 5. For example, the carbon heat source type flavor inhaler 5 may not include the airflow directing element 11 disposed inside the holder 8. In this case, the air hole 81 may preferably be provided at a location of the holder 8 corresponding to the outer circumference of the flavor source 7. This allows external air to be introduced into the flavor source 7 during smoking for aerosol formation.

[0060] Reference is now made to the structure of the lighter 1. As illustrated in Fig. 1, the lighter 1 has a lighter body 2. The lighter body 2 has a casing 20. A power supply 21 is accommodated in the casing 20. The lighter body 2 includes an ignition operating part 22 that is operated by the smoker. A portion of the ignition operating part 22 is exposed to the outside of the casing 20 through an opening provided in the casing 20, such that, for example, the ignition operating part 22 is pressed in by the smoker. An activation switch (not illustrated), which operates in conjunction with the ignition operating part 22, is accommodated in the casing 20. Although the activation switch is not particularly limited, the activation switch may be in the form of, for example, a push-button switch of a momentary type (momentary on/momentary off type) whose on and off states can be switched in conjunction

with the pressing of the ignition operating part 22. The power supply 21 may be a disposable primary battery, or may be a rechargeable secondary battery.

[0061] The lighter body 2 has a cavity 3 capable of accommodating at least a portion of the carbon heat source 6. The cavity 3, which is circular in section, defines a through-hole extending through the lighter body 2. The cavity 3 has a cylindrical inner circumferential face, with a lateral-circumference heater 4 disposed on the inner circumferential face. Although described in more detail later, the lateral-circumference heater 4 is used to heat at least a portion of the lateral circumferential part 62 of the carbon heat source 6 when the cavity 3 is accommodated in the carbon heat source 6.

[0062] Fig. 4 is a sectional view of the vicinity of the cavity 3 of the lighter 1 in accordance with Embodiment 1. More specifically, Fig. 4 is a sectional view taken along an arrow A-A in Fig. 1. Reference sign 20A in Fig. 4 denotes an upper face of the casing 20, and reference sign 20B denotes a lower face of the casing 20. Reference sign 31 denotes an insertion opening defined as one open end of the cavity 3 extending through the lighter body 2. The carbon heat source 6 can be inserted and removed through the insertion opening 31. In the example in Fig. 4, the insertion opening 31 is provided on the upper face 20A of the casing 20. Reference sign 32 denotes a passage opening defined as the other open end of the cavity 3. In the example in Fig. 4, the passage opening 32 is provided on the lower face 20B of the casing 20.

[0063] As illustrated in Fig. 4, the lateral-circumference heater 4 includes an electric heating coil wire 40 and a lateral-circumference heating part 41. The lateral-circumference heating part 41 of the lateral-circumference heater 4 is a cylindrical metal plate used to heat the lateral circumferential part 62 of the carbon heat source 6, and defines the inner circumferential face of the cavity 3. The electric heating coil wire 40 is disposed on the back side of the lateral-circumference heating part 41 (near the inner portion of the casing 20), and wound in a spiral along the back face of the lateral-circumference heating part 41. The electric heating coil wire 40 and the lateral-circumference heating part 41 are integrally secured in place by using a suitable method. Although the electric heating coil wire 40 is not particularly limited, the electric heating coil wire 40 may be, for example, a kanthal wire or a nichrome wire. The electric heating coil wire 40 may be positioned to be exposed toward the cavity 3.

[0064] A terminal (not illustrated) is attached at each end of the electric heating coil wire 40 of the lateral-circumference heater 4. Each terminal of the electric heating coil wire 40 is electrically connected to the power supply 21 and the activation switch (not illustrated) via an electrically conductive component (not illustrated) (e.g., a lead wire) such that, for example, the electric heating coil wire 40 is energized while the ignition operating part 22 is pressed in by the smoker. Reference sign Dh1 in Fig. 4 denotes the inner diameter of the cavity 3, which is substantially equal to the inner diameter of the lateral-circumference heating part 41. Reference sign CL denotes the axis of the cavity 3. In Embodiment 1, the inner diameter Dh1 of the cavity 3 is constant along the axis CL. The inner diameter Dh1 of the cavity 3 is set greater than the diameter Dc1 of the carbon heat source 6. This facilitates insertion of the carbon heat source 6 into the cavity 3 through the insertion opening 31 of the cavity 3. More specifically, this helps to reduce breaking, chipping, or other damage to the carbon heat source 6 during insertion of the carbon heat source 6 into the cavity 3.

<Method for Igniting Carbon Heat Source>

[0065] Reference is now made to how the carbon heat source 6 of the carbon heat source type flavor inhaler 5 is ignited with the lighter 1. Fig. 5 illustrates the lighter body 2 with the carbon heat source 6 of the carbon heat source type flavor inhaler 5 inserted into the cavity 3 through the insertion opening 31. In a portion of the carbon heat source type flavor inhaler 5 according to Embodiment 1 where the holder 8 is connected with the carbon heat source 6, the diameter (outer diameter) Dc2 of the holder 8 is set greater than the diameter Dc1 of the carbon heat source 6. The inner diameter Dh1 of the cavity 3 is set less than the diameter (outer diameter) Dc2 of the holder 8. The above configuration ensures that when the smoker inserts the carbon heat source 6 through the insertion opening 31 of the lighter body 2, further insertion is restricted once the distal end 8A of the holder 8 comes into contact with the edge portion of the insertion opening 31. This allows for proper positioning of the carbon heat source 6 with respect to the cavity 3. In Embodiment 1, the edge portion of the insertion opening 31, which comes into contact with the distal end 8A of the holder 8 to allow positioning of the carbon heat source 6 with respect to the cavity 3, corresponds to positioning means according to the present invention. The edge portion of the insertion opening 31 also serves as locking means for locking the holder 8 in place to thereby regulate the insertion depth to which the carbon heat source 6 is inserted into the cavity 3.

[0066] As illustrated in Fig. 5, with the carbon heat source 6 positioned with respect to the cavity 3, the lateral circumferential part 62 of the carbon heat source 6 faces the lateral-circumference heating part 41, in other words, the lateral circumferential part 62 of the carbon heat source 6 is surrounded by the lateral-circumference heating part 41. When the smoker presses in the ignition operating part 22 in this state, the activation switch (not illustrated) activates, and the electric heating coil wire 40 of the lateral-circumference heater 4 is energized while the ignition operating part 22 is pressed in. As a result, the electric heating coil wire 40 constituting the lateral-circumference heater 4 becomes red hot, which causes the lateral-circumference heating part 41 integrally joined with the electric heating coil wire 40 to reach an elevated temperature. The lateral-circumference heating part 41,

which is now at an elevated temperature, heats the lateral circumferential part 62 of the carbon heat source 6 to allow selective ignition of the lateral circumferential part 62 of the carbon heat source 6. When igniting the carbon heat source 6, the smoker may ignite the carbon heat source 6 while drawing (puffing) on the filter 9.

[0067] The carbon heat source 6 of the carbon heat source type flavor inhaler 5 contains the combustion improver. This helps to ensure that even if an air gap is present between the lateral-circumference heating part 41 of the lateral-circumference heater 4 and the lateral circumferential part 62 of the carbon heat source 6, the lateral circumferential part 62 can be easily ignited by the heat of radiation from the lateral-circumference heating part 41. The lighter 1 according to Embodiment 1 includes no heating part disposed at a location facing the distal end face 63A of the carbon heat source 6 to heat the distal end face 63A. Consequently, in igniting the carbon heat source 6, the lateral circumferential part 62 of the carbon heat source 6 can be selectively heated by the lateral-circumference heating part 41 of the lateral-circumference heater 4. This allows only the lateral circumferential part 62 to be ignited and combusted. As a result, after combustion of the carbon heat source 6 is initiated from the lateral circumferential part 62, the combustion is allowed to gradually proceed toward the center of the carbon heat source 6 in the radial direction. By controlling combustion such that the combustion proceeds gradually from the lateral circumferential part 62 of the carbon heat source 6 toward the inner layer part 61 in this way, the sustainability of combustion of the carbon heat source 6 can be improved. In other words, combustion of the carbon heat source 6 can be sustained for an extended period of time.

[0068] In the lighter 1 according to Embodiment 1, the carbon heat source 6 protrudes from the distal end 8A of the holder 8 by a length (to be referred to as "carbon-heat-source protrusion length" hereinafter) that is set greater than the length along the axis CL of the cavity 3 (to be referred to as "cavity length" hereinafter). Consequently, as illustrated in Fig. 4, with the carbon heat source 6 positioned with respect to the cavity 3, the ignition end portion 63 of the carbon heat source 6 protrudes downward from the passage opening 32 provided on the lower face 20B of the casing 20.

