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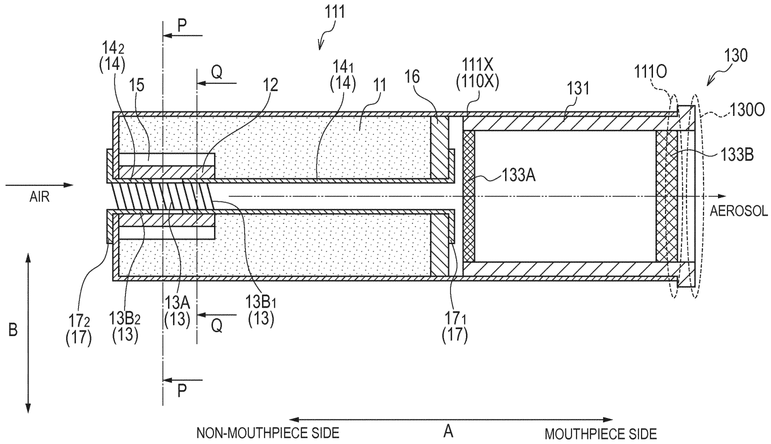
(54) METHOD FOR PRODUCING ATOMIZATION UNIT, AND ATOMIZATION UNIT

(57) This method for producing an atomization unit comprises: a step A in which a resistance heating element is disposed so as to be parallel to a spiral-shaped groove or protrusion formed on a side surface of a base member having an axis that extends in a prescribed direction; a step B in which the base member is rotated using said axis as the axis of rotation, and at least a portion of the resistance heating element is separated from the groove or protrusion; and a step C in which a liquid holding member that holds an aerosol source is disposed so as to be in contact with or in close proximity to at least a portion of the resistance heating element.

FIG. 2



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Description

TECHNICAL FIELD

[0001] The present invention relates to a manufacturing method of an atomizing unit having a heating element for atomizing an aerosol source without burning and an atomizing unit.

BACKGROUND ART

[0002] Conventionally, a non-burning type flavor inhaler for inhaling flavor without burning is known. The non-burning type flavor inhaler comprises an atomizing unit for atomizing an aerosol source without burning. The atomizing unit includes a reservoir for storing an aerosol source, a liquid holding member for holding an aerosol source supplied from the reservoir, and a heating element (atomizing portion) for atomizing the aerosol source held by the liquid holding member. Here, the heating element is a helical coil and has a shape extending along a predetermined direction. The liquid holding member has a shape extending along a predetermined direction and is disposed to contact the outer side surface of the heating element in a direction orthogonal to the predetermined direction (for example, Patent Literatures 1 and 2).

CITATION LIST

PATENT LITERATURE

[0003]

Patent Literature 1: PCT National Publication No. 2012-517229
Patent Literature 2: PCT National Publication No. 2015-504652

SUMMARY OF THE INVENTION

[0004] A first feature is summarized as a manufacturing method of an atomizing unit, comprising: a step A of disposing a resistance heating element along a groove or a projection having a spiral shape and formed on a side surface of a base member having an axis extending along a predetermined direction; a step B of rotating the base member about the axis as a rotation axis to separate at least a part of the resistance heating element from the groove or the projection; and a step C of disposing a liquid holding member holding an aerosol source to contact or come close to at least a part of the resistance heating element.

[0005] A second feature according to the first feature is summarized as that the step C is performed after the step A and before the step B.

[0006] A third feature according to the second feature is summarized as that the resistance heating element includes a heating portion for heating the aerosol source, and the step C is a step of disposing the liquid holding member while the liquid holding member presses the inner side surface or the outer side surface of the heating portion.

[0007] A fourth feature according to any one of the first to third features is summarized as that the resistance heating element includes a heating portion for heating the aerosol source, and the step C is a step of disposing the liquid holding member to contact the entire circumference of the inner side surface or the outer side surface of the heating portion.

[0008] A fifth feature according to any one of the first to fourth features is summarized as that the step B is a step of forming an aerosol intake to pass aerosol atomized by the resistance heating element to the inside of the resistance heating element by separating of the resistance heating element.

[0009] A sixth feature according to any one of the first to fifth features is summarized as that the step B is a step of forming at least a part of an air flow path inside the resistance heating element by separating of the resistance heating element.

[0010] A seventh feature according to any one of the first to sixth features is summarized as that the step C is a step of disposing the liquid holding member on the outside of the resistance heating element in a case where the resistance heating element is disposed on the outer side surface of the base member.

[0011] An eighth feature according to any one of the first to seventh features is summarized as that the base member is a jig, and the step B is a step of separating the whole resistance heating element from the jig and forming at least a part of the air flow path inside the resistance heating element by separating of the resistance heating element, and the manufacturing method comprising: a step G of disposing a flow path forming member forming at least a part of the air flow path, before the step B.

[0012] A ninth feature according to the eighth feature is summarized as that the step G includes a step of disposing the flow path forming member along the outer side surface of the jig.

[0013] A tenth feature according to any one of the first to ninth features is summarized as that the base member is a jig, and the step B is a step of separating the whole resistance heating elements from the jig, and the manufacturing method comprising: a step E of disposing a cylindrical member having a tubular shape and forming at least a part of an air flow path on the outer side surface or the inner side surface of the resistance heating element in the orthogonal direction perpendicular to the predetermined direction, before the step B.

[0014] An eleventh feature according to the tenth feature is summarized as that the step B is performed after fixing the cylindrical member to a housing of the atomizing unit and / or after fixing the resistance heating element to the cylindrical member.

[0015] A twelfth feature according to the eleventh feature is summarized as that the cylindrical member is constituted by a first cylindrical member and a second cylindrical member, and the step E is a step of disposing the first cylindrical member and the second cylindrical member in a state of being separated from each other.

[0016] A thirteenth feature according to the twelfth feature is summarized as that a part or a whole of the first cylindrical member is formed of a conductive member, and a part or a whole of the second cylindrical member is formed of a conductive member.

[0017] A fourteenth feature according to the twelfth feature is summarized as that the jig includes a first locking portion for locking the first cylindrical member and a second locking portion for locking the second cylindrical member, and the step E includes a step E_1 of pacing the first cylindrical member at a position where the first cylindrical member is locked by the first locking portion, and a step E_2 of placing the first cylindrical member at a position where the second cylindrical member is locked by the second locking portion.

[0018] A fifteenth feature according to any one of the twelfth to fourteenth features is summarized as that the jig includes a first support portion having a first outer diameter and a second support portion having a second outer diameter smaller than the first outer diameter, the inner diameter of the first cylindrical member corresponds to the first outer diameter, the inner diameter of the second cylindrical member corresponds to the second outer diameter, and the step E includes a step E 3 of disposing the first cylindrical member on an outer side face of the first support portion in the orthogonal direction, and a step E 3 of disposing the second cylindrical member on the outer side face of the second support portion in the orthogonal direction.

[0019] A sixteenth feature according to any one of the twelfth to fifteenth features is summarized as that the jig includes a first support portion having a first outer diameter and a second support portion having a second outer diameter smaller than the first outer diameter, the step E or E 1 or E 3 is a step of sliding the first cylindrical member from the second support portion side to the first support portion side, and the step E or E 2 or E 4 is a step of sliding the second cylindrical member from the second support portion side to the first support portion side.

[0020] A seventeenth feature according to any one of the twelfth to sixteenth features is summarized as that the jig includes a first support portion having a first outer diameter and a second support portion having a second outer diameter smaller than the first outer diameter, and the step C is a step of sliding the liquid holding member from the second support portion side to the first support portion side.

[0021] An eighteenth feature according to any one of the twelfth to sixteenth features is summarized as that the jig includes a first support portion having a first outer diameter and a second support portion having a second outer diameter smaller than the first outer diameter, the groove or the projection is provided on a side surface of the first support portion, and the step A is a step of disposing the resistance heating element on the outer side surface of the first support portion and the outer side surface of the second cylindrical member.

[0022] A nineteenth feature according to any one of the first to eighteenth features is summarized as that the step C includes: a step C 1 of sliding a sliding member along an outer side surface of the resistance heating element in an orthogonal direction perpendicular to the predetermined direction; a step C 2 of disposing the liquid holding member along the outer side surface of the sliding member in the orthogonal direction; and a step C 3 of removing the sliding member by sliding from between the liquid holding member and the resistance heating element after the step C 1 and the step C 2.

[0023] A twentieth feature according to any one of the first to eighth features is summarized as that the base member is a cylindrical member having a tubular shape forming at least a part of an air flow path.

[0024] A twenty-first feature according to the twentieth feature is summarized as that the cylindrical member is constituted by a first cylindrical member and a second cylindrical member, and the manufacturing method comprising: a step D of electrically connecting the cylindrical member and the resistance heating element.

[0025] A twenty-second feature according to the twentieth feature or the twenty-first feature is summarized as that the cylindrical member is constituted by a first cylindrical member and a second cylindrical member, the step A is a step of disposing the resistance heating element across both the first cylindrical member and the second cylindrical member, and the step B is a step of separating the first cylindrical member and the second cylindrical member from each other, while maintaining a state in which the resistance heating element is disposed over both the first cylindrical member and the second cylindrical member.

[0026] A twenty-third feature according to the first feature is summarized as that the base member is a cylindrical member, the step A is a step of disposing the resistance heating element to be along a helical groove or projection formed on an outer side surface of the cylindrical member, and the step B and the step C comprising steps of separating a part of the resistance heating element from the cylindrical member by rotation of the cylindrical member, separating a part of the liquid holding member disposed inside the cylindrical member from the cylindrical member, and bringing a part of the liquid holding member into contact with or close to a part of the resistance heating element by expansion of a part of the liquid holding member.

[0027] A twenty-fourth feature is summarized as a manufacturing method of an atomizing unit, comprising: a step A of disposing a resistance heating element along a spiral groove or a projection formed on a side surface of a base member having an axis extending along a predetermined direction; a step C of disposing a liquid holding member holding an aerosol source to contact or come close to at least a part of the resistance heating element, or a step C 4 of disposing a liquid holding member holding an aerosol source to contact or come close to a part of a resistance heating element by rotating the base member about the axis as a rotation axis to separate at least a part of the resistance heating element from the grove or the projection, and a step F of accommodating the resistance heating element and the liquid holding member in the housing.

[0028] A twenty-fifth feature is summarized as an atomizing unit comprising: a base member having an axis extending along a predetermined direction; a resistance heating element disposed to follow a helical groove or projection formed on a side surface of the base member; a liquid holding member holding an aerosol source, which is disposed to contact or come close to at least a part of the resistance heating element, or disposed to contact or come close to at least a part of the resistance heating element by a step B of rotating the base member around the axis as a rotation axis to separate at least a part of the resistance heating element from the groove or the projection; and a housing configured to accommodate the resistance heating element and the liquid holding member.

[0029] In the fifteenth feature described above, "corresponding" means the following. First, in the case where a resistance heating element is interposed between the outer side surface of the jig (the first support portion or the second support portion) and the inner side surface of the cylindrical member (the first cylindrical member and the second cylindrical member), the "corresponding" means the relationship between the inner diameter of the cylindrical member and the outer diameter of the jig, in which the inner side surface of the cylindrical member is slidable along the resistance heating element disposed on the outer side surface of the jig, and the resistance heating element disposed on the outer side surface of the jig contacts the inner side surface of the cylindrical member. Second, in the case where a resistance heating element is not interposed between the outer side surface of the jig and the inner side surface of the cylindrical member, the "corresponding" means the relationship between the inner diameter of the cylindrical member and the outer diameter of the jig, in which the inner side surface of the cylindrical member is slidable along the outer side surface of the jig, and the center axis of the cylindrical member does not deviate from the center axis of the jig in a state that the cylindrical member is disposed on the outer side surface of the jig. In the case where the jig or the cylindrical member is formed of a member having elasticity, the "outer diameter" and "inner diameter" mean the sizes in a state after the cylindrical member is disposed on the outer side surface of the jig.