[0069] In the carbon heat source type flavor inhaler 5 according to Embodiment 1, the average weight concentration of the combustion improver in the lateral circumferential part 62 of the carbon heat source 6 is higher than the average weight concentration of the combustion improver in the inner layer part 61. As a result, in igniting the carbon heat source 6 with the lighter 1, ignition in the lateral circumferential part 62 is further facilitated, and control of the progression of combustion from the lateral circumferential part 62 toward the inner layer part 61 is further facilitated. Further, in the carbon heat source 6, the average weight concentration of the combustion improver in the lateral circumferential part 62 is higher than the average weight concentration of the combustion improver in the ignition end portion 63. This helps to reduce the spread of combustion to the distal end face 63 A of the carbon heat source 6 during ignition of the carbon heat source 6. In particular, the absence of the combustion improver in the ignition end portion 63 of the carbon heat source 6 helps to further reduce the spread of combustion to the distal end face 63 A of the carbon heat source 6. In the carbon heat source 6 according to Embodiment 1, the average weight concentration of the combustion improver in the rear end portion 64 is higher than the average weight concentration of the combustion improver in the ignition end portion 63. This helps to accelerate ignition of the rear end portion 64, which is located near the flavor source 7 disposed downstream of the carbon heat source 6. This helps to accelerate the release of flavor from the flavor source 7 upon ignition of the carbon heat source 6, leading to improved response of smoke taste at the beginning of smoking. In other words, a sufficient amount of flavor can be supplied to the smoker from the beginning of smoking.

[0070] Although the foregoing description of Embodiment 1 is directed to a case where the electric heating coil wire 40 is used for the lateral-circumference heater 4, other heating means may be employed. For example, the lateral-circumference heater 4 may include a gas heater, or may include an induction heating (IH) heater that utilizes high-frequency dielectric heating. If an IH heater is to be used for the lateral-circumference heater 4, the carbon heat source 6 may be heated as an electric conductor (heated object) (direct heating system), or the carbon heat source 6 may be heated by disposing a conductive metallic susceptor (heated object) on the inner circumferential face of the cavity 3 and transferring the heat of the metallic susceptor to the carbon heat source 6 (indirect heating system). If an IH heater is to be used for the lateral-circumference heater 4, it may be preferable to apply alternating current to the IH heater from the power supply 21. The lateral-circumference heater 4 may include a thin planar heating element such as a film heater. The film heater may be made of, for example, a sheet material that is a laminate of an aluminum foil and a PET film and on which a heater circuit is etched.

<Embodiment 2>

[0071] Embodiment 2 is described below. Fig. 6 is a sectional view of the vicinity of a cavity 3 A of a lighter body 2 A in accordance with Embodiment 2. In Embodiment 2, components or features identical to those in Embodiment 1 are denoted by the same reference signs and thus will not be described in further detail. The cavity 3A of the lighter body 2A according to Embodiment 2 has a cavity length L1 greater than a carbon-heat-source protrusion length L2, which is the protrusion length of the carbon heat source 6 of the carbon heat source type flavor inhaler 5. Further, a heating-part length L3 that the lateral-circumference heating part 41 of the lateral-cir-

cumference heater 4 extends along the axis CL of the cavity 3A is set greater than the carbon-heat-source protrusion length L2 of the carbon heat source 6. In Embodiment 2, the inner diameter Dh1 of the cavity 3A is set greater than the diameter Dc1 of the carbon heat source 6 and the diameter (outer diameter) Dc2 of the holder 8.

[0072] Fig. 6 illustrates the carbon heat source type flavor inhaler 5 with the carbon heat source 6 accommodated in the cavity 3A of the lighter body 2A. In the carbon heat source type flavor inhaler 5 according to Embodiment 2, a positioning mark 83 is provided on the outer face (surface) of the holder 8. The positioning mark 83 is a mark that, when the carbon heat source 6 is accommodated into the cavity 3A of the lighter body 2A, allows the smoker to identify whether the carbon heat source 6 has been inserted into the cavity 3A to an appropriate depth. Details such as the size, shape, motif, and number of positioning marks 83 can be changed as appropriate. The positioning mark 83 may be provided on the surface of the lateral circumferential part 62 of the carbon heat source 6 instead of or in addition to the outer face (surface) of the holder 8. For example, the positioning mark 83 is provided on the surface of the lateral circumferential part 62 of the carbon heat source 6 for a case where ignition of the carbon heat source 6 is performed with the carbon heat source 6 accommodated halfway into the cavity 3A.

[0073] In Embodiment 2, in inserting the carbon heat source 6 of the carbon heat source type flavor inhaler 5 into the cavity 3A of the lighter body 2A, the positioning mark 83 on the surface of the holder 8 is aligned with, for example, the position of the insertion opening 31 of the cavity 3A (a height flush with the upper face 20A of the casing 20). This results in the positional relationship between the carbon heat source type flavor inhaler 5 and the cavity 3A as illustrated in Fig. 6. That is, as illustrated in Fig. 6, substantially the entirety of the carbon heat source 6 protruding from the holder 8, and at least a portion of the flavor source 7 accommodated in the holder 8 are accommodated in the cavity 3A in this state. In other words, with the lighter 1 according to Embodiment 2, the lateral-circumference heating part 41 of the lateral-circumference heater 4 can be positioned to overlie the carbon heat source 6 and the flavor source 7.

[0074] Consequently, in igniting the carbon heat source 6 of the carbon heat source type flavor inhaler 5, the flavor source 7 can be preheated with the heat from the lateral-circumference heating part 41 of the lateral-circumference heater 4. This helps to accelerate the release of flavor from the flavor source 7, leading to improved response of smoke taste at the beginning of smoking. Further, in Embodiment 2, with the carbon heat source 6 accommodated in the cavity 3A, the rear end portion 64 of at least the lateral circumferential part 62 of the carbon heat source 6 is heated by the lateral-circumference heating part 41. This results in accelerated ignition of the rear end portion 64 located proximate to the flavor source 7. This allows for quicker release of flavor from the flavor source 7. In one alternative configuration, a heat-conducting component may be disposed in the holder 8 to conduct the heat from the lateral-circumference heating part 41 to the flavor source 7, and the flavor source 7 may be heated via the heat-conducting component.

[0075] As described above with reference to Embodiment 2, the inner diameter Dh1 of the cavity 3A is set greater than the diameter Dc1 of the carbon heat source 6 and the diameter (outer diameter) Dc2 of the holder 8, and the cavity 3A is formed so as to extend through the lighter body 2A. Consequently, even if the lighter body 2A has the cavity length L1 and the heating-part length L3 that are set less than the carbon-heat-source protrusion length L2 of the carbon heat source type flavor inhaler 5, the lateral-circumference heating part 41 can be positioned to overlie both the carbon heat source 6 and the flavor source 7. As a result, in igniting the carbon heat source 6, the flavor source 7 can be preheated concurrently with the ignition. The lighter body 2A may be provided with locking means for locking the holder 8 of the carbon heat source type flavor inhaler 5 in place to thereby regulate the insertion depth to which the carbon heat source 6 is inserted into the cavity 3A.

<Modification of Embodiment 2>

[0076] A modification of Embodiment 2 is described below. Fig. 7 is a sectional view of the vicinity of a cavity 3B of a lighter body 2B in accordance with a modification of Embodiment 2. In this modification, components or features identical to those in Embodiment 2 are denoted by the same reference signs and thus will not be described in further detail. As illustrated in Fig. 7, a flavor-source heater 4A and a carbon-heat-source heater 4B are disposed in the cavity 3B of the lighter body 2B according to this modification. The flavor-source heater 4A includes a flavor-source electric heating coil wire 40A and a flavor-source heating part 41A. The carbon-heat-source heater 4B includes a carbon-heat-source electric heating coil wire 40B and a carbon-heat-source heating part 41B.

[0077] In this modification, the flavor-source heating part 41A and the carbon-heat-source heating part 41B define the inner circumferential face of the cavity 3B. As illustrated in Fig. 7, the flavor-source heating part 41A is positioned near the insertion opening 31 of the cavity 3B. The carbon-heat-source heating part 41B is positioned farther from the insertion opening 31 than the flavor-source heating part 41A is, in other words, near the passage opening 32 of the cavity 3B. In this modification, the flavor-source heating part 41A and the carbon-heat-source heating part 41B each correspond to a lateral-circumference heating part according to the present invention.

[0078] In this modification, the heating temperature set for the carbon-heat-source heating part 41B is higher than the heating temperature set for the flavor-source

heating part 41A. More specifically, the temperature of the flavor-source heater 4A, and the temperature of the carbon-heat-source heater 4B are controlled independently from each other, such that during energization of the flavor-source electric heating coil wire 40A and the carbon-heat-source electric heating coil wire 40B, the temperature of the carbon-heat-source heating part 41B is higher than the temperature of the flavor-source heating part 41A.

[0079] Fig. 7 depicts a state in which, in inserting the carbon heat source 6 into the cavity 3B, the positioning mark 83 on the holder 8 is aligned with the height of the insertion opening 31 of the cavity 3B to thereby position the carbon heat source 6 in place. With the carbon heat source 6 positioned in this way, as illustrated in Fig. 7, the flavor-source heating part 41A faces the flavor source 7 accommodated in the holder 8, and the carbon-heat-source heating part 41B faces the lateral circumferential part 62 of the carbon heat source 6. Consequently, in igniting the carbon heat source 6, the lateral circumferential part 62 of the carbon heat source 6 is heated by the carbon-heat-source heating part 41B, and the flavor source 7 is heated by the flavor-source heating part 41A. At this time, as described above, the heating temperature set for the carbon-heat-source heating part 41B is higher than the heating temperature set for the flavor-source heating part 41A. This helps to reduce excessive heating of the flavor source 7 and the holder 8 accommodating the flavor source 7, while also allowing for quick ignition of the lateral circumferential part 62 of the carbon heat source 6. This helps to reduce scorching, burning, or damaging of the distal end region of the holder 8 at the time of ignition of the carbon heat source 6.