[0030] In the fifteenth feature described above, it is preferable that the step E 3 of disposing the first cylindrical member on the outer side face of the first support portion in the orthogonal direction is performed before the step E 4 of arranging the second cylindrical member on the outer side face of the second support portion in the orthogonal direction. By such a method, it easy to dispose the first cylindrical member and the second cylindrical member.

[0031] In the features described above, the step C is preferably performed after the step E. By such a method, it is easy to dispose the liquid holding member, the first cylindrical member, and the second cylindrical member.

[0032] In the features described above, the step B is preferably performed before the step C 2 and the step C 3. By such a method, it is possible to separate the base member as soon as possible, divert the base member to the next semi-finished product manufacturing in a short time, and improve the productivity of the atomizing unit.

[0033] In the twenty-fourth feature described above, it is preferable to perform the step F in a state that at least a part of the base member is exposed from the housing. By such a method, it becomes easier to separate the resistance heating element from the groove or the projection by the rotation of the base member before using the atomizing unit.

[0034] In the twenty-fifth feature described above, at least a part of the base member is preferably exposed from the housing. With such a configuration, it becomes easy to separate the resistance heating element from the groove or the projection by the rotation of the base member before using the atomizing unit.

[0035] In the above features, the resistance heating element is formed of a wire having a spiral shape, and may be a coil having a shape extending along a predetermined direction.

BRIEF DESCRIPTION OF THE DRAWINGS

[0036]

FIG. 1 is a diagram showing a non-burning type flavor inhaler 100 according to an embodiment.

FIG. 2 is a diagram showing an atomizing unit 111 according to an embodiment.

FIG. 3 (A) is a diagram showing a P-P cross-section shown in FIG. 2, and FIG. 3(B) is a diagram showing a Q-Q cross-section shown in FIG. 2.

FIGS. 4 (A) to 4(D) are diagrams for explaining a manufacturing method of an atomizing unit 111 according to an embodiment.

FIGS. 5 (A) to 5 (C) are diagrams for explaining a manufacturing method of an atomizing unit 111 according to an embodiment.

FIGS. 6 (A) to 6 (D) are diagrams for explaining a manufacturing method of an atomizing unit 111 according to a modification 1.

FIGS. 7 (A) and 7 (B) are diagrams for explaining a manufacturing method of an atomizing unit 111 according to a modification 2.

FIGS. 8 (A) and 8 (B) are diagrams for explaining a manufacturing method of an atomizing unit 111 according to a modification 3.

FIG. 9 is a diagram showing an atomizing unit 111 according to a modification 4.

FIG. 10 is a diagram showing an atomizing unit 111 according to a modification 5.

FIG. 11 is a diagram showing an atomizing unit 111 according to a modification 6.

FIGS. 12 (A) to 12 (E) are diagrams for explaining a manufacturing method of an atomizing unit 111 according to a modification 7.

FIGS. 13 (A) to 13 (D) are diagrams for explaining a manufacturing method of an atomizing unit 111 according to a modification 8.

FIGS. 14 (A) to 14 (E) are diagrams for explaining a manufacturing method of an atomizing unit 111 according to a modification 9.

FIG. 15 is a diagram showing an atomizing unit 111 according to a modification 10.

FIG. 16 is a diagram showing an atomizing unit 111 according to a modification 11.

FIG. 17 is a diagram showing an atomizing unit 111 according to a modification 12.

FIGS. 18 (A) and 18 (B) are diagrams for explaining a manufacturing method of an atomizing unit 111 according to a modification 13.

FIG. 19 is a diagram showing an atomizing unit 111 according to a modification 14.

FIG. 20 is a diagram showing the atomizing unit 111 according to a modification 15.

FIG. 21 is a diagram showing a liquid amount adjusting member 19 according to a modification 15.

FIGS. 22 (A) and 22 (B) are diagrams for explaining a manufacturing method of the atomizing unit 111 according to a modification 16.

MODE FOR CARRYING OUT THE INVENTION

[0037] Hereinafter, embodiments of the present invention will be described. In the following description of the drawings, the same or similar reference numerals denote the same or similar parts. It should be noted that the drawings are schematic, and the ratios of dimensions and the like may be different from the actual ones.

[0038] Therefore, specific dimensions and the like may be determined by referring to the following description. Of course, the drawings may include the parts having different dimensions and ratios.

[Summary of Disclosure]

[0039] However, in the atomizing unit mentioned in Background Art, it is difficult to manufacture an atomizing unit having a high-quality heating element.

[0040] A manufacturing method of an atomizing unit according to a summary of disclosure comprises: a step A of disposing a resistance heating element along a groove or a projection having a spiral shape and formed on a side surface of a base member having an axis extending along a predetermined direction; a step B of rotating the base member about the axis as a rotation axis to separate at least a part of the resistance heating element from the groove or the projection; and a step C of disposing a liquid holding member holding an aerosol source to contact or come close to at least a part of the resistance heating element.

[0041] According to the summary of disclosure, since the resistance heating element is supported by the base member in the manufacturing process of the atomizing unit, it is possible to prevent deformation of the resistance heating element in the manufacturing process of the atomizing unit, and manufacture an atomizing unit having a high-quality resistance heating element.

[Embodiment]

(Non-Burning Type Flavor Inhaler)

[0042] Hereinafter, a non-burning type flavor inhaler according to an embodiment will be described. FIG. 1 is a diagram showing a non-burning type flavor inhaler 100 according to an embodiment. The non-burning type flavor inhaler 100 is a device for inhaling an inhaling flavor component without burning, and has a shape extending along a predetermined direction A that is a direction from a non-mouthpiece end to a mouthpiece end. FIG. 2 is a diagram illustrating an atomizing unit 111 according to an embodiment. FIG. 3 (A) is a diagram showing a P-P cross-section of the atomizing unit 111 shown in Fig. 2, and Fig. 3 (B) is a diagram showing a Q-Q cross-section of the atomizing unit 111 shown in Fig. 2. In the following description, it should be noted that the non-burning type flavor inhaler 100 is simply referred to as a flavor inhaler 100.

[0043] As shown in FIG. 1, the flavor inhaler 100 includes an inhaler body 110 and a cartridge 130.

[0044] The inhaler body 110 constitutes a main body of the flavor inhaler 100, and has a shape capable of connecting the cartridge 130. Specifically, the inhaler body 110 has an inhaler housing 110 X, and the cartridge 130 is connected to a downstream end of the inhaler housing 110 X. The inhaler body 110 includes an atomizing unit 111 for atomizing an aerosol source without burning, and an electrical unit 112. The atomizing unit 111 and the electrical unit 112 are accommodated in the inhaler housing 110 X.

[0045] In the embodiment, the atomizing unit 111 includes an atomizing unit housing 111 X constituting a part of the inhaler housing 110X. The atomizing unit 111 includes a connection part 111 C to a power source provided in the electrical unit 112, and a mouthpiece side opening 111 O provided on the opposite side of the connection part 111 C. The connection part 111 C is, for example, a connector to be connected to a power source. The mouthpiece side opening 111 O is an opening for receiving the cartridge 130, and is provided in the mouthpiece end. As shown in FIG. 2, the atomizing unit 111 includes a reservoir 11, a liquid holding member 12, a heating element 13, a cylindrical member 14 (cylindrical member 14_1 and cylindrical member 14_2), a cover member 15, a cap 16 and a flange 17 (flange 17_1 and flange 17_2). These members are accommodated in the atomizing unit housing 111 X. The atomizing unit housing 111 X has a shape (for example, a cylindrical shape) extending along the predetermined direction A. In FIG. 2, the connection part 111 C is omitted, but the connection part 111 C is provided in the non-mouthpiece end (the electrical unit 112 side) of the flange 17_2.

[0046] The reservoir 11 stores an aerosol source. The reservoir 11 has a configuration (size, material, structure, etc.) suitable for storing an aerosol source used for a plurality of puff actions. For example, the reservoir 11 may be a porous body formed of a material such as a resin web and the like, or a cavity for storing an aerosol source. The reservoir 11 is preferably able to store more aerosol sources per unit volume. The reservoir 11 may be disposed at a position where the aerosol source can be supplied to the liquid holding member 12, and contacts at least a part of the liquid holding member 12. In the embodiment, as shown in FIGS. 3 (A) and 3 (B), at least a part of the reservoir 11 is preferably arranged outside the cover member 15 in a direction B orthogonal to the predetermined direction A.

[0047] The liquid holding member 12 holds the aerosol source supplied from the reservoir 11. The liquid holding member 12 has a configuration (size, material, structure, etc.) suitable for holding a part of the aerosol source storable in the reservoir 11 (for example, an aerosol source used for one puff action) by transferring from the reservoir 11 to a position contacting or close to the heating element 13. The liquid holding member 12 may be a member for transferring the aerosol source from the reservoir 11 to the liquid holding member 12 by capillary phenomenon. The liquid holding member 12 transfers the aerosol source to the liquid holding member 12 by contacting the reservoir 11. When the reservoir 11 is a hollow, the contact between the liquid holding member 12 and the reservoir 11 means that the liquid holding member 12 is exposed to the cavity (reservoir 11). However, it should be noted that after the aerosol source is filled in the reservoir 11, the liquid holding member 12 is arranged to contact the aerosol source filled in the cavity (reservoir 11). For example, the liquid holding member 12 is made of glass fiber or porous ceramic. For example, the liquid holding member 12 is a wick made of glass fiber or porous ceramic. The liquid holding member 12 preferably has a heat resistance to withstand heating of the heating element 13. As shown in FIGS. 3 (A) and 3 (B), the liquid holding member 12 has a cylindrical shape extending along the predetermined direction A.

[0048] Here, at least a part of the inner side surface of the liquid holding member 12 contacts or comes close to the heating element 13 in the orthogonal direction B. The "at least a part of the inner side surface of the liquid holding member 12 contacts or comes close to the heating element 13" means that the distance between the heating element 13 and the inner side surface of the liquid holding member 12 is maintained to keep the distance between the heating element 13 and the aerosol source to a degree that the aerosol source can be atomized by the heating element 13 when the liquid holding member 12 holds the aerosol source. The distance between the heating element 13 and the inner side surface of the liquid holding member 12 depends on types of the aerosol source and the liquid holding member 12, temperatures of the heating element, and the likes, and may be, for example, 3 mm or less, preferably 1 mm or less. Further, "at least a part of the inner side surface of the liquid holding member 12 contacts with or comes close to the heating element 13" means that the distance between the heating element 13 and the inner side surface of the liquid holding member 12 is kept at a degree that the aerosol source can be atomized by the heating element 13. Thus, when the aerosol source is in a state where atomization of the aerosol source by the heating element 13 is impossible or atomization of the aerosol source is inhibited due to intervention of something between the heating element 13 and the aerosol source, it is not said that at least a part of the inner side surface of the liquid holding member 12 comes close to the heating element 13.

[0049] In the embodiment, the inner side surface of the liquid holding member 12 contacts or comes close to the heating portion 13 A of the heating element 13 as shown in FIG. 3 (A). On the other hand, as shown in FIG. 3 (B), a cylindrical member 14_1 is interposed between the liquid holding member 12 and the first end portion 13 B_1, and the inner side surface of the liquid holding member 12 does not contact or come close to the first end portion 13 B_1 of the heating element 13. Similarly, a cylindrical member 14_2 is interposed between the liquid holding member 12 and the second end portion 13 B_2, and the inner side surface of the liquid holding member 12 does not contact or come close to the second end portion 13 B_2 of the heating element 13.