[0080] Although Fig. 7 depicts an example in which the position of the upper end of the flavor-source heating part 41A is aligned with the position of insertion opening 31 of the cavity 3B, this is not intended to be limiting. For example, the upper end of the flavor-source heating part 41A may be positioned lower than the insertion opening 31 of the cavity 3B. Although Fig. 7 depicts an example in which the position of the lower end of the carbon-heat-source heating part 41B is aligned with the position of the passage opening 32 of the cavity 3B, this is not intended to be limiting. For example, the lower end of the carbon-heat-source heating part 41B may be positioned higher than the passage opening 32 of the cavity 3B. The flavor-source heating part 41A and the carbon-heat-source heating part 41B may not be provided contiguous to each other. Alternatively, the two heating parts may be spaced apart from each other.

<Embodiment 3>

[0081] Embodiment 3 is described below. Fig. 8 is a sectional view of the vicinity of a cavity 3C of a lighter body 2C in accordance with Embodiment 3. In Embodiment 3, components or features identical to those in Embodiment 1 are denoted by the same reference signs and thus will not be described in further detail. The cavity 3C of the lighter body 2C according to Embodiment 3 has a bottom part 33 provided at the passage opening 32. The passage opening 32 is closed by the bottom part 33. The lighter body 2C is otherwise similar in basic structure to the lighter body 2 according to Embodiment 1. The inner diameter Dh1 of the cavity 3C in the lighter body 2C is equal to the diameter Dc1 of the carbon heat source 6. The bottom part 33 of the cavity 3C thus has a sectional area substantially equal to the sectional area of the distal end face 63A of the carbon heat source 6.

[0082] Fig. 9 illustrates the carbon heat source type flavor inhaler 5 with the carbon heat source 6 inserted in the cavity 3C. In Fig. 9, the distal end face 63A of the carbon heat source 6 comes into contact with the bottom part 33 of the cavity 3C to thereby position the carbon heat source 6 in place. The bottom part 33 of the cavity 3C serves as a stopper that, upon contact with the distal end face 63A of the carbon heat source 6, restricts further insertion of the carbon heat source 6. In Embodiment 3, the bottom part 33 of the cavity 3C corresponds to positioning means and a stopper according to the present invention. As described above, the bottom part 33 of the cavity 3C serves as positioning means and a stopper. This helps to ensure that, in accommodating the carbon heat source 6 into the cavity 3C, the carbon heat source 6 is inserted into the cavity 3C to an appropriate depth.

[0083] In Embodiment 3, as illustrated in Fig. 9, ignition of the carbon heat source 6 occurs in a state in which the bottom part 33 of the cavity 3C is in close contact (abutting contact) with the distal end face 63A of the carbon heat source 6, and the lateral-circumference heating part 41 of the lateral-circumference heater 4, which defines the inner circumferential face of the cavity 3C, is in close contact (abutting contact) with the outer circumferential face of the lateral circumferential part 62 of the carbon heat source 6. In other words, ignition of the carbon heat source 6 is performed in a state in which the cavity 3C accommodating the carbon heat source 6 is hermetically closed. At this time, in the carbon heat source type flavor inhaler 5 according to Embodiment 3, the air hole 81 of the holder 8 is not accommodated outside the cavity 3C. This allows the smoker to ignite the carbon heat source 6 while drawing on the carbon heat source type flavor inhaler 5, without the need to provide the carbon heat source 6 with an air flow channel through which air is supplied to the flavor source 7 accommodated in the holder 8.

[0084] Even if, as with the carbon heat source type flavor inhaler 5 according to a modification illustrated in Fig. 10 and Figs. 11A to 11C, the carbon heat source 6 has an air flow channel that axially extends through the carbon heat source 6, the bottom part 33 of the cavity 3C is in contact with the distal end face 63A of the carbon heat source 6, and thus the carbon heat source 6 can be ignited with the air flow channel hermetically closed. In this regard, reference is now made to Figs. 11A to 11C to describe a carbon heat source 6A of a carbon heat

source type flavor inhaler 5A according to a modification. Fig. 11A is a longitudinal sectional view of the carbon heat source 6A attached to the distal end of the carbon heat source type flavor inhaler 5A in accordance with the modification. Fig. 11B illustrates the carbon heat source 6A as viewed from the ignition side in accordance with the modification. Fig. 11C illustrates the carbon heat source 6A as viewed from the side (puff-side end face) opposite to the ignition side in accordance with the modification. As illustrated in Fig. 11A, the inner layer part 61 of the carbon heat source 6A has a cavity 61A in ventilating communication in the longitudinal direction L. The cavity 61A of the inner layer part 61 is provided over the entire length of the carbon heat source 6A. As illustrated in Fig. 11 and Fig. 11B, the distal end face 63A of the ignition end portion 63 of the carbon heat source 6A has a groove 63B that communicates with the cavity 61A. As illustrated in Fig. 11B, a groove 62B in the distal end face 63A of the ignition end portion 63 is extended across the ignition end portion 63 so as to be exposed on the lateral face 62A of the ignition end portion 63. For a case where the carbon heat source 6A with the groove 63B and the cavity 61A is to be ignited as well, the bottom part 33 of the cavity 3C in the lighter body 2C comes into contact with the distal end face 63A of the carbon heat source 6A. This helps to reduce entry of components derived from the carbon heat source 6 (e.g., CO) into the holder 8 via the above-mentioned air flow channel (e.g., the groove 63B and the cavity 61A). Likewise, since ignition of the carbon heat source 6 is performed with the lateral-circumference heating part 41 of the lateral-circumference heater 4 brought into contact with the outer circumferential face of the lateral circumferential part 62 of the carbon heat source 6, even if the groove 63B that radially traverses the ignition end portion 63 of the carbon heat source 6A is provided as illustrated in Fig. 11B, the carbon heat source 6A can be ignited with the groove 63B hermetically closed. This helps to reduce entry of components derived from the carbon heat source 6 (e.g., CO) into the holder 8 via the groove 63B.

[0085] The foregoing description of Embodiment 3 is directed to an exemplary implementation in which the outer surface of the carbon heat source 6 has substantially no flow channel in ventilating communication with the internal space of the holder 8. In another alternative implementation, the lateral-circumference heating part 41 defining the inner wall face of the cavity 3C may be provided so as to at least partially contact the lateral circumferential part 62 of the carbon heat source 6. This has the advantage of being able to reduce entry of components derived from the carbon heat source 6 into the holder 8. The word "substantially" in the above description is herein intended to mean that fine internal voids in the carbon heat source 6 are not included in the air flow channel.

[0086] In Embodiment 3, the bottom part 33 of the cavity 3C is made of a heat-resistant material. This helps to reduce thermally induced damage to the bottom part 33 of the cavity 3C at the time of ignition of the carbon heat source 6. In Embodiment 3, the carbon heat source 6 is ignited with contact being made between the lateral-circumference heating part 41 of the lateral-circumference heater 4, which defines the inner circumferential face of the cavity 3C, and the outer circumferential face of the lateral circumferential part 62 of the carbon heat source 6. This allows the lateral-circumference heating part 41 to efficiently heat the lateral circumferential part 62 of the carbon heat source 6. The lateral circumferential part 62 can be thus ignited in a shorter time. In igniting the carbon heat source 6, the bottom part 33 of the cavity 3C is brought into close contact with the distal end face 63A of the carbon heat source 6. This helps to reduce the spread of combustion to the distal end face 63A of the carbon heat source 6. This further facilitates the control of combustion of the carbon heat source 6, such that the combustion is allowed to proceed gradually from the lateral circumferential part 62 toward the inner layer part 61.

[0087] The lighter body 2C according to Embodiment 3 may have an O-ring provided at the insertion opening 31 of the cavity 3C so that, when the carbon heat source 6 is accommodated in the cavity 3C, the cavity 3C is hermetically closed. In this case, even if the inner diameter Dh1 of the cavity 3C in the lighter body 2C is set greater than the diameter Dc1 of the carbon heat source 6, the carbon heat source 6 can be ignited with the cavity 3C hermetically closed.

<Modification of Embodiment 3>

[0088] A modification of Embodiment 3 is described below. Fig. 12 is a sectional view of the vicinity of a cavity 3D of a lighter body 2D in accordance with a modification of Embodiment 3. In this modification, components or features identical to those in Embodiment 3 are denoted by the same reference signs and thus will not be described in further detail. The modification illustrated in Fig. 12 is similar to Embodiment 3 except that a distal-end-face heating part 33A is disposed on the bottom part 33 of the cavity 3D. The distal-end-face heating part 33A is positioned such that the distal-end-face heating part 33Afaces the distal end face 63A of the carbon heat source 6 when the carbon heat source 6 is accommodated in the cavity 3D. At the time of ignition of the carbon heat source 6, the distal end face 63A can be heated by the distal-end-face heating part 33A. The distal-end-face heating part 33A may be disposed separately from the lateral-circumference heating part 41, or may be disposed integrally with the lateral-circumference heating part 41.

[0089] The heating temperature set for the distal-end-face heating part 33A is lower than the heating temperature set for the lateral-circumference heating part 41. Consequently, in igniting the carbon heat source 6, the lateral circumferential part 62 can be heated in a preferential manner at a temperature higher than a temperature at which the distal end face 63A of the carbon heat source

6 is heated. This helps to promote ignition of the lateral circumferential part 62. As a result, after combustion of the carbon heat source 6 is initiated from the lateral circumferential part 62, the combustion is allowed to gradually proceed toward the radially central portion of the carbon heat source 6. This helps to improve the sustainability of the combustion of the carbon heat source 6.

<Embodiment 4>

[0090] Embodiment 4 is described below. Fig. 13 is a perspective view of a lighter body 2E of the lighter 1 in accordance with Embodiment 4. Fig. 14 is a top view of the lighter body 2E in accordance with Embodiment 4. In Embodiment 4, components or features identical to those in the foregoing embodiments are denoted by the same reference signs and thus will not be described in further detail. The lighter body 2E according to Embodiment 4 has a deformable part 15 that allows a cavity 3E to change in cross-sectional area. The lighter body 2E also has a first body part 201 and a second body part 202 that are coupled to each other via the deformable part 15. The deformable part 15 is an extensible component disposed between the first body part 201 and the second body part 202 and capable of elongation deformation and contraction deformation. In Embodiment 4, the deformable part 15 is positioned to divide the plane of the cavity 3E into two parts.

[0091] The cavity 3E is defined by a first inner wall part 30A and a second inner wall part 30B that have a semicylindrical shape with the deformable part 15 positioned therebetween. The first inner wall part 30A of the cavity 3E is disposed on the first body part 201, and the second inner wall part 30B is disposed on the second body part 202. The lateral-circumference heater 4 of the lighter body 2E includes at least one heating region. In Embodiment 4, the lateral-circumference heater 4 has a first lateral-circumference heating part 400A and a second lateral-circumference heating part 400B. The first lateral-circumference heating part 400A is disposed on the first inner wall part 30A, and the second lateral-circumference heating part 400B is disposed on the second inner wall part 30B.

[0092] In this case, contraction deformation of the deformable part 15 (extensible component) of the lighter body 2E causes the first inner wall part 30A of the first body part 201 and the second inner wall part 30B of the second body part 202 to move toward each other, and elongation deformation of the deformable part 15 (extensible component) causes the first inner wall part 30A of the first body part 201 and the second inner wall part 30B of the second body part 202 to move away from each other. Figs. 13 and 14 illustrate the deformable part 15 (extensible component) under contraction deformation. Fig. 15 illustrates the deformable part 15 (extensible component) under elongation deformation. As described above, in the lighter body 2E according to Embodiment 4, the lateral-circumference heater 4 includes at least one heating region (the first lateral-circumference heating part 400A and the second lateral-circumference heating part 400B), and the at least one heating region is movable in conjunction with deformation of the deformable part 15. Further, the lighter body 2E includes plural inner wall parts (the first inner wall part 30A and the second inner wall part 30B) defining the cavity 3E. Relative movement between the inner wall parts (the first inner wall part 30A and the second inner wall part 30B) in conjunction with deformation of the deformable part 15 allows the cavity 3E to change in cross-sectional area. As illustrated in Fig. 14, with the deformable part 15 under contraction deformation, the cavity 3E has a circular cross-section. In Embodiment 4, the inner diameter Dh1 of the cavity 3E is set such that with the deformable part 15 under contraction deformation, the inner diameter Dh1 is substantially equal to the inner diameter Dh1. As illustrated in Fig. 15, with the deformable part 15 under elongation deformation, the first inner wall part 30A of the first body part 201, and the second inner wall part 30B of the second body part 202 move away from each other. This causes the cross-section of the cavity 3E to change to an elliptical shape, resulting in increased cross-sectional area of the cavity 3E.

[0093] Reference is now made to how the carbon heat source 6 of the carbon heat source type flavor inhaler 5 is ignited with the lighter 1 according to Embodiment 4. First, prior to insertion of the carbon heat source 6 into the carbon heat source type flavor inhaler 5, the deformable part 15 is deformed to elongate to thereby increase the cross-sectional area of the cavity 3E as illustrated in Fig. 15. This facilitates insertion of the carbon heat source 6 into the cavity 3E through the insertion opening 31. Subsequently, after the insertion of the carbon heat source 6 into the cavity 3E is complete, the deformable part 15 is deformed to contract as illustrated in Fig. 14.

[0094] Fig. 16 illustrates the lighter body 2E with the deformable part 15 deformed to contract after the carbon heat source 6 of the carbon heat source type flavor inhaler 5 is accommodated into the cavity 3E of the lighter body 2E. In the example in Fig. 16, the lateral-circumference heating part 41 of the lateral-circumference heater 4 is in close contact (abutting contact) with the outer circumferential face of the lateral circumferential part 62 of the carbon heat source 6. Pressing in the ignition operating part 22 of the lighter body 2E in this state causes the first lateral-circumference heating part 400A and the second lateral-circumference heating part 400B of the lateral-circumference heater 4 to generate heat. In Embodiment 4, the first lateral-circumference heating part 400A is, for example, a film heater disposed along the first inner wall part 30A of the first body part 201. The second lateral-circumference heating part 400B is, for example, a film heater disposed along the second inner wall part 30B of the second body part 202. The first body part 201 and the second body part 202 are provided with a power supply (not illustrated) to supply electric power to the first lateral-circumference heating part 400A and

the second lateral-circumference heating part 400B. As the first lateral-circumference heating part 400A and the second lateral-circumference heating part 400B generate heat, the lateral circumferential part 62 of the carbon heat source 6 can be selectively heated and ignited.

[0095] With the lighter 1 according to Embodiment 4, the cavity 3E can be changed in cross-sectional area by deforming the deformable part 15 to elongate and contract. Consequently, in inserting the carbon heat source 6 into the cavity 3E, the cavity 3E is increased in cross-sectional area in advance to enable smooth insertion of the carbon heat source 6. This also helps to reduce breaking, chipping, or other damage to the carbon heat source 6 during insertion of the carbon heat source 6 into the cavity 3. In igniting the carbon heat source 6, the cross-sectional area of the cavity 3E is reduced in advance to allow the first lateral-circumference heating part 400A and the second lateral-circumference heating part 400B to move toward the lateral circumferential part 62 of the carbon heat source 6. This enables efficient heating of the lateral circumferential part 62. In Embodiment 4, the inner diameter Dh1 of the cavity 3E may be set such that with the deformable part 15 under contraction deformation, the inner diameter Dh1 is greater than the diameter Dc1 of the carbon heat source 6. The cavity 3E in the lighter body 2E may be defined by three or more inner wall parts capable of moving relative to each other as the deformable part 15 deforms. In this case, the lateral-circumference heater 4 may include at least one heating region, and the at least one heating region may be movable in conjunction with deformation of the deformable part 15.

[0096] Although embodiments of the present invention and their modifications have been described above, the lighter and the smoking system according to the present invention are not limited to the described embodiments and modifications. These embodiments and modifications may be combined as much as possible.

Reference Signs List

[0097]

1 lighter

2 lighter body
3 cavity
4 lateral-circumference heater
5 carbon heat source type flavor inhaler
6 carbon heat source
7 flavor source
8 holder
9 filter

Claims

1. A lighter for a carbon heat source type flavor inhaler, the carbon heat source type flavor inhaler including a holder and a carbon heat source, the holder containing a flavor source and having a tubular shape, the carbon heat source being disposed in an end portion of the holder in an axial direction of the holder, the lighter comprising:

a lighter body having a cavity, the cavity having an insertion opening through which the carbon heat source can be inserted and removed, the cavity being capable of accommodating at least a portion of the carbon heat source; and
a lateral-circumference heating part disposed in the cavity of the lighter body, the lateral-circumference heating part heating at least a portion of a lateral circumferential part of the carbon heat source when the carbon heat source is accommodated in the cavity.

2. The lighter for a carbon heat source type flavor inhaler according to Claim 1,
wherein the lighter body has a deformable part that allows the cavity to change in cross-sectional area.

3. The lighter for a carbon heat source type flavor inhaler according to Claim 2,
wherein the lateral-circumference heating part includes two or more heating regions, and at least one of the two or more heating regions is movable in conjunction with deformation of the deformable part.

4. The lighter for a carbon heat source type flavor inhaler according to Claim 2 or 3,
wherein the lighter body includes a plurality of inner wall parts defining the cavity, the plurality of inner wall parts being movable relative to each other in conjunction with deformation of the deformable part to cause the cavity to change in cross-sectional area.

5. The lighter for a carbon heat source type flavor inhaler according to any one of Claims 2 to 4,
wherein the lighter body has a first body part and a second body part, the first body part including a first inner wall part defining the cavity, the second body part including a second inner wall part defining the cavity, and the deformable part comprises an extensible component, the extensible component being disposed between the first body part and the second body part and capable of elongation deformation and contraction deformation, and
wherein contraction deformation of the extensible component causes the first inner wall part and the second inner wall part to move toward each other, and elongation deformation of the extensible component causes the first inner wall part and the second inner wall part to move away from each other.

6. The lighter for a carbon heat source type flavor in-

haler according to Claim 5,
wherein the first inner wall part and the second inner wall part each have a semi-cylindrical shape.