[0050] At least a part of the outer side surface of the liquid holding member 12 in the orthogonal direction B is covered with the cover member 15 as shown in FIG. 3 (A) and 3 (B).

[0051] The heating element 13 is an example of an atomizing portion for atomizing the aerosol source held by the liquid holding member 12. In the embodiment, the heating element 13 is a resistance heating element that generates heat by a supplied to the heating element 13. Further, the heating element 13 is formed of a wire having a spiral shape, and is a coil having a shape extending along the predetermined direction A. Further, the inside of the heating element 13 forms at least a part of an air flow path that is a flow path of air inhaled from the mouthpiece end (the outlet 130 O shown in FIG. 1). Preferably, the inside of the heating element 13 is hollow.

[0052] Here, the heating element 13 includes the heating portion 13 A, the first end portion 13 B_1, and the second end portion 13 B_2. The heating element 13 is provided with a first contact electrically connected to a first pole of the power source and a second contact electrically connected to a second pole of the power source on the wire with a space therebetween. In the embodiment, the first contact is constituted by the first end portion 13 B_1 and the cylindrical member 14_1. Similarly, the second contact is constituted by the second end portion 13 B_2 and the cylindrical member 14_2.

[0053] The heating portion 13 A is formed of a wire between the first contact and the second contact arranged closest to each other on the wire. The first end portion 13 B_1 is formed of a wire on one side of the heating portion 13 A on the wire (in the embodiment, the wire on the downstream side in the air flow path). The second end portion 13 B_2 is formed of a wire on the other side of the heating portion 13 A on the wire (in the embodiment, the wire on the upstream side in the air flow path). The pitches of the wires forming the heating portion 13 A, the first end portion 13 B_1 and the second end portion 13 B_2 are the same. It is to be noted that the "pitch" means the distance between adjacent wires in the predetermined direction A. The "the pitches of the wires are the same" does not mean that the pitches of the wires are exactly the same, and means that the pitches of the wires are substantially the same. The "substantially the same" means that the difference in the pitches of the wires forming the heating portion 13 A, the first end portion 13 B_1 and the second end portion 13 B_2 are not intentionally set, and means that a difference caused by a manufacturing error and the like is acceptable.

[0054] The cylindrical member 14 has a tubular shape and includes a cylindrical member 14_1 and a cylindrical member 14_2. The cylindrical member 14_1 and the cylindrical member 14_2 have a tubular shape forming at least a part of an air flow path communicating from an inlet 112 A to an outlet 130 O (mouthpiece end). That is, the cylindrical member 14_1 constitutes a first cylindrical member, and the cylindrical member 14_2 constitutes a second cylindrical member spaced from the cylindrical member 14_1 in the predetermined direction A. It is preferable that each of the cylindrical member 14_1 and the cylindrical member 14_2 has a completely closed tubular shape without having an opening on the outer side surface of the cylindrical member 14_1 and the cylindrical member 14_2. In the embodiment, the inner diameter of the cylindrical member 14_1 is the same as the inner diameter of the cylindrical member 14_2.

[0055] The cylindrical member 14 has an aerosol intake to pass aerosol atomized by the heating element 13 to the air flow path. In the embodiment, the cylindrical member 14 includes the cylindrical member 14_1 and the cylindrical member 14_2, and the aerosol intake is a space between the cylindrical member 14_1 and the cylindrical member 14_2. The heating portion 13 A described above is arranged to be adjacent to the aerosol intake over the entire length of the aerosol intake in the predetermined direction A. The liquid holding member 12 described above is arranged to be adjacent to the aerosol intake over the entire length of the aerosol intake in the predetermined direction A. With such a configuration, the aerosol source held by the liquid holding member 12 can be atomized by efficiently using a portion with good quality other than the end portion of the wire constituting the heating element 13 (coil) as the heating portion 13 A. Incidentally, "adjacent to each other" may be a positional relationship in which the heating portion 13 A (or the liquid holding member 12) is exposed to the aerosol intake, a positional relationship in which a gap exists between the heating portion 13 A (or the liquid holding member 12) and the aerosol intake, or a positional relationship in which a part of the heating portion 13 A (or the liquid holding member 12) enters the aerosol intake. It should be noted that even in an aspect in which the heating portion 13 A (or the liquid holding member 12) is adjacent to the aerosol intake, a positional relationship between the heating portion 13 A and the inner side surface of the liquid holding member 12 satisfies the above-mentioned contact or close relationship.

[0056] A part or the whole of the cylindrical member 14 is formed of a conductive member having an electric resistivity lower than that of the wire forming the heating portion 13 A, and constitutes a first contact and a second contact by contacting the heating element 13. The cylindrical member 14 is made of, for example, aluminum or stainless steel (SUS). In the embodiment, the cylindrical member 14_1 constitutes a first conductive member contacting the first end portion 13 B_1 at the first contact, and the cylindrical member 14_2 constitutes a second conductive member contacting the second end portion 13 B_2 at the second contact. The heating portion 13 A described above is exposed from the cylindrical member 14 between the cylindrical member 14_1 and the cylindrical member 14_2.

[0057] In the embodiment, the cylindrical member 14_1 is disposed between the liquid holding member 12 and the first end portion 13 B_1 in the orthogonal direction B. Likewise, the cylindrical member 14_2 is disposed between the liquid holding member 12 and the second end portion 13 B_2 in the orthogonal direction B.

[0058] In the embodiment, as shown in FIG. 3 (B), the cylindrical member 14 constitutes a barrier member having an outer side surface located between the outer side surface of the heating member 13 and the inner side surface of the liquid holding member 12 in the orthogonal direction B. The outer side surface of the cylindrical member 14 is preferably provided at a position facing a part of the inner side surface of the liquid holding member 12. Further, the outer side surface of the cylindrical member 14 is preferably provided at a position facing a part of the inner side surface of the cover member 15. However, the outer side surface of the cylindrical member 14 may be provided at a position not facing the inner side surface of the cover member 15. The cylindrical member 14 preferably has a function of suppressing deformation of the heating element 13 due to a stress in an inward direction of the liquid holding member 12 covered by the cover member 15. That is, the cylindrical member 14 preferably has strength enough to withstand the stress of the cover member 15 pressing the outer side surface of the cylindrical member 14 inwardly in the orthogonal direction B. Therefore, the cylindrical member 14 is preferably formed of a conductive member (for example, stainless steel (SUS)) having a predetermined strength. In the embodiment, since the cylindrical member 14 forming the air flow path has a predetermined strength and the outer side surface of the cylindrical member 14 is provided at a position facing a part of the inner side surface of the cover member 15, deformation of the heating element 13 due to the stress of the cover member 15 and deformation of the air flow path are suppressed.

[0059] The cover member 15 restricts the amount of the aerosol source supplied to the liquid holding member 12. As shown in FIGS. 3 (A) and 3 (B), the cover member 15 has a cylindrical shape extending along the predetermined direction A. The cover member 15 is formed of a liquid impermeable member. The cover member 15 may be a liquid impermeable coating. The cover member 15 is preferably formed of a member having a thermal conductivity lower than that of the aerosol source or the liquid holding member 12. With such a configuration, the heat of the heating element 13 is hard to be transmitted to the aerosol source stored in the reservoir 11. The cover member 15 is preferably formed of a member pressing the liquid holding member 12 inwardly, for example, an elastic member. As a member constituting the cover member 15, for example, a silicone resin or a polyolefin resin can be used.

[0060] In the embodiment, as shown in FIG. 2, the cover member 15 covers the outer side surface of the liquid holding member 12 over the entire length of the outer side surface of the liquid holding member 12 along the predetermined direction A in a range where the inner side surface of the liquid holding member 12 and the heating element 13 (heating portion 13 A) contact or come close to each other.

[0061] In the embodiment, as shown in FIG. 3(A), the cover member 15 covers the outer side surface of the liquid holding member 12 over the entire circumference of the outer side surface of the liquid holding member 12 in a circumferential direction around the predetermined direction A as an axis in a range where the inner side surface of the liquid holding member 12 and the heating element 13 (heating portion 13 A) contact or come close to each other.

[0062] In such a case, preferably, the cover member 15 uniformly covers the outer side surface of the liquid holding member 12. For example, the cover member 15 may have no opening and cover the outer side surface of the liquid holding member 12. Alternatively, the cover member 15 may have ten or more openings, each of which is equally spaced in a predetermined direction (extension direction of the liquid holding member 12) or / in a circumferential direction around the predetermined direction as an axis. Or, the cover member 15 may have a plurality of equally spaced openings as described above, and a covering area, which is an area of the outer side surface of the liquid holding member 12 covered by the cover member 15, may be 60% or more of the area of the outer side surface of the member 12. Or, the cover member 15 may have ten or more equally spaced openings as described above, and the covering area may be 60% or more of the area of the outer side surface of the liquid holding member 12. A range of the outer side surface of the liquid holding member 12 uniformly covered by the cover member 15 may be only a range where the inner side surface of the liquid holding member 12 and the heating element 13 (heating portion 13 A) contact or come close to each other, or may be a whole range where the inner side surface of the cover member 15 and the outer side surface of the liquid holding member 12 contact each other.

[0063] As shown in FIGS. 2 and 3 (B), even in a range where the inner side surface of the liquid holding member 12 and the heating element 13 (heating portion 13 A) do not contact or come close to each other, the cover member 15 may cover the outer side surface of the liquid holding member 12.

[0064] For example, when the liquid holding member 12 is provided on the whole outside of the heating element 13 (the heating portion 13 A, the first end portion 13 B_1, and the second end portion 13 B_2), the cover member 15 may cover the outer side surface of the liquid holding member 12 over the entire length of the outer side surface of the liquid holding member 12 along the predetermined direction A in a range where the inner side surface of the cover member 15 and the outer side surface of the holding member 12 contact each other, or may cover the outer side surface of the liquid holding member 12 over the entire circumference of the outer side surface of the liquid holding member 12 in the circumferential direction around the predetermined direction A as an axis.

[0065] In the embodiment, it is preferable that the cover member 15 presses the outer side surface of the liquid holding member 12 inwardly in the orthogonal direction B, and brings the inner side surface of the liquid holding member 12 into contact or close to the heating element 13 by a stress of a degree that the heating element 13 is not deformed. Further, in the orthogonal direction B, the thickness of the liquid holding member 12 covered by the cover member 15 is preferably smaller than that of the liquid holding member 12 covered by the cover member 15.

[0066] From the viewpoint of applying a stress of a degree that the heating element 13 is not deformed, the cover member 15 preferably covers the outer side surface of the liquid holding member 12 even in a range where the inner side surface of the liquid holding member 12 and the heating element 13 (heating portion 13 A) do not contact or come close to each other. The cylindrical member 14_1 is preferably provided inside the cover member 15 in a range where the first end portion 13 B_1 is provided, and the cylindrical member 14_2 is preferably provided inside the cover member 15 in a range where the second end portion 13 B_2 is provided.

[0067] The cap 16 is a member to close a supply port for supplying the aerosol source to the reservoir 11. In the embodiment, the supply port is provided at the end (hereinafter referred to as a downstream end) of the reservoir 11 on the downstream side of the air flow path. In other words, the supply port is provided on the opposite side of the connection part 111 C to the power source (that is, the mouthpiece side opening 111 O) with respect to the reservoir 11. The supply port opens toward a predetermined direction (a downstream side in the predetermined direction A in FIG. 2), in which the aerosol atomized by the heating element 13 is directed toward the mouthpiece side opening 111 O, and the cap 16 is arranged to cover the supply port from the mouthpiece side opening 111 O. In the predetermined direction (the downstream side in the predetermined direction A in FIG. 2), in which the aerosol atomized by the heating element 13 is directed toward the mouthpiece side opening 111 O, the connection part 111 C, the reservoir 11, the cap 16 and the mouthpiece side opening 111 O are arranged in this order. The connection part 111 C, the reservoir 11, the cap 16 and the mouthpiece side opening 111 O are arranged on a straight line. The cap 16 is preferably fixed to the inhaler housing 110 X or / and the cylindrical member 14_1. At least one of the heating element 13 and the power supply member is damaged by a movement (here, movement to downstream) of separating the cap 16 from the reservoir 11.

[0068] Here, the power supply member may be any member as long as it electrically connects the heating element 13 and the power source. The power supply member is, for example, a lead wire (not shown in FIG. 2) for connecting the cylindrical member 14, the flange 17, or a lead wire connecting the cylindrical member 14 or the flange 17 to the power source. Although wiring of the lead wire is not particularly restricted, for example, the lead wire may be connected to the power source through the interior of the atomizing unit housing 111 X.

[0069] The flange 17 is formed of a conductive member and connected to the aforementioned lead wire for example. For instance, the flange 17 has a flange 17_1 connected to a lead wire extending from a first pole of the power source and a flange 17_2 connected to a lead wire extending from a second pole of the power source. The flange 17_1 is fixed to the cylindrical member 14_1, and the flange 17_2 is fixed to the cylindrical member 14_2. The flange 17_1 may be fixed to the cap 16. As described above, the flange 17 and the lead wire connected to the flange 17 are an example of a power supply member. The power supply member includes a first power supply portion (for example, the flange 17_2 and the lead wire connected to the flange 17_2) including a portion extending from the heating element 13 to the connection part 111 C to the power source, and a second power supply portion (for example, the flange 17_1 and the lead wire connected to the flange 17_1) including a portion extending from the heating element 13 to the opposite side of the connection part 111 C (that is, the mouthpiece side opening 111 O). In such a case, for example, the second power supply portion (for example, the lead wire connected to the flange 17_1 and the flange 17_1) is damaged by the movement (in this case, downstream movement) of separating the cap 16 from the reservoir 11.

[0070] Here, "damage" means an event degrading the function of each member. In the embodiment, it is to be noted that "damage" is a concept including a deformation of the heating element 13, poor contact between the cylindrical member 14 and the heating element 13, falling off of the flange 17_1, peeling of the lead wire from the flange 17_1, disconnection of the lead wire, etc.

[0071] In the embodiment, assuming the direction of separating the cap 16 from the reservoir 11 to be a separating direction, the power supply member is provided on the side of separating at least a part of the cap 16. The power supply member may be arranged to pass through the interior of the cap 16. The power supply member may be fixed to the cap 16.

[0072] For example, since the cap 16 is fixed to the cylindrical member 14_1, deformation of the heating element 13, poor contact between the cylindrical member 14 and the heating element 13 and the like occur along with the separation of the cap 16. Or, since the flange 17_1 is provided on the downstream end face of the cap 16, dropping of the flange 17, peeling of the lead wire from the flange 17, disconnection of the lead wire and the like occur along with the separation of the cap 16. Or, when the flange 17_1 is fixed to the cylindrical member 14_1 and the cap 16, deformation of the heating element 13, poor contact between the cylindrical member 14 and the heating element 13 and the like occur along with the separation of the cap 16.

[0073] In the embodiment, the heating element 13 is more easily damaged than the power supply member such as the cylindrical member 14, the flange 17 and the lead wire. The lead wire is more easily damaged than the cylindrical member 14 and the flange 17.

[0074] The aerosol source is a liquid such as glycerin or propylene glycol. The aerosol source is held, for example, by a porous body formed of a material such as a resin web as described above. The porous body may be formed of non-tobacco material or may be formed of tobacco material. The aerosol source may contain or may not contain an inhaling flavor component (nicotine component, etc.).

[0075] The electrical unit 112 includes an electrical unit housing 112 X constituting a part of the inhaler housing 110 X. In the embodiment, the electrical unit 112 has an inlet 112 A. As shown in FIG. 2, air flowing in from the inlet 112 A is guided to the atomizing unit 111 (the heating element 13). The electrical unit 112 includes a power source for driving the flavor inhaler 100 and a control circuit for controlling the flavor inhaler 100. The power source and the control circuit are accommodated in the electrical unit housing 112 X. The electrical unit housing 112 X has a cylindrical shape (for example, a tubular shape) extending along the predetermined direction A. The power source is, for example, a lithium ion battery The control circuit is composed of, for example, a CPU and a memory.

[0076] The cartridge 130 is configured to be connectable to the inhaler body 110 constituting the flavor inhaler 100. The cartridge 130 is provided on the downstream side of the atomizing unit 111 in the air flow path communicating with the outlet 130 O (mouthpiece end) from the inlet 112 A. In other words, the cartridge 130 is not necessarily provided on the mouthpiece end side than the atomizing unit 111 in terms of physical space, and may be provided on the downstream side of the atomizing unit 111 on the air flow path leading aerosol generated by the atomizing unit 111 to the mouthpiece end side.

[0077] For example, the cartridge 130 includes a cartridge housing 131, a flavor source 132, a mesh 133 A, and a filter 133 B.

[0078] The cartridge housing 131 has a cylindrical shape (for example, a tubular shape) extending along the predetermined direction A. The cartridge housing 131 accommodates a flavor source 132. Here, the cartridge housing 131 is configured to be inserted into the inhaler housing 110 X along the predetermined direction A.

[0079] The flavor source 132 is provided downstream of the atomizing unit 111 on the air flow path. The flavor source 132 adds an inhaling flavor component to the aerosol generated by the aerosol source. In other words, flavor given to aerosol by the flavor source 132 is carried to the mouthpiece end.

[0080] In the embodiment, the flavor source 132 is formed of a raw material piece adding an inhaling flavor component to the aerosol generated by the atomizing unit 111. The size of the raw material piece is preferably 0.2 mm or more and 1.2 mm or less. Further, the size of the raw material piece is preferably 0.2 mm or more and 0.7 mm or less. Since a specific surface area increases as the size of the raw material piece forming the flavor source 132 is smaller, the inhaling flavor component is likely to be released from the raw material piece forming the flavor source 132. Therefore, when adding a desired amount of inhaling flavor component to the aerosol, the amount of the raw material piece can be decreased. As a raw material piece forming the flavor source 132, a shredded tobacco, a shaped product formed into a granular form of tobacco material can be used. However, the flavor source 132 may be a shaped product obtained by shaping tobacco material into a sheet. Further, the raw material piece forming the flavor source 132 may be made of plants (for example, mint, herb, etc.) other than tobacco. Perfume such as menthol may be added to the flavor source 132.

[0081] Here, the raw material piece forming the flavor source 132 is, for example, obtained by sieving according to JIS Z 8815 using a stainless sieve conforming to JIS Z 8801, for example. For example, using a stainless steel sieve having mesh size of 0.71 mm, a raw material piece passing through the stainless sieve having mesh size of 0.71 mm is obtained by sieving the raw material piece over 20 minutes by a dry and mechanical shaking method. Then, using the stainless steel sieve with a mesh size of 0.212 mm, a raw material piece passing through the stainless steel sieve with a mesh size of 0.212 mm is removed by sieving a raw material piece over 20 minutes by a dry and mechanical shaking method. That is, the raw material piece forming the flavor source 132 is a raw material piece, which passes through the stainless steel sieve (mesh size = 0.71 mm) defining an upper limit and does not pass through a stainless steel sieve (mesh size = 0.212 mm) defining a lower limit. Therefore, in the embodiment, the lower limit of the size of the raw material piece forming the flavor source 132 is defined by the mesh size of the stainless sieve defining the lower limit. The upper limit of the size of the raw material piece forming the flavor source 132 is defined by the mesh size of the stainless steel sieve defining the upper limit.

[0082] In the embodiment, the flavor source 132 is a tobacco source having an alkaline pH. The pH of the tobacco source is preferably greater than 7, more preferably 8 or more. This makes it possible to efficiently extract an inhaling flavor component generated by the tobacco source by aerosol. This makes it possible to decrease the amount of the tobacco source when adding a desired amount of the inhaling flavor component to the aerosol. On the other hand, the pH of the tobacco source is preferably 14 or less, more preferably 10 or less. As a result, it is possible to decrease damage (such as corrosion) to the flavor inhaler 100 (for example, the cartridge 130 or the inhaler body 110).

[0083] It should be noted that the inhaling flavor component generated by the flavor source 132 is being carried by the aerosol and heating of the flavor source 132 itself is unnecessary.

[0084] The mesh 133 A is provided to block the opening of the cartridge housing 131 upstream of the flavor source 132, and the filter 133 B is provided to block the opening of the cartridge housing 131 downstream of the flavor source 132. The mesh 133 A has roughness of a degree not to pass a raw material piece forming the flavor source 132. The roughness of the mesh 133 A has a mesh size of, for example, 0.077 mm or more and 0.198 mm or less. The filter 133 B is made of a substance with air permeability The filter 133 B is preferably an acetate filter for example. The filter 133 B has roughness of a degree not to pass a material piece forming the flavor source 132.

(Use Mode of Non-Burning Type Flavor Inhaler)

[0085] Hereinafter, a use mode of the non-burning type flavor inhaler according to the embodiment will be described. Upon detecting the user's inhaling operation, the flavor inhaler 100 starts supplying the power supply output to the heating element 13. As the power supply output to the heating element 13 is started, atomization of the aerosol source held by the liquid holding member 12 is started. On the other hand, when the user's inhaling operation is not detected, the flavor inhaler 100 stops supplying the power supply output to the heating element 13. As the power supply output to the heating element 13 is stopped, the atomization of the aerosol source held by the liquid holding member 12 is stopped.

(Manufacturing Method of Atomizing Unit)

[0086] Hereinafter, a method of manufacturing the atomizing unit according to the embodiment will be described. FIGS. 4 and 5 are diagrams for explaining the manufacturing method of the atomizing unit 111 according to the embodiment.

[0087] As shown in FIG. 4 (A), the heating element 13 is arranged to follow a helical groove or projection formed on the side surface of the base member 300 having the axis X extending along the predetermined direction A (step A). In the embodiment, the base member 300 is a jig including a portion having a cylindrical shape.

[0088] As described above, the heating element 13 is formed of a wire, and the step shown in FIG. 4 (A) is a step of forming a coiled wire from a non-coiled wire by winding the non-coiled wire to be along the groove or the projection having the spiral shape and formed on the side surface of the base member 300.

[0089] Next, as shown in FIG. 4 (B), by sliding the cylindrical member 14_2 with the flange 17_2 fixed along the predetermined direction A, the cylindrical member 14_2 is disposed on the outer side surface of the heating element 13, and by sliding the cylindrical member 14_1 along the predetermined direction A, the cylindrical member 14_1 is disposed on the outer side surface of the heating element 13 (step E). In such a case, in order to expose the heating portion 13 A of the heating element 13, the cylindrical member 14_1 and the cylindrical member 14_2 are disposed in being separated from each other.

[0090] Next, as shown in FIG. 4 (C), by sliding a housing cap body 111 X_1 constituting a part of the atomizing unit housing 111 X along the predetermined direction A, the housing cap body 111 X_1 is brought into contact with the flange 17_2. Then, by sliding the liquid holding member 12 along the predetermined direction A, the liquid holding member 12 is disposed to contact or come close to at least a part (heating portion 13 A) of the heating element 13 (step C). The housing cap body 111 X_1 is fixed to the cylindrical member 14_2 and the flange 17_2.