7. The lighter for a carbon heat source type flavor inhaler according to Claim 5 or 6,
wherein the lateral-circumference heating part includes a first lateral-circumference heating part and a second lateral-circumference heating part, the first lateral-circumference heating part being disposed on the first inner wall part, the second lateral-circumference heating part being disposed on the second inner wall part.

8. The lighter for a carbon heat source type flavor inhaler according to any one of Claims 1 to 7,
wherein no heating part that heats a distal end face of the carbon heat source is disposed at a location that faces the distal end when the carbon heat source is accommodated in the cavity.

9. The lighter for a carbon heat source type flavor inhaler according to any one of Claims 1 to 7,
wherein a distal-end-face heating part that heats a distal end face of the carbon heat source is disposed at a location that faces the distal end face when the carbon heat source is accommodated in the cavity, the distal-end-face heating part being integrated with or separate from the lateral-circumference heating part, and a heating temperature set for the distal-end-face heating part is lower than a heating temperature set for the lateral-circumference heating part.

10. The lighter for a carbon heat source type flavor inhaler according to any one of Claims 1 to 9,
wherein the cavity has a cavity length greater than a protrusion length by which the carbon heat source protrudes from the end portion of the holder, the cavity length being a length of the cavity extending in an axial direction of the cavity.

11. The lighter for a carbon heat source type flavor inhaler according to Claim 10,
wherein the lateral-circumference heating part has a heating-part length greater than the protrusion length by which the carbon heat source protrudes from the end portion of the holder, the heating-part length being a length of the heating part extending in the axial direction of the cavity.

12. The lighter for a carbon heat source type flavor inhaler according to any one of Claims 1 to 11,
wherein the lateral-circumference heating part includes a flavor-source heating part and a carbon-heat-source heating part, the flavor-source heating part being disposed in a portion of the cavity near the insertion opening, the carbon-heat-source heating part being disposed farther from the insertion opening than the flavor-source heating part is.

13. The lighter for a carbon heat source type flavor inhaler according to Claim 12,
wherein a heating temperature set for the carbon-heat-source heating part is higher than a heating temperature set for the flavor-source heating part.

14. The lighter for a carbon heat source type flavor inhaler according to any one of Claims 1 to 13,
wherein the cavity extends through the lighter body, and has a passage opening through which the carbon heat source can be passed, the passage opening being located at an end of the cavity different from the insertion opening.

15. The lighter for a carbon heat source type flavor inhaler according to any one of Claims 1 to 14, further comprising
positioning means for, when the carbon heat source is accommodated in the cavity, positioning the carbon heat source with respect to the cavity.

16. The lighter for a carbon heat source type flavor inhaler according to Claim 15,
wherein the positioning means includes a stopper that, when the carbon heat source is accommodated in the cavity, contacts the carbon heat source to regulate an insertion depth to which the carbon heat source is inserted into the cavity.

17. The lighter for a carbon heat source type flavor inhaler according to Claim 16,
wherein the cavity has a bottom part at an end different from the insertion opening, and the bottom part defines the stopper.

18. The lighter for a carbon heat source type flavor inhaler according to Claim 17,
wherein the bottom part of the cavity is made of a heat-resistant material.

19. The lighter for a carbon heat source type flavor inhaler according to any one of Claims 15 to 18,
wherein the positioning means includes locking means for locking the holder in place to regulate an insertion depth to which the carbon heat source is inserted into the cavity.

20. The lighter for a carbon heat source type flavor inhaler according to Claim 19,
wherein the insertion opening has an inner diameter less than an outer diameter of the holder, and
wherein an edge portion of the insertion opening defines the locking means.

21. A smoking system comprising:

a carbon heat source type flavor inhaler including a holder and a carbon heat source, the holder containing a flavor source and having a tubular shape, the carbon heat source being disposed in an end portion of the holder in an axial direction of the holder; and
the lighter according to any one of Claims 1 to 20.

22. The smoking system according to Claim 21,
wherein when the carbon heat source is accommodated in the cavity, at least a portion of the lateral circumferential part of the carbon heat source, and at least a portion of the flavor source of the holder are both heated by the lateral-circumference heating part of the lighter.

23. The smoking system according to Claim 21 or 22,
wherein with the carbon heat source accommodated in the cavity, a rear end portion of at least the lateral circumferential part of the carbon heat source is heated by the lateral-circumference heating part of the lighter.

24. The smoking system according to any one of Claims 21 to 23,
wherein the cavity has an inner diameter greater than or equal to an outer diameter of the carbon heat source.

25. The smoking system according to any one of Claims 21 to 24,
wherein in a portion of the carbon heat source type flavor inhaler where the holder and the carbon heat source are connected to each other, the holder has an outer diameter greater than an outer diameter of the carbon heat source.

26. The smoking system according to any one of Claims 21 to 25,
wherein at least one of the holder and the carbon heat source is provided with a mark that allows a smoker to identify whether the carbon heat source is inserted in the cavity to an appropriate depth.

27. The smoking system according to any one of Claims 21 to 26,
wherein the carbon heat source includes a combustion improver.

28. The smoking system according to Claim 27,
wherein the combustion improver has an average weight concentration that varies in a radial direction of the carbon heat source.

29. The smoking system according to Claim 28,
wherein the combustion improver has an average weight concentration in the lateral circumferential part of the carbon heat source higher than an average weight concentration of the combustion improver in an inner layer part of the carbon heat source, the inner layer part being located inside the lateral circumferential part in the radial direction of the carbon heat source.

30. The smoking system according to any one of Claims 27 to 29,
wherein the combustion improver has an average weight concentration in the lateral circumferential part of the carbon heat source higher than an average weight concentration of the combustion improver in an ignition end portion of the carbon heat source.

31. The smoking system according to Claim 30,
wherein the ignition end portion of the carbon heat source includes no combustion improver.

32. The smoking system according to any one of Claims 27 to 31,
wherein the combustion improver has an average weight concentration in a rear end portion of the carbon heat source higher than an average weight concentration of the combustion improver in an ignition end portion of the carbon heat source.

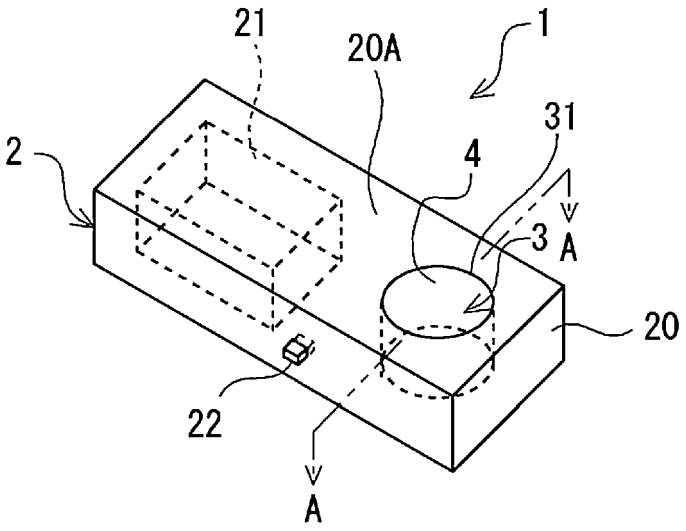
33. The smoking system according to any one of Claims 21 to 32,
wherein at least a portion of an inner wall surface of the cavity contacts the lateral circumferential part of the carbon heat source accommodated in the cavity.

34. The smoking system according to any one of Claims 21 to 33,
wherein an outer surface of the carbon heat source has substantially no flow channel in ventilating communication with an internal space of the holder.

35. The smoking system according to any one of Claims 21 to 34,
wherein the cavity has a bottom part at an end different from the insertion opening, the bottom part being capable of making close contact with a distal end face of the carbon heat source when the carbon heat source is accommodated in the cavity.

36. The smoking system according to any one of Claims 21 to 35,
wherein the cavity is hermetically closed when the carbon heat source is accommodated in the cavity.

FIG. 1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20A
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31
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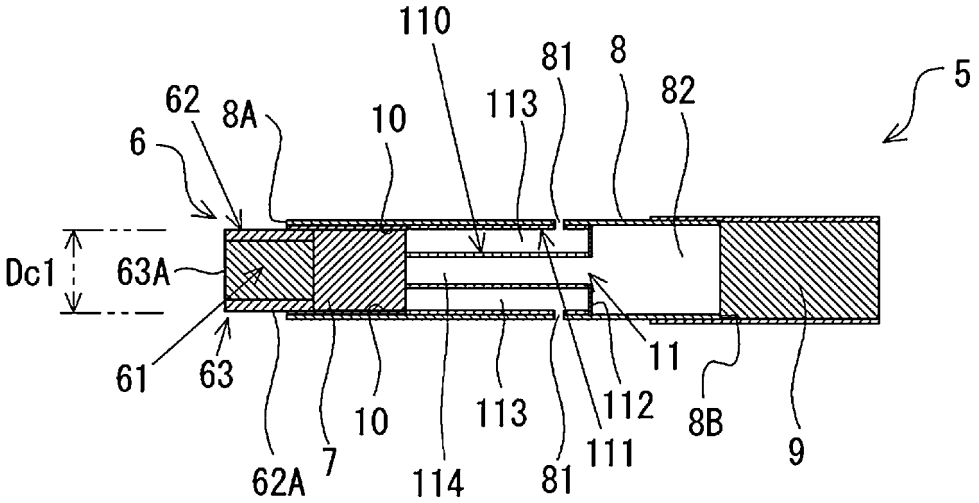
3
A
20
22
A