[0091] The step of disposing the liquid holding member 12 to contact or come close to the heating portion 13 A of the heating element 13 may be a step of disposing the liquid holding member 12 to contact or come close to the heating portion A of the heating element 13 by the arrangement of the cover member 15 shown in FIG. 4 (D) to be described later. Further, the step of disposing the liquid holding member 12 may be a step of disposing the liquid holding member 12 while the liquid holding member 12 presses the outer side surface of the heating portion 13 A. The step of disposing the liquid holding member 12 may be a step of disposing the liquid holding member 12 to contact the entire circumference of the outer side surface of the heating portion 13 A. The step of disposing the liquid holding member 12 is a step of disposing the liquid holding member 12 on the outside of the heating element 13 when the heating element 13 is disposed on the outer side surface of the base member 300 (jig).

[0092] Next, as shown in FIG. 4 (D), by sliding the cover member 15 along the predetermined direction A, the cover member 15 is disposed on the outer side surface of the liquid holding member 12. By the displacement of the cover member 15, the heating portion 13 A of the heating element 13 comes into good contact with or comes close to the liquid holding member 12.

[0093] Next, as shown in FIG. 5 (A), the housing cylinder 111 X_2 constituting a part of the atomizing unit housing 111 X is fixed to the housing cap body 111 X_1. Then, the reservoir 11 is paced in the space formed by the housing cap body 111 X_1, the housing cylinder 111 X_2, and the cylindrical member 14. A part of the reservoir 11 is preferably placed also outside the cover member 15. The placement of the reservoir 11 may be performed before fixing the housing cylinder 111 X_2 to the housing cap body 111 X_1.

[0094] Here, it is preferable to fix the heating element 13 to the cylindrical member 14 after pacing the cylindrical member 14 on the outer side surface of the heating element 13. The step of fixing the heating element 13 and the cylindrical member 14 may be performed after the step shown in FIG. 4 (B) and before the step shown in FIG. 5 (B). The step of fixing the heating element 13 and the cylindrical member 14 are preferably performed before the step shown in FIG. 5 (A), more preferably before the step of FIG. 4 (C). This makes it possible to fix the heating element 13 and the cylindrical member 14 in a state in which there is no unnecessary member on the outer side surface of the cylindrical member 14. This makes it easy to fix the heating element 13 and the cylindrical member 14.

[0095] Next, as shown in FIG. 5 (B), after filling the reservoir 11 with the aerosol source, the downstream end of the reservoir 11 is covered by the cap 16. The cap 16 is fixed to the housing cylindrical 111 X_2. It is to be noted that the upstream end of the reservoir 11 is covered by the housing cap 111 X_1. Then, the flange 17_1 is disposed on the downstream end face of the cap 16. The flange 17_1 is fixed to the cylindrical member 14_1.

[0096] Next, as shown in FIG. 5 (C), the base member 300 (jig) is rotated about the axis X as a rotation axis to separate the whole heating element 13 from the groove or projection of the base member 300 (step B). Here, it should be noted that the cylindrical member 14 is fixed to the atomizing unit housing 111 X (the housing cap 111 X_1 and the housing cylinder 111 X_2) through the cap 16, the flange 17, and the like. Therefore, the step shown in FIG. 5 (C) is performed after fixing the cylindrical member 14 to the atomizing unit housing 111 X or / and after fixing the heating element 13 to the cylindrical member 14. Here, in the step shown in FIG. 5 (C), a space used as an air flow path is formed inside the heating element 13. The step shown in FIG. 5(C) is a step of forming, by separating the heating element 13, an aerosol intake (space between the cylindrical member 14_1 and the cylindrical member 14_2) that passes the aerosol atomized by the heating element 13. Since the aerosol intake communicates with the inside of the heating element 13 only by separating the heating element 13 from the base member 300, it should be noted that the step shown in FIG. 5 (C) is a step of forming the aerosol intake.

[0097] Further, the step shown in FIG. 5 (C) is a step of forming at least a part of the air flow path inside the heating element 13 by the separation of the heating elements 13. Specifically, in the step shown in FIG. 5 (C), the whole heating element 13 is separated from the base member 300 (jig), and at least a part of the air flow path is formed inside the heating element 13 by the separation of the heating elements 13. In such a case, before the step shown in FIG. 5 (C), it is preferable to perform a step (step G) of disposing a flow path forming member forming at least a part of the air flow path. The flow path forming member, for example, may be considered as the above-described cylindrical member 14. Therefore, the step of disposing the flow path forming member may be considered as the step shown in FIG. 4 (B).

[0098] In the embodiment, the depth of the groove of the base member 300 or the height of the projection of the base member 300 is preferably the same or less than the diameter of the wire forming the heating element 13 from the viewpoint of electrical connection between the cylindrical member 14 and the heating element 13. On the other hand, the depth of the groove of the base member 300 or the height of the projection of the base member 300 is preferably half or more of the diameter of the wire forming the heating element 13 from the viewpoint of holding the heating element 13 by the base member 300.

(Operation and Effect)

[0099] In the embodiment, at least a part of the outer side surface of the liquid holding member 12 in the orthogonal direction B is covered with the cover member 15. With such a configuration, it is possible to prevent a situation (oversupply) in which the aerosol source is excessively supplied to the liquid holding member 12. The prevention of the oversupply lowers a risk of leakage. In addition, the prevention of the oversupply decreases a heat loss in thermal atomization, and restricts a reduction of atomization efficiency.

[0100] Here, the cover member 15 is formed of a liquid impermeable member. As a result, oversupply of the aerosol source is suppressed. The cover member 15 is preferably formed of a member having a thermal conductivity lower than the thermal conductivity of the aerosol source or the liquid holding member 12. With such a configuration, a heat loss in thermal atomization is suppressed. The cover member 15 is preferably formed of a member that presses the liquid holding member 12 in the inward direction. With such a configuration, the liquid holding member 12 can be brought into good contact with or close to the heating element 13.

[0101] In the embodiment, it is preferable that the cover member 15 covers the outer side surface of the liquid holding member 12 over the entire length of the outer side surface of the liquid holding member 12 along the predetermined direction A in the range where the inner side surface of the liquid holding member 12 and the heating element 13 (the heating portion 13 A) contact or come close to each other. With such a configuration, the above-described oversupply can be further decreased.

[0102] In the embodiment, it is preferable that the cover member 15 covers the outer side surface of the liquid holding member 12 over the entire circumference of the outer side surface of the liquid holding member 12 in the circumferential direction around the predetermined direction A as an axis in the range where the inner side surface of the liquid holding member 12 and the heating element 13 (the heating portion 13 A) contact or come close to each other. With such a configuration, the above-described oversupply can be further decreased.

[0103] In the embodiment, it is preferable that the cover member 15 uniformly covers the outer side surface of the liquid holding member 12. With such a configuration, it is possible to uniformly supply the aerosol source to the heating element 13 (heating portion 13 A) and to improve the atomization efficiency. For example, the cover member 15 may have no opening and cover the outer side surface of the liquid holding member 12. This makes it possible to more effectively suppress the above-described oversupply. Or, the cover member 15 may have ten or more equally spaced openings. By adjusting the number and size of the 10 or more equally spaced openings, it is possible not only to decrease the above-described oversupply, but also to adjust the supply amount of the aerosol source to a desired amount, and to easily supply an equal amount of the aerosol source, improving the atomization efficiency. Or, the cover member 15 has a plurality of equally spaced openings, and the covering area, which is the area of the outer side surface of the liquid holding member 12 covered by the cover member 15, may be 60% or more of the area of the outer side surface of the liquid holding member 12. With such a configuration, the aerosol source supply amount can be more effectively decreased.

[0104] In the embodiment, it is preferable that the thickness of the liquid holding member 12 covered with the cover member 15 is smaller than the thickness of the liquid holding member 12 not covered with the cover member 15, in other words, a configuration that the liquid holding member 12 is compressed by the cover member 15 is preferable. With such a configuration, a situation that an excessive amount of the aerosol source is held by the liquid holding member 12 is decreased by the compression of the liquid holding member 12.

[0105] In the embodiment, at least a part of the reservoir 11 is preferably arranged outside the cover member 15 in the orthogonal direction B. With such a configuration, it is possible to decrease the oversupply described above by the cover member 15, while increasing the capacity of the reservoir 11 (that is, the amount of aerosol source storable by the reservoir 11) by allocating the space outside the cover member 15 to the reservoir 11.

[0106] In the embodiment, the cylindrical member 14 constitutes a barrier member having an outer side surface located between the outer side surface of the heating element 13 and the inner side surface of the cover member 15 in the orthogonal direction B. It is preferable that the outer side surface of the cylindrical member 14 is provided at a position facing a part of the inner side surface of the liquid holding member 12. Further, it is preferable that the outer side surface of the cylindrical member 14 is provided at a position facing a part of the inner side surface of the cover member 15. With such a configuration, deformation of the heating element 13 due to a stress in the inward direction of the liquid holding member 12 covered by the cover member 15 is suppressed. Further, when the cylindrical member 14 constitutes an air flow path and has a predetermined strength (for example, strength to withstand a stress of the cover member 15 pressing the outer side surface of the cylindrical member 14 in the inward direction in the orthogonal direction B), deformation of the heating element 13 due to the stress of the cover member 15 and deformation of the air flow path are suppressed. In other words, in an aspect where the inside of the cylindrical member 14 is an air flow path, the cylindrical member 14 functions as a barrier member in terms of suppressing deformation of the heating element 13 and deformation of the air flow path due to the stress of the cover member 15.

[0107] In the embodiment, the cylindrical member 14 forming at least a part of the air flow path is formed of a conductive member, and includes a cylindrical member 14_1 contacting the first end portion 13 B_1 at the first contact point and a cylindrical member 14_2 contacting the second end portion 13 B_2 at the second contact point. Therefore, it is possible to reduce the number of components required for forming the air flow path and forming the electrical contact.

[0108] In the embodiment, a cap 16 is provided to cover the supply port for supplying the aerosol source to the reservoir 11. At least one of the heating element 13 and the power supply member is damaged by a movement (here, downstream movement) of separating the cap 16 from the reservoir 11. Therefore, the use of the flavor inhaler 100 accompanied by reinjection of the aerosol source to the reservoir 11 can be effectively decreased. Since the cap 16 covers the supply port provided on the opposite side of the connection part 111 C to the power source with reference to the reservoir, the use of the flavor inhaler 100 accompanied by the reinjection of the aerosol source is effectively decreased.

[0109] In the embodiment, the power supply member includes a first power supply portion (e.g, the flange 17_2 and a lead wire connected to the flange 17_2) including a portion extending from the heating element 13 to the power source connection part 111 C side, and a second power supply portion (e.g, the flange 17_1 and a lead wire connected to the flange 17_1) including a portion extending from the heating element 13 to the opposite side of the connection part 111 C (that is, the mouthpiece side opening 111 o). Therefore, it is easy to adopt a configuration in which the second power supply portion is damaged by the movement (here, downstream movement) of separating the cap 16 from the reservoir 11.

[0110] In the embodiment, a coil forming the heating element 13 includes a heating portion 13 A formed of a wire between the first contact and the second contact arranged closest to each other on the wire, a first end portion 13 B_1 formed on the wire by a wire on one outer side of the heating portion 13 A on the wire, and a second end portion 13 B_2 formed on the wire by a wire on the other outer side of the heating portion 13 A. At least a part of the inner side surface of the liquid holding member 12 contacts or comes close to the heating portion 13 A. In other words, since the end portion (the first end portion 13 B_1 and the second end portion 13 B_2 in the embodiment) having a high possibility of poor quality is not used as a heating portion, and the end portion other than the end portion of the wire forming the heating element 13 (coil) (the heating portion 13 A in the embodiment) is used as a heating portion, it is possible to improve the uniformity of the aerosol generation amount without depending on the manufacturing method of the heating element 13.

[0111] In the embodiment, since only the central portion of the heating element 13 (coil) is used as the heating portion 13 A, the liquid holding member 12 can be easily disposed over the entire central portion used as the heating member 13 A, and the atomizing unit 111 with little energy loss can be easily formed.

[0112] In the embodiment, the cylindrical member 14 is formed of a conductive member, and includes a cylindrical member 14_1 contacting the first end portion 13 B_1 at the first contact point and a cylindrical member 14_2 contacting the second end portion 13 B_2 at the second contact point. The cylindrical member 14_1 and the cylindrical member 14_2 are disposed on the side surface (in the embodiment, the outer side surface) of the heating element 13. The side surface of the heating element 13 means the outer peripheral surface and the inner peripheral surface of the coil when considering the coil forming the heating element 13 as a cylindrical member. Therefore, the side surface of the heating element 13 is actually constituted by the side surface of the wire forming the coil. With the configuration described above, by making contact with the cylindrical member 14 on the side surface of the heating element 13, it is possible to make electrical connection on the surface and realize stable electrical connection. In addition, in the case of making electrical connection with fixation to the cylindrical member 14 on the side surface of the heating element 13, fixation on the surface is possible, and the heating element 13 can be firmly fixed to the cylindrical member 14. In addition, fixing such as welding is easy to perform.

[0113] Furthermore, in the embodiment, since the cylindrical member 14 is a member having a surface, it is possible to make electrical connection between surfaces and realize stable electrical connection, and the heating element 13 can be firmly fixed to the cylindrical member 14. Further, fixing by welding becomes easy.

[0114] In the embodiment, the cylindrical member 14_1 is disposed between the liquid holding member 12 and the first end portion 13 B_1 in the orthogonal direction B, and the cylindrical member 14_2 is disposed between the liquid holding member 12 and the second end portion 13 B_2. Therefore, since the heating element 13 is supported by the cylindrical member 14_1 and the cylindrical member 14_2, deformation of the heating element 13 is prevented even if the inside of the heating element 13 is hollow.

[0115] In the embodiment, the manufacturing method of the atomizing unit 111 includes steps of disposing the heating element 13 to follow a helical groove or a projection formed on the side surface of the base member 300 (jig) having the axis X extending along the predetermined direction A, and rotating the base member 300 about the axis X to separate the whole heating elements 13 from the groove or projection of the base member 300. In other words, since the heating member 13 is supported by the base member 300 in the manufacturing process of the atomizing unit 111, it is possible to prevent deformation of the heating element 13 in the manufacturing process of the atomizing unit 111, and manufacture the atomizing unit 111 having the heating element 13 with high quality.

[0116] In the embodiment, after bringing the liquid holding member 12 into contact with or close to the heating portion 13 A of the heating element 13, the base member 300 (jig) is rotated about the axis X as a rotation axis to separate the whole heat generating body 13 from the groove or projection of the base member 300. Therefore, it is possible to prevent the deformation of the heating element 13 by the step of disposing the liquid holding member 12 to contact or come close to the heating part 13 A of the heat generating element 13 (in particular, the step of bringing the heating part 13 A into contact with or close to the liquid holding member 12). This makes it possible to manufacture the atomizing unit 111 with the high-quality heating element 13.

[0117] In the embodiment, the base member 300 (jig) is rotated about the axis X as a rotation axis, and before the whole heating element 13 is separated from the groove or the projection of the base member 300, the cylindrical member 14 is disposed on the outer side surface of the heating element 13 in the orthogonal direction. In other words, the heating member 13 is always supported by the base member 300 or the cylindrical member 14 in the manufacturing process of the atomizing unit 111. Therefore, it is possible to always suppress the deformation of the heating element 13 in the manufacturing process of the atomizing unit 111, and to manufacture the atomizing unit 111 having the high-quality heating elements 13.

[0118] The step of disposing the liquid holding member 12 may be a step of disposing the liquid holding member 12 while the liquid holding member 12 presses the outer side surface of the heating portion 13 A. The step of disposing the liquid holding member 12 may be a step of disposing the liquid holding member 12 to contact the entire circumference of the outer side surface of the heating portion 13 A. In these cases, since the liquid holding member 12 is disposed before separating the heating element 13 from the base member 300, it is possible to prevent the deformation of the heating element 13 in the step of disposing the liquid holding member 12, and to manufacture the atomizing unit 111 with the high-quality heating element 13.

[0119] In addition, by the separation of the heating elements 13, at least a part of the air flow path may be formed inside the heating element 13. As a result, before the heating element 13 is separated from the base member 300, ingress of foreign matter into the air flow path is prevented.

[0120] In the embodiment, after fixing the cylindrical member 14 to the atomizing unit housing 111 X or / and after fixing the heating element 13 to the cylindrical member 14, the base member 300 (jig) is rotated about the axis X as a rotation axis to separate the whole heating element 13 from the groove or projection of the base member 300. As a result, it is possible to prevent the deformation of the heating element 13 accompanied by the rotation of the base member 300, and to manufacture the atomizing unit 111 with the high-quality heating element 13.

[Modification 1]

[0121] Hereinafter, a modification 1 of the embodiment will be described. Differences from the embodiment will mainly be described below.

[0122] In the modification 1, a description will be given on an example of a step (step shown in FIG. 4 (C)) of disposing the liquid holding member 12 to contact or come close to the heating portion 13 A of the heating element 13. FIG. 6 is a diagram for explaining a modification example of the process shown in FIG. 4(C). However, it should be noted that the modification 1 is different from the embodiment in that the step of rotating the base member 300 (jig) about the axis X as a rotation axis to separate the whole heating elements 13 from the groove or projection of the base member 300 is performed in the middle of the process shown in FIG. 4 (C).

[0123] Specifically, as shown in FIG. 6 (A), by sliding a sliding member 400 having a cylindrical shape along the predetermined direction A, the sliding member is disposed on the outer side surfaces of the heating element 13 and the cylindrical member 14. That is, the sliding member 400 is slid along the outer side surfaces of the heating element 13 and the cylindrical member 14 in the orthogonal direction B (step C 1).

[0124] Next, as shown in FIG. 6 (B), the base member 300 (jig) is rotated about the axis X as a rotation axis to separate the whole heating elements 13 from the groove or projection of the base member 300 (step B). Here, it should be noted that the cylindrical member 14 is fixed to the atomizing unit housing 111 X (the housing cap body 111 X_1) via the flange 17 and the like.

[0125] Next, as shown in FIG. 6 (C), the liquid holding member 12 is slid along the outer side surface of the sliding member 400 in the orthogonal direction B (step C 2). Here, since the heating element 13 is covered with the sliding member 400, even if the liquid holding member 12 is disposed in a state where the whole heating element 13 is separated from the base member 300 (jig), deformation of the heating element 13 accompanied by the disposition of the liquid holding member 12 is prevented.

[0126] Next, as shown in FIG. 6 (D), the sliding member 400 is removed by sliding the sliding member 400 in the predetermined direction A. That is, the sliding member 400 is removed by sliding from between the liquid holding member 12 and the heating element 13 (step C 3). It should be noted that the liquid holding member 12 is placed to contact or come close to the heating portion 13 A of the heating element 13.

[0127] In such a case, it is preferable that the sliding member 400 is constituted by a member that is more likely to slide in the predetermined direction A than the liquid holding member 12. For example, the sliding member 400 is configured so that a frictional force (dynamic frictional force or / and static frictional force) acting between the inner side surface of the sliding member 400 and the outer side surface of the cylindrical member 14 is smaller than the frictional force between the inner side surface of the liquid holding member 12 and the outer side surface of the cylindrical member 14. With this configuration, it becomes easier to dispose the liquid holding member 12 by sliding by using the sliding member 400, as compared with the case where the liquid holding member 12 is disposed as a single unit. In such a case, the rigidity of the sliding member 400 is preferably higher than that of the liquid holding member 12. With this configuration, as compared with the case where the liquid holding member 12 is disposed as a single unit, the use of the sliding member 400 makes it easier to dispose the liquid holding member 12, because when sliding the sliding member 400 between the cylindrical member 14_1 and the cylindrical member 14_2, it becomes difficult to be caught by a cut of the cylinder.

[0128] In the example shown in FIG. 6, the sliding member 400 is slid along the outer side surface of the cylindrical member 14, and then the liquid holding member 12 is slid along the outer side surface of the sliding member 400. However, the modification 1 is not limited thereto. Specifically, after inserting the sliding member 400 inside the liquid holding member 12, in a state where the sliding member 400 is inserted inside the liquid holding member 12, the sliding member 400 may be slid along the outer side surface of the cylindrical member 14.

[0129] In the example shown in FIG. 6, the sliding member 400 is removed by sliding after separating the heating element 13 from the groove or projection of the base member 300. The modification 1 is not limited thereto. Specifically, the step of removing the sliding member 400 by sliding may be performed before the step of separating the heating element 13 from the groove or projection of the base member 300.

[0130] In the modification 1, the depth of the groove of the base member 300 or the height of the projection of the base member 300 is equal to or less than the diameter of the wire constituting the heating element 13, preferably equal to or more than half the diameter of the wire.

[0131] In the modification 1, the step of separating the heating element 13 from the groove or the projection of the base member 300 is, as in the embodiment, preferably performed after fixing the cylindrical member 14 to the atomizing unit housing 111 X or / and after fixing the heating element 13 to the cylindrical member 14.

(Operation and Effect)

[0132] In the modification 1, the heating element 13 is separated from the groove or the projection of the base member 300 before disposing the liquid holding member 12 to contact or come close to the heating portion 13 A of the heating element 13. In this manner, the base member 300 can be separated as fast as possible before assembling members such as the liquid holding member 12, so that the base member 300 can be diverted to the next semi-finished product in a short time, improving the productivity of the atomizing unit 111.

[0133] While obtaining such an effect, by using the sliding member 400, in the step of disposing the liquid holding member 12 to contact or come close to the heating portion 13 A of the heating element 13 (for example, the step of sliding the liquid holding member 12), it is possible to prevent the deformation of the heating element 13, and to manufacture the atomizing unit 111 with the high-quality heating element 13. Further, this makes it easy to dispose the liquid holding member 12 on the outer side surfaces of the heating element 13 and the cylindrical member 14.

[Modification 2]

[0134] Hereinafter, a modification 2 of the embodiment will be described. Differences from the embodiment will mainly be described below.

[0135] In the embodiment, the base member 300 is a jig having a cylindrical shape. In contrast, in the modification 2, a case where the base member 300 is the cylindrical member 14 (the cylindrical member 14_1 and the cylindrical member 14_2) is exemplified. FIG. 7 is a diagram for explaining a method of manufacturing the atomizing unit 111 according to the modification 2. In FIG.

7, it should be noted that the atomizing unit housing 111 X, the cap 16, the flange 17 and the like are omitted.

[0136] Specifically, as shown in FIG. 7 (A), the heating element 13 is disposed to follow a helical groove or a projection formed on the inner side surface of the cylindrical member 14 having an axis X extending along the predetermined direction A, and the cylindrical member 14 and the heating element 13 are electrically connected (step A and step D). Here, the cylindrical member 14 is disposed outside the heating element 13.

[0137] In the modification 2, the cylindrical member 14_1 and the cylindrical member 14_2 are continuous in the predetermined direction A. In other words, the step A is a step of disposing the heating element 13 across both the cylindrical member 14_1 and the cylindrical member 14_2.