FIG. 2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8A
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113
82
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Dc1
63A
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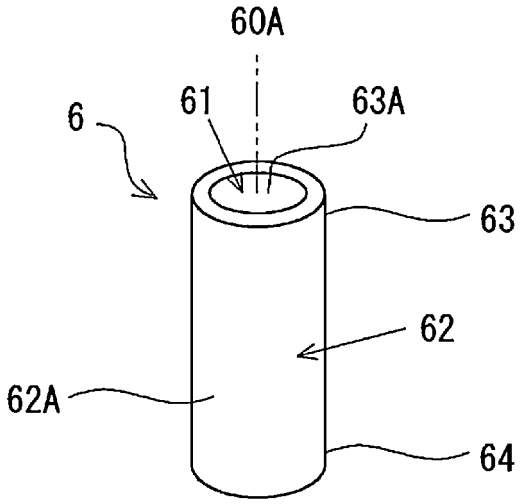
63
62A
7
10
114
81
113
112
111
11
8B
9

FIG. 3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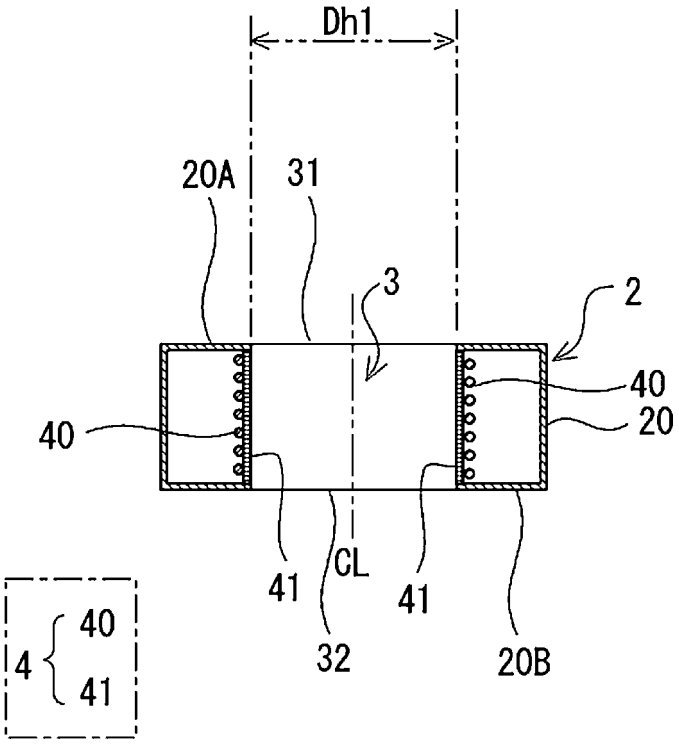
63
62
62A
64

FIG. 4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3
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CL
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20B
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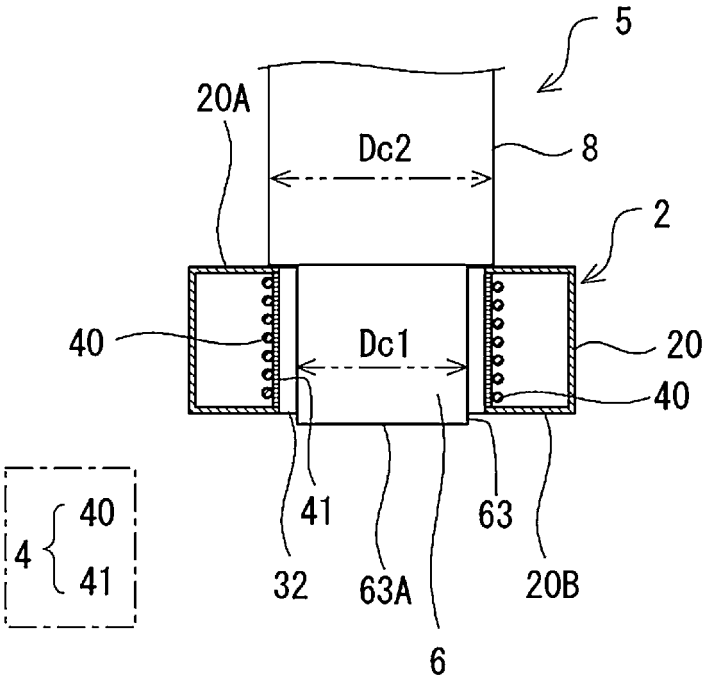
41

FIG. 5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Dc1
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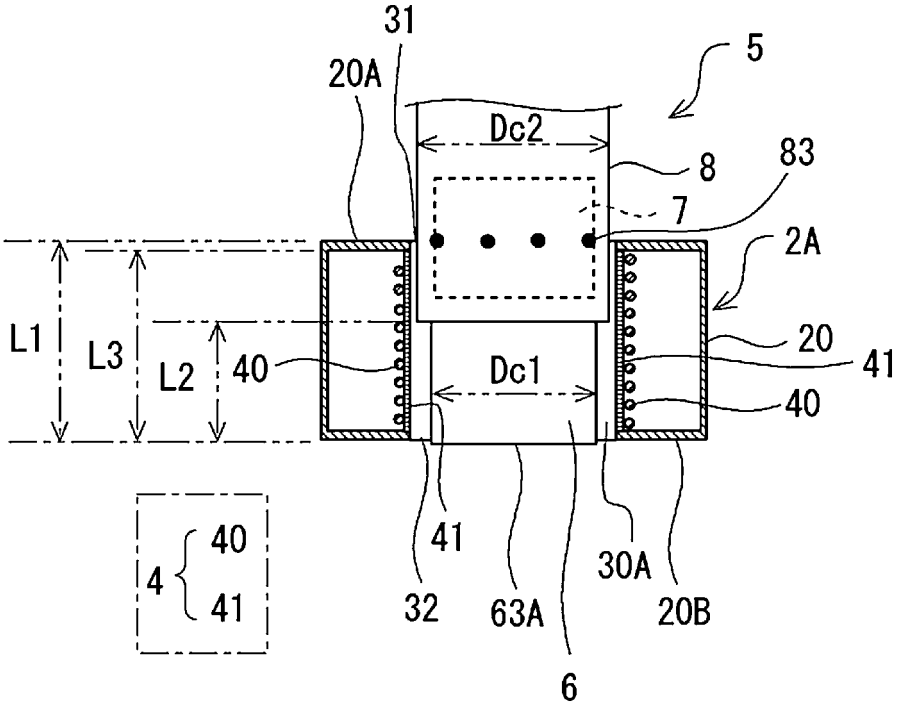
63A
20B
6

FIG. 6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2A
L1
L3
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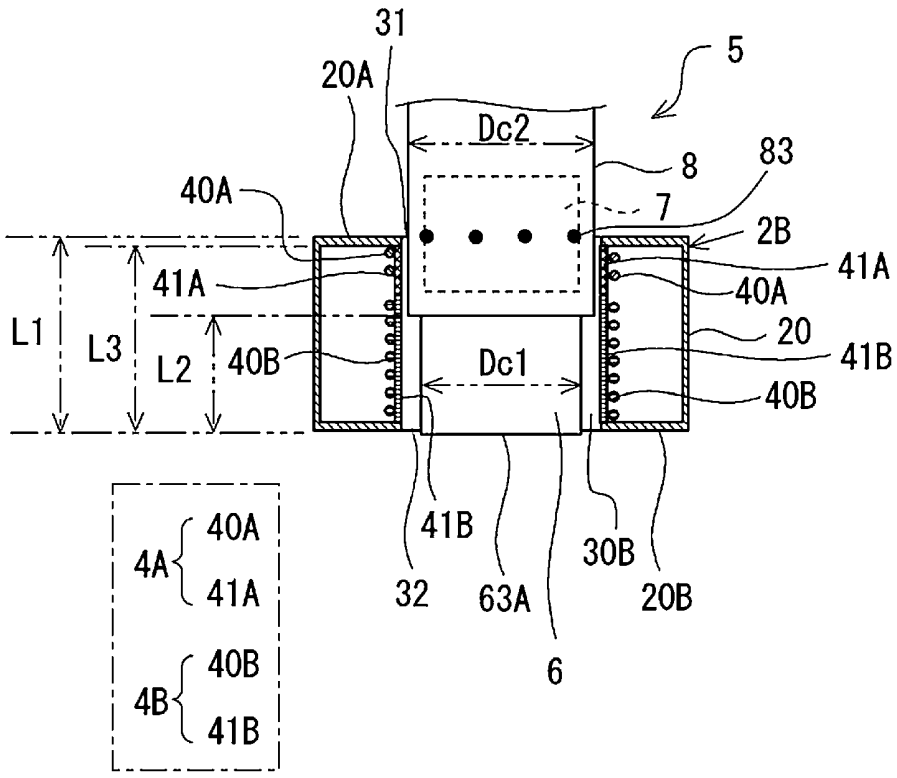
40
41
41
30A
32
63A
20B
6