[0138] Here, it should be noted that the liquid holding member 12 is disposed on the outer side surface of the cylindrical member 14 (the cylindrical member 14_1 and the cylindrical member 14_2) in the orthogonal direction B.

[0139] Next, in FIG. 7 (B), at least one of the cylindrical member 14_1 and the cylindrical member 14_2 is rotated about the axis X as a rotation axis to separate the heating element 13 from the groove or the projection (step B). That is, the step B is a step of separating the cylindrical member 14_1 and the cylindrical member 14_2 from each other, while maintaining the state in which the heating element 13 is disposed over both the cylindrical member 14_1 and the cylindrical member 14_2.

[0140] In the modification 2, by separating the cylindrical member 14_1 and the cylindrical member 14_2 from each other, the heating portion 13 A of the heating element 13 is exposed to the liquid holding member 12. The liquid holding member 12 is disposed to contact or come close to the heating portion 13 A of the heating element 13 (step C or step C 4). Since a space between the cylindrical member 14_1 and the cylindrical member 14_2 is formed for the first time in the step shown in FIG. 7 (B), the step shown in FIG. 7 (B) is a step of forming the aerosol intake (space between the cylindrical member 14_1 and the cylindrical member 14_2) to pass aerosol atomized by the heating element 13 to the inside of the heating element 13 by the separation of the heating element 13.

[0141] Here, in the case of fixing the heating element 13 to the cylindrical member 14, such a fixing step may be performed after the step shown in FIG. 7(B). Alternatively, in the cylindrical member 14_1 and the cylindrical member 14_2, after fixing the conductive member and the heating element 13 in one of them, the conductive member in the other of them may be separated from the conductive member in the one of them. The step (step D) of electrically connecting the cylindrical member 14 and the heating element 13 may be considered as such a fixing step.

[0142] The cylindrical member 14_1 and the cylindrical member 14_2 may be connected by screwing in a state before separating the cylindrical member 14_1 and the cylindrical member 14_2 from each other (i.e., in the state shown in FIG. 7 (A)).

(Operation and Effect)

[0143] In the modification 2, the heating element 13 is disposed to follow the helical groove or projection formed on the inner side surface of the cylindrical member 14, and one of the cylindrical member 14_1 and the cylindrical member 14_2 is rotated to separate from the groove or the projection of the heating element 13. That is, in the manufacturing process of the atomizing unit 111, since the heating element 13 is supported by the cylindrical member 14_1 and the cylindrical member 14_2, it is possible to prevent deformation of the heating element 13, and to manufacture the atomizing unit 111 with the high-quality heating element 13.

[0144] In the modification 2, since the cylindrical member 14 is used as a base member 300, an extra jig used for forming the heating element 13 as in the embodiment is unnecessary, and the manufacturing process of the atomizing unit 111 can be simplified.

[Modification 3]

[0145] Hereinafter, a modification 3 of the embodiment will be described. Differences from the modification 2 will be mainly described below.

[0146] In the modification 2, the heating element 13 is disposed to follow the helical groove or projection formed on the inner side surface of the cylindrical member 14. On the other hand, in the modification 3, the heating element 13 is disposed to follow the helical groove or projection formed on the outer side surface of the cylindrical member 14.

[0147] Specifically, as shown in FIG. 8 (A), a heating element 13 is disposed to follow a helical groove or projection formed on the outer side surface of the cylindrical member 14 having an axis X extending along a predetermined direction A, and the cylindrical member 14 and the heating element 13 are electrically connected (Step A and Step D). Here, the cylindrical member 14 is disposed inside the heating element 13.

[0148] Next, in FIG. 8 (B), at least one of the cylindrical member 14_1 and the cylindrical member 14_2 is rotated about the axis X as a rotation axis to separate the heating element 13 from the groove or the projection (step B). Since the space between the cylindrical member 14_1 and the cylindrical member 14_2 is formed for the first time in the step shown in FIG. 8 (B), the step shown in FIG. 8 (B) is a step of forming the aerosol intake (the space between the cylindrical member 14_1 and the cylindrical member 14_2) to pass the aerosol atomized by the heating element 13 to the inside of the heating element 13 by the separation of the heating element 13.

(Operation and Effect)

[0149] In the modification 3, as in the modification 2, it is possible to manufacture the atomizing unit 111 with the high-quality heating element 13, and to simplify the manufacturing process of the atomizing unit 111.

[Modification 4]

[0150] Hereinafter, a modification 4 of the embodiment will be described. Differences from the embodiment will mainly be described below.

[0151] In the embodiment, the inner diameter of the cylindrical member 14_1 is the same as the inner diameter of the cylindrical member 14_2. In contrast, in the modification 4, as shown in FIG. 9, the inner diameter and the outer diameter of the cylindrical member 14_1 are larger than the inner diameter and the outer diameter of the cylindrical member 14_2. In FIG. 9, it should be noted that the atomizing unit housing 111 X, the cap 16, the flange 17 and the like are omitted.

[0152] In such a case, as shown in FIG. 9, the heating element 13 has the heating portion 13 A and the first end portion 13 B_1, but does not have the second end portion 13 B_2. The outer side surface of the first end portion 13 B_1 contacts the inner side surface of the cylindrical member 14_1. In other words, the cylindrical member 14_1 is disposed outside the heating element 13. On the other hand, a lead wire drawn upstream from the heating portion 13 A is connected to the outer side surface or the end face of the cylindrical member 14_2. Here, the lead wire is made of the same member (for example, a nichrome wire) as the heating element 13. The lead wire may be a member in which the wire forming the heating element 13 is extended as it is. The outer side surface or the end face of the cylindrical member 14_2 and the lead wire form the second contact CP 2. The lead wire is fixed to the outer side surface of the cylindrical member 14_1 by welding or soldering.

[0153] In FIG. 9, it should be noted that the lead wire is inflated for convenience of illustration, but the lead wire is actually disposed between the liquid holding member 12 and the cylindrical member 14.

(Operation and Effect)

[0154] In the modification 4, the outer diameter of the cylindrical member 14_1 provided on the downstream side is larger than the outer diameter of the cylindrical member 14_2 provided on the upstream side. Therefore, the distance between the cover member 15 and the cylindrical member 14_1 is smaller than the distance between the cover member 15 and the cylindrical member 14_2, and it is possible to prevent the oversupply of the aerosol source to the liquid holding member 12 on the downstream side.

[0155] In the modification 4, the cylindrical member 14_1 is disposed between the liquid holding member 12 and the first end portion 13 B_1 in the orthogonal direction B. Therefore, since the heating element 13 is supported by the cylindrical member 14_1, deformation of the heating element 13 is prevented even if the inside of the heating element 13 is hollow.

[Modification 5]

[0156] Hereinafter, a modification 5 of the embodiment will be described. Differences from the embodiment will mainly be described below.

[0157] In the embodiment, the inner diameter of the cylindrical member 14_1 is the same as the inner diameter of the cylindrical member 14_2. In contrast, in the modified example 4, as shown in FIG. 10, the inner diameter and the outer diameter of the cylindrical member 14_1 are larger than the inner diameter and the outer diameter of the cylindrical member 14_2. In FIG. 10, it should be noted that the atomizing unit housing 111 X, the cap 16, the flange 17 and the like are omitted.

[0158] In this case, as shown in FIG. 10, the heating element 13 has a heating portion 13 A, a first end portion 13 B_1 and a second end portion 13 B $_2$. However, the outer diameter of the second end portion 13 B_2 is smaller than the outer diameter of the first end portion 13 B_1. The outer side surface of the first end portion 13 B_1 contacts the inner side surface of the cylindrical member 14_1. Similarly, the outer side surface of the second end portion 13 B_2 contacts the inner side surface of the cylindrical member 14_2. In other words, the cylindrical member 14_1 and the cylindrical member 14_2 are disposed outside the heating element 13.

(Operation and Effect)

[0159] In the modification 5, the outer diameter of the cylindrical member 14_1 provided on the downstream side is larger than the outer diameter of the cylindrical member 14_2 provided on the upstream side. Therefore, as in the modification 4, the distance between the cover member 15 and the cylindrical member 14_1 is smaller than the distance between the cover member 15 and the cylindrical member 14_2, and it is possible to suppress the oversupply of the aerosol source to the liquid holding member 12 on the downstream side.

[0160] In the modification 5, the cylindrical member 14_1 is disposed between the liquid holding member 12 and the first end portion 13 B_1 in the orthogonal direction B, and the cylindrical member 14_2 is disposed between the liquid holding member 12 and the second end portion 13 B_2. Therefore, since the heating element 13 is supported by the cylindrical member 14_1, deformation of the heating element 13 is suppressed even if the inside of the heating element 13 is hollow.

[Modification 6]

[0161] Hereinafter, a modification 6 of the embodiment will be described. Differences from the embodiment will mainly be described below.

[0162] In the embodiment, the inner diameter of the cylindrical member 14_1 is the same as the inner diameter of the cylindrical member 14_2. In contrast, in the modified example 6, as shown in FIG. 11, the inner diameter and the outer diameter of the cylindrical member 14_1 are larger than the inner diameter and the outer diameter of the cylindrical member 14_2. In FIG. 11, it should be noted that the atomizing unit housing 111 X, the cap 16, the flange 17 and the like are omitted.

[0163] In such a case, as shown in FIG. 11, the heating element 13 has the heating portion 13 A and the second end portion 13 B_2, but does not have the first end portion 13 B_1. The inner side surface of the second end portion 13 B_2 contacts the outer side surface of the cylindrical member 14_2. In other words, the cylindrical member 14_2 is disposed inside the heating element 13. On the other hand, a lead wire drawn downstream from the heating portion 13 A is connected to the outer side surface or the end face of the cylindrical member 14_1. The outer side surface or the end face of the cylindrical member 14_1 and the lead wire constitute the first contact CP 1.

[0164] In FIG. 11, it should be noted that the lead wire is inflated for convenience of illustration, but the lead wire is actually laid between the liquid holding member 12 and the cylindrical member 14.

(Operation and Effect)

[0165] In the modification 6, the outer diameter of the cylindrical member 14_1 provided on the downstream side is larger than the outer diameter of the cylindrical member 14_2 provided on the upstream side. Therefore, as in the modification 4 and modification 5, the distance between the cover member 15 and the cylindrical member 14_1 is smaller than the distance between the cover member 15 and the cylindrical member 14_2, and it is possible to prevent the oversupply of the aerosol source to the liquid holding member 12 on the the downstream side.

[0166] In the modification 6, the cylindrical member 14_2 is disposed between the liquid holding member 12 and the second end portion 13 B_2 in the orthogonal direction B. Therefore, since the heating element 13 is supported by the tubular member 142, deformation of the heating element 13 is prevented even if the inside of the heating element 13 is hollow.

[Modification 7]

[0167] Hereinafter, a modification 7 of the embodiment will be described. Differences from the embodiment will mainly be described below.

[0168] In the modification 7, a method of manufacturing the atomizing unit 111 shown in the modification 4 (FIG. 9) will be described. However, since the method of attaching the atomizing unit housing 111 X, the cover member 15, the cap 16, and the flange 17 are substantially the same as those in the embodiment, their mounting methods will be omitted. In the modification 7, the base member 300 (jig) with an axis X extending along a predetermined direction has a first support portion 310 having a first outer diameter, a second support portion 320 having a second outer diameter smaller than the first outer diameter, a base portion 330, and a step portion 340. The inner diameter of the cylindrical member 14_1 corresponds to the first outer diameter, and the inner diameter of the cylindrical member 14_2 corresponds to the second outer diameter. The base portion 330 is a member for supporting the first support portion 310, and constitutes a first locking portion for locking the cylindrical member 14_1. The step portion 340 is a boundary portion between the first support portion 310 and the second support portion, and constitutes a second locking portion for locking the cylindrical member 14_2.