FIG. 7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40A
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2B
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41A
40A
L1
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L2
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Dc1
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41B
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4B
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41B
41B
30B
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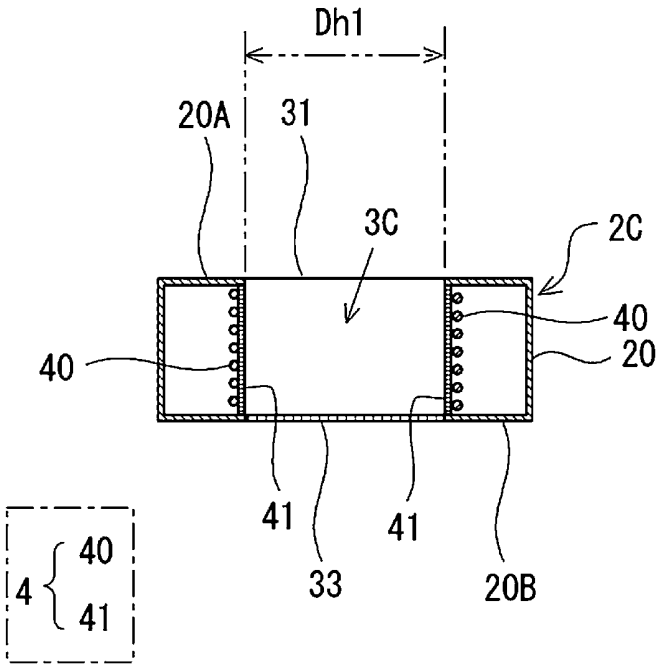
63A
20B
6

FIG. 8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20B
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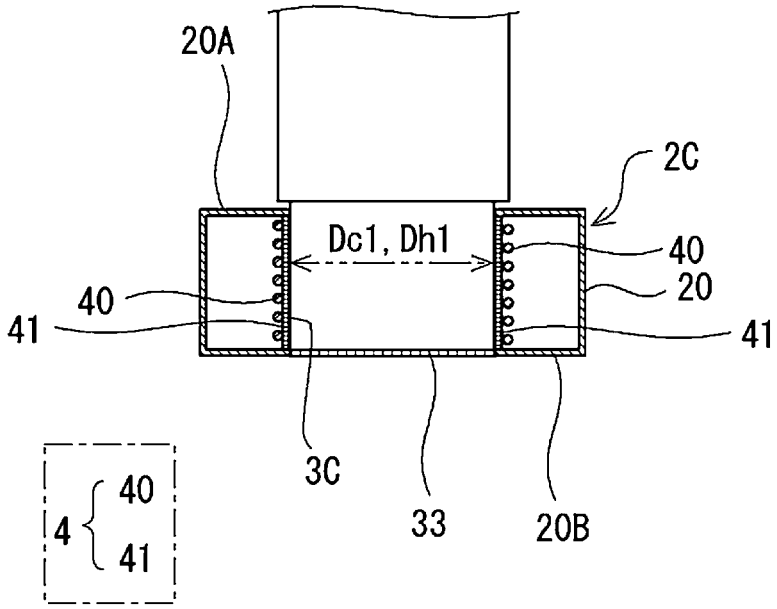
41

FIG. 9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Dc1, Dh1
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3C
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20B
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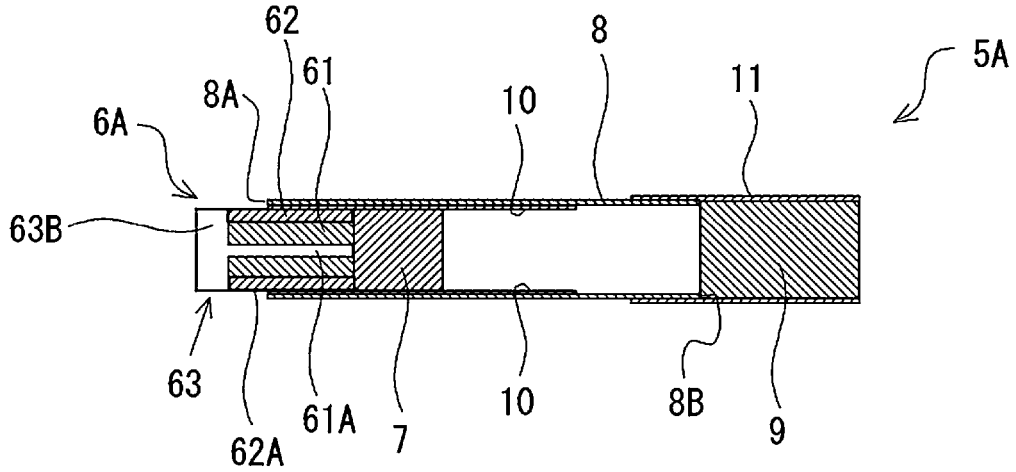
40
41

FIG. 10


62
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6A
63B
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62A
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10
8B
9

FIG. 11A

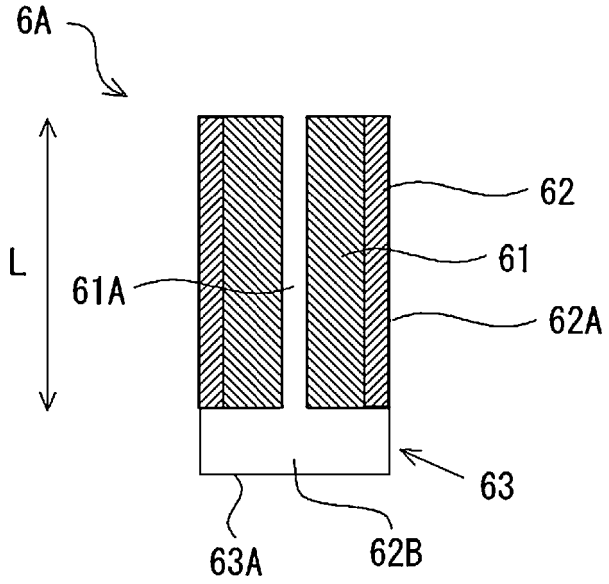


FIG. 11B

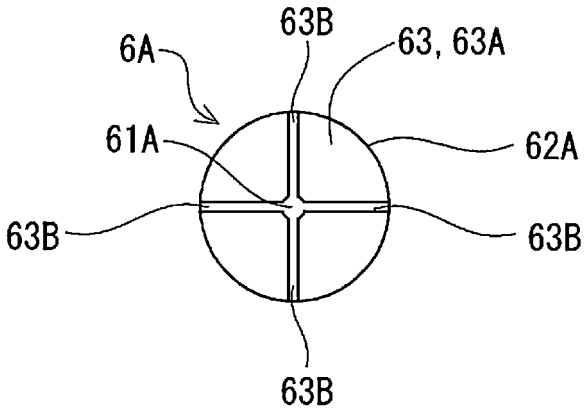


FIG. 11C

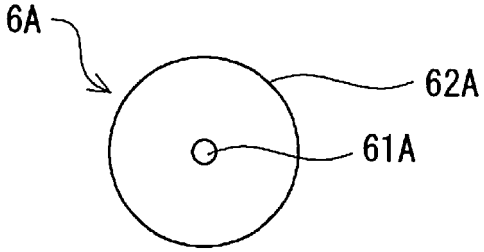


FIG. 12

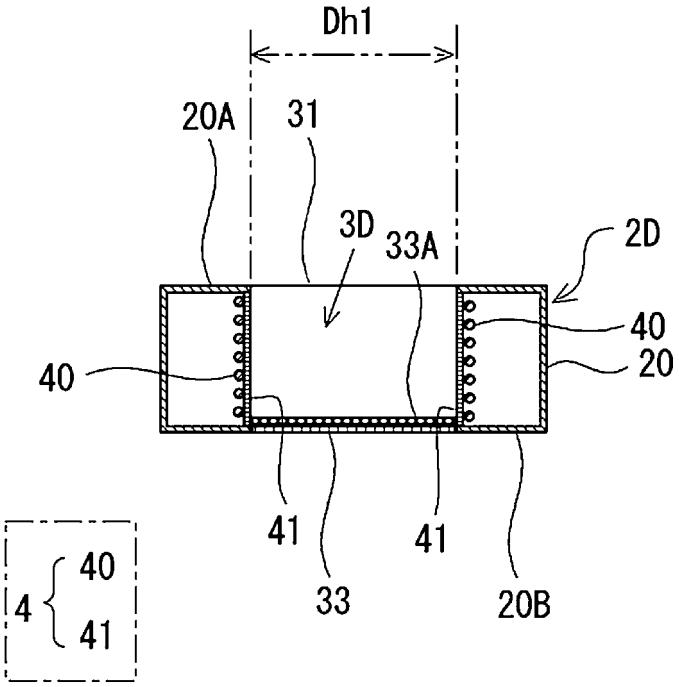
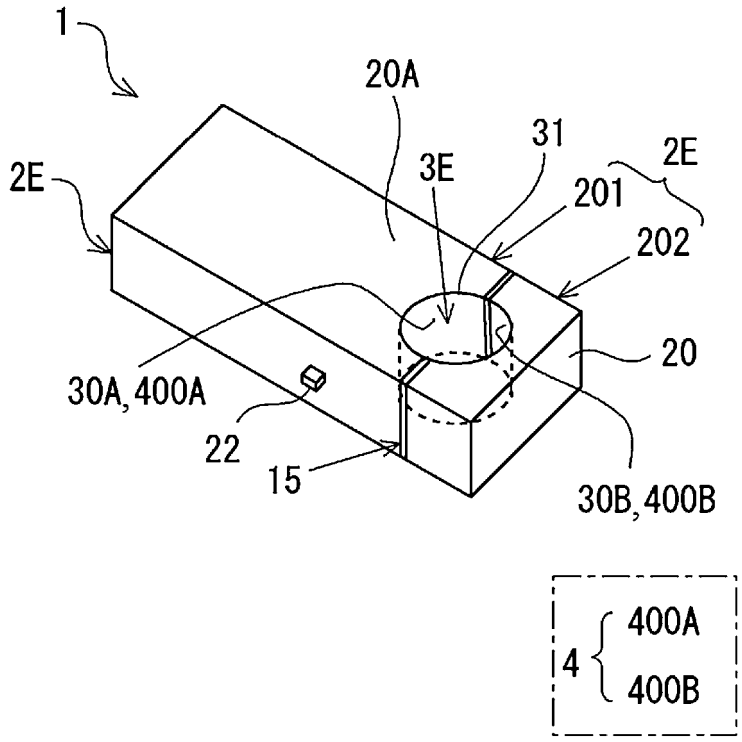


FIG. 13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30B, 400B
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400A
400B

FIG. 14

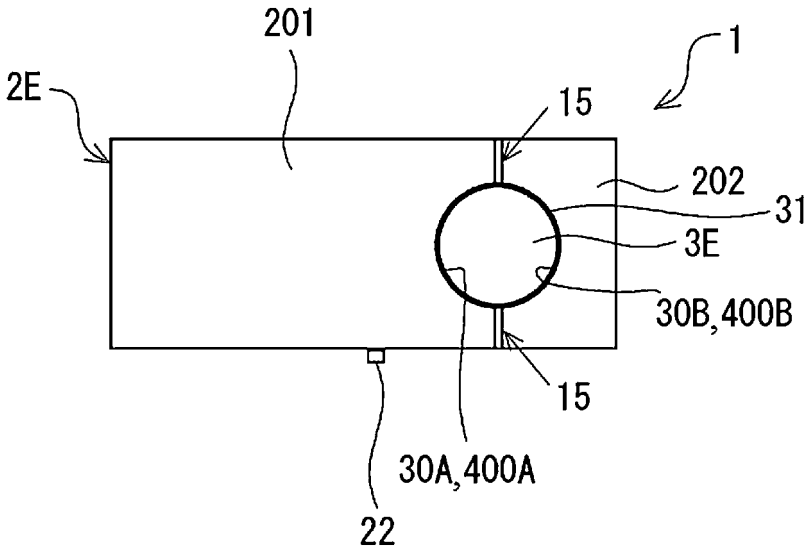
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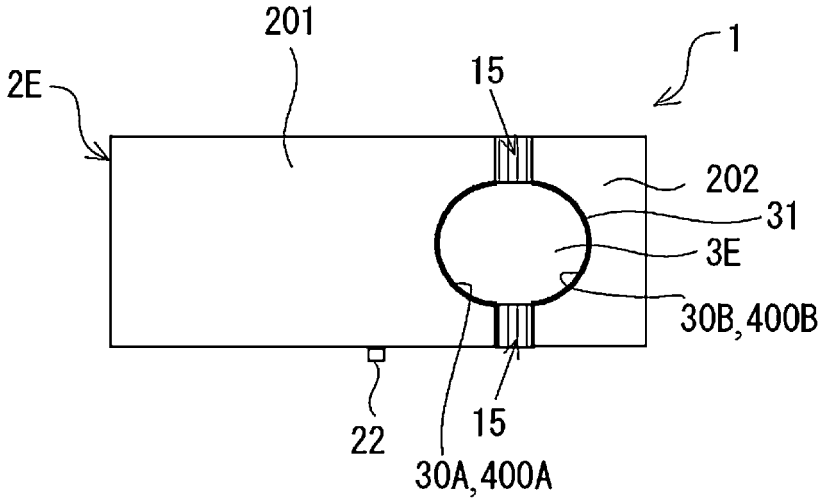
FIG. 15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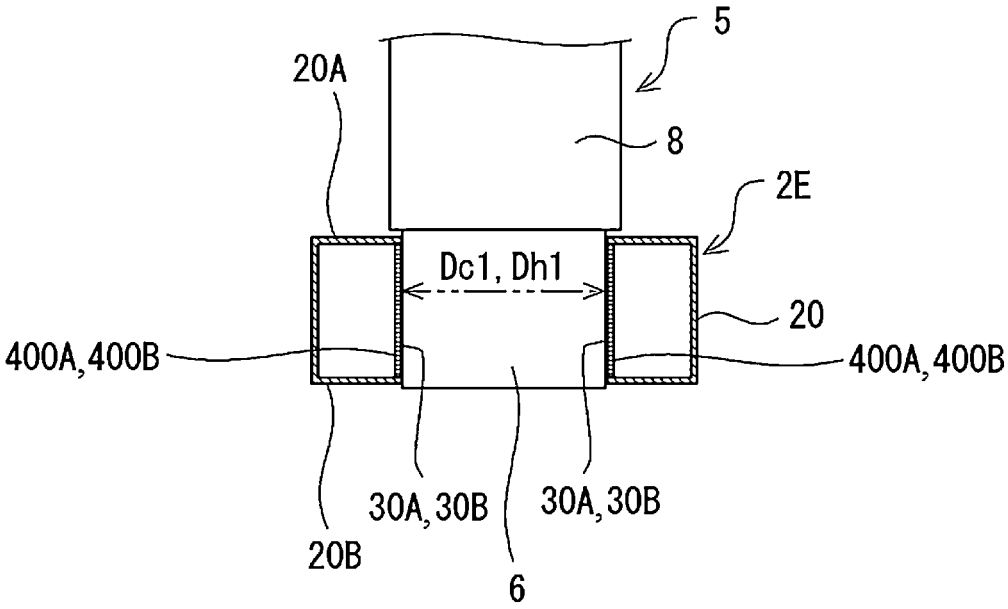
30A, 400A

FIG. 16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Dc1, Dh1
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400A, 400B
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6

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2018/037113

A. CLASSIFICATION OF SUBJECT MATTER
Int.Cl. F23Q7/00(2006.01)i, A24F47/00(2006.01)i, F23Q7/02(2006.01)i

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
Int.Cl. F23Q3/00-7/26, A24F47/00

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

Published examined utility model applications of Japan	1922-1996
Published unexamined utility model applications of Japan	1971-2018
Registered utility model specifications of Japan	1996-2018
Published registered utility model applications of Japan	1994-2018

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.
Y	WO 2013/146951 A2 (JAPAN TOBACCO INC.) 03 October 2013, paragraphs [0023], [0085], fig. 7 & JP 2016-163585 A & US 2015/0013703 A1,	1-8, 15-18, 21, 23-25, 27-36
A	paragraphs [0034], [0096], fig. 7 & EP 2829184 A2 & CN 104203017 A	9-14, 19-20, 22, 26
Y	JP 2014-100320 A (NIPPON KODO CO., LTD.) 05 June 2014, paragraphs [0035]-[0038], fig. 5-8 & JP 5259008 B1	1-8, 15-18, 21, 23-25, 27-36

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

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"O" document referring to an oral disclosure, use, exhibition or other means
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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
18.12.2018	08.01.2019

Name and mailing address of the ISA/	Authorized officer
Japan Patent Office 3-4-3, Kasumigaseki, Chiyoda-ku, Tokyo 100-8915, Japan	Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2018/037113

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 3175946 U (HEYDELA INC.) 07 June 2012, paragraphs [0009]-[0018], fig. 1-8 (Family: none)	1-8, 15-18, 21, 23-25, 27-36
Y	JP 2016-514243 A (DAMIANI, T. R.) 19 May 2016, entire text, all drawings & US 2014/0262856 A1, entire text, all drawings & WO 2014/158670 A1 & CA 2905706 A1 & CN 105378387 A	2-8, 15-18, 21, 23-25, 27-36
Y	JP 2015-527073 A (PHILIP MORRIS PRODUCTS S.A.) 17 September 2015, paragraphs [0045]-[0103], [0207], [0208], fig. 1, 2 & US 2015/0216231 A1, paragraphs [0045]-[0103], [0209], [0210], fig. 1, 2 & WO 2014/037270 A1 & CA 2880478 A1 & CN 104602554 A & KR 10-2015-0048869 A	27-36
Y	JP 2018-46874 A (PHILIP MORRIS PRODUCTS S.A.) 29 March 2018, paragraphs [0019]-[0036], [0100]-[0108], [0117]-[0136], fig. 1, 2 & JP 2015-507934 A & US 2015/0007837 A1, paragraphs [0018]-[0035], [0099]-[0107], [0116]-[0135], fig. 1, 2 & WO 2013/124357 A1 & CA 2865025 A1 & CN 104203013 A & KR 10-2014-0130130 A	27-36
A	WO 2014/136872 A1 (JAPAN TOBACCO INC.) 12 September 2014, entire text, all drawings & US 2015/0374036 A1 & EP 2954793 A1	1-36

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Patent documents cited in the description

- JP 2015509709 W **[0004]**
- JP 2015507934 W **[0004]**