[0169] In the modification 7, "the inner diameter of the cylindrical member 14_1 corresponds to the first outer diameter" means the relationship between the inner diameter of the cylindrical member 14_1 and the outer diameter of the first support portion 310, in which the inner side surface of the cylindrical member 14_1 is slidable along the heating element 13 disposed on the outer side surface of the first support portion 310, and the inner side surface of the cylindrical member 14_1 contacts the heating element 13 disposed on the outer side surface of the first support portion 310. On the other hand, "the inner diameter of the cylindrical member 14_2 corresponds to the second outer diameter" means the relationship between the inner diameter of the cylindrical member 14_2 and the outer diameter of the second support portion 320, in which the inner side surface of the cylindrical member 14_2 is slidable along the outer side surface of the second support portion 320, and the center axis of the cylindrical member 14_2 does not deviate from the center axis of the second support portion 320 in a state where the cylindrical member 14_2 is disposed on the outer side surface of the second support portion 320 (for example, a manufacturing process).

[0170] As shown in FIG. 12 (A), the heating element 13 is disposed to follow a helical groove or projection formed on the outer side surface of the first support portion 310 (step A).

[0171] Next, as shown in FIG. 12 (B), by sliding the cylindrical member 14_1 along the axis X to a position where the cylindrical member 14_1 is locked by the base portion 330, the cylindrical member 14_1 is disposed along the outer side surface of the first support portion 310 (step E 1 and step E 3). The step shown in FIG. 12 (B) is a step of placing the cylindrical member 14_1 from the side of the second support part 320 with a small outer diameter toward the side of the first support part 310 with a large outer diameter. It should be noted that in the predetermined direction along the axis X, the total length of the cylindrical member 14_1 is shorter than the total length of the first support portion 310.

[0172] Next, as shown in FIG. 12 (C), by sliding the member 14_2 along the axis X to a position where the cylindrical member 14_2 is locked by the step portion 340, the cylindrical member 14_2 is placed along the outer side surface of the second support portion 320 (step E 2 and step E 4). The step shown in FIG. 12(C) is a step of disposing the cylindrical member 14_2 from the side of the second support part 320 with a small outer diameter toward the side of the first support part 310 with a large outer diameter. It should be noted that the cylindrical member 14_2 is locked by the step portion 340. Thereby, the cylindrical member 14_1 and the cylindrical member 14_2 are disposed in a state of being separated from each other.

[0173] Next, as shown in FIG. 12 (D), the second contact CP 2 is formed by connecting the lead wire drawn upstream from the heating portion 13 A to the outer side surface of the cylindrical member 14_2. For example, the lead wire is fixed to the outer side surface of the cylindrical member 14_2 by welding or soldering. The second contact CP 2 may be formed by connecting a lead wire to the end face of the cylindrical member 14_2.

[0174] Then, by sliding the liquid holding member 12 along the axis X, the liquid holding member 12 is placed on the outer side surface of the heating element 13 and the cylindrical member 14. That is, the liquid holding member 12 is disposed to contact or come close to the heating portion 13 A of the heating element 13 (step C). Here, the step of disposing the liquid holding member 12 to contact or come close to the heating portion 13 A of the heating element 13 is a step of disposing the liquid holding member 12 from the side of the second support portion 320 with a small outer diameter to the side of the first support portion 310 with a large outer diameter.

[0175] Next, in FIG. 12 (E), the base member 300 (jig) is rotated about the axis X as a rotation axis to separate the whole heating element 13 from the groove or projection of the base member 300 (step B). The aerosol intake and the air flow path are formed in the step shown in FIG. 12 (E). This is the same as in the embodiment.

[0176] Although omitted in FIG. 12, as in the embodiment, the cylindrical member 14 is preferably fixed to the atomizing unit housing 111 X (the housing cap body 111 X_1 and the housing cylindrical body 111 X_2) via the cap 16, the flange 17, and the like. That is, it is preferable that the step shown in FIG. 12(E) is performed after fixing the cylindrical member 14 to the atomizing unit housing 111 X.

[0177] In FIG. 12, the lead wire is inflated for convenience of illustration, but it should be noted that the lead wire is actually laid between the liquid holding member 12 and the cylindrical member 14.

(Operation and Effect)

[0178] In the modification 7, the second contact CP 2 is formed by connecting the lead wire drawn upstream from the heating portion 13 A to the outer side surface or the end face of the cylindrical member 14_2. Therefore, it is easy to form the second contact CP 2.

[0179] In the modification 7, the cylindrical member 14_1 is locked by the base portion 330, and the cylindrical member 14_2 is locked by the step portion 340. Therefore, it is easy to position the cylindrical member 14_1 and the cylindrical member 14_2, and it is easy to separate the cylindrical member 14_1 and the cylindrical member 14_2 from each other by a distance corresponding to the heating portion 13 A.

[0180] In the modification 7, the cylindrical member 14_1, the cylindrical member 14_2, and the liquid holding member 12 are slid from the side of the second support portion 320 with a small outer diameter toward the side of the first support portion 310 with a large outer diameter. Therefore, it is easy to slide these members.

[Modification 8]

[0181] Hereinafter, a modification 8 of the embodiment will be described. Differences from the modification 7 will mainly be described below.

[0182] In the modification 8, a method of manufacturing the atomizing unit 111 shown in the modification 5 (FIG. 10) will be described. However, since the method of attaching the atomizing unit housing 111 X, the cover member 15, the cap 16, and the flange 17 are substantially the same as those in the embodiment, their mounting methods will be omitted. In the modification 8, the same base member 300 (jig) as in the modification 7 is used.

[0183] In the modification 8, "the inner diameter of the cylindrical member 14_1 corresponds to the first outer diameter" means the relationship between the inner diameter of the cylindrical member 14_1 and the outer diameter of the first support portion 310, in which the inner side surface of the cylindrical member 14_1 is slidable along the heating element 13 disposed on the outer side surface of the first support portion 310, and the inner side surface of the cylindrical member 14_1 contacts the heating element 13 disposed on the outer side surface of the first support portion 310. Similarly, "the inner diameter of the cylindrical member 14_2 corresponds to the second outer diameter" means the relationship between the inner diameter of the cylindrical member 14_2 and the outer diameter of the second support portion 320, in which the cylindrical member 14_2 is slidable along the heating element 13 disposed on the outer side surface of the second support portion 320, and the heating element 13 disposed in the second support portion 320 contacts the inner side surface of the cylindrical member 14_2.

[0184] As shown in FIG. 13 (A), the heating element 13 is disposed to follow a helical groove or projection formed on the outer side surface of the first support portion 310 and the outer side surface of the second support portion 320 (step A).

[0185] Next, as shown in FIG. 13 (B), by sliding the cylindrical member 14_1 along the axis X to the position where the cylindrical member 14_1 is locked by the base portion 330, the cylindrical member 14_1 is disposed along the outer side surface of the first support portion 310 (step E 1 and step E 3).

[0186] Next, as shown in FIG. 13 (C), by sliding the cylindrical member 14_2 along the axis X to a position where the cylindrical member 14_2 is locked by the step portion 340, the cylindrical member 14_2 is disposed along the outer side surface of the second support portion 320 (step E 2 and step E 4). Then, by sliding the liquid holding member 12 along the axis X, the liquid holding member 12 is disposed on the outer side surface of the heating element 13 and the cylindrical member 14.

[0187] Next, in FIG. 13 (D), the base member 300 (jig) is rotated about the axis X as a rotation axis to separate the whole heating elements 13 from the groove or projection of the base member 300 (step B). The aerosol intake and the air flow path are formed in the step shown in FIG. 13 (D). This is the same as in the embodiment.

(Operation and Effect)

[0188] In the modification 8, the cylindrical member 141 is locked by the base portion 330, and the cylindrical member 142 is locked by the step portion 340. Therefore, it is easy to position the cylindrical member 14_1 and the cylindrical member 14_2, and it is easy to separate the cylindrical member 14_1 and the cylindrical member 14_2 from each other by a distance corresponding to the heating portion 13 A.

[0189] In the modification 8, the cylindrical member 14_1, the cylindrical member 14_2, and the liquid holding member 12 are slid from the side of the second support portion 320 with a small outer diameter toward the side of the first support portion 310 with a large outer diameter. Therefore, it is easy to slide these members.

[Modification 9]

[0190] Hereinafter, a modification 9 of the embodiment will be described. Differences from the modification 7 will mainly be described below.

[0191] In the modification 9, a method of manufacturing the atomizing unit 111 shown in the modification 6 (FIG. 11) will be described. However, since the method of attaching the atomizing unit housing 111 X, the cover member 15, the cap 16, and the flange 17 are substantially the same as those in the embodiment, their mounting methods will be omitted. In the modification 9, the same base member 300 (jig) as in the modification 7 is used.

[0192] In the modification 9, "the inner diameter of the cylindrical member 14_1 corresponds to the first outer diameter" means the relationship between the inner diameter of the cylindrical member 14_1 and the outer diameter of the first support portion 310, in which the inner side surface of the cylindrical member 14_1 is slidable along the heating element 13 disposed on the outer side surface of the first support portion 310, and the center axis of the cylindrical member 14_1 does not deviate from the center axis of the first support portion 310 in a state where the cylindrical member 14_1 is disposed on the outer side surface of the first support portion 310 (for example, a manufacturing process). Similarly, "the inner diameter of the cylindrical member 14_2 corresponds to the second outer diameter" means the relationship between the inner diameter of the cylindrical member 14_2 and the outer diameter of the second support portion 320, in which the cylindrical member 14_2 is slidable along the outer side surface of the second support portion 320, and the center axis of the cylindrical member 14_2 does not deviate from the center axis of the second support portion 320 in a state where the cylindrical member 14_2 is disposed on the outer side surface of the second support portion 320 (for example, a manufacturing process).

[0193] As shown in FIG. 14 (A), by sliding the cylindrical member 14_1 along the axis X to a position where the cylindrical member 14_1 is locked by the base portion 330, the cylindrical member 14_1 is disposed along the outer side surface of the first support portion 310 (step E 1 and step E 3).

[0194] As shown in FIG. 14 (B), by sliding the cylindrical member 14_2 along the axis X to a position where the cylindrical member 14_{21} is locked by the step portion 340, the cylindrical member 14_2 is disposed along the outer side surface of the second support portion 320 (step E 2 and step E 4).

[0195] Here, after sliding the cylindrical member 14_2 along the outer side surface of the second support portion 320, the outer side surface of the cylindrical member 14_2 preferably does not have a step with the outer side surface of the first support portion 310. In other words, the outer diameter of the cylindrical member 14_2 is preferably equal to the outer diameter of the first support portion 310.

[0196] Next, as shown in FIG. 14 (C), the heating element 13 is disposed on the outer side surface of the first support portion 310 and the outer side surface of the cylindrical member 14_2 (step A). Here, a helical groove or projection is provided on the outer side surface of the first support portion 310. Furthermore, it is preferable that a helical groove or projection is also provided on the outer side surface of the cylindrical member 14_2. It is preferable that the helical groove or projection formed on the outer side surface of the cylindrical member 14_2 is continuous with a groove or a projection having a spiral shape and formed on the outer side surface of the first support portion 310. The step A is a step of disposing the heating element 13 to be along the groove or the projection having the spiral shape and formed on the outer side surface of the first support portion 310 and the outer side surface of the cylindrical member 14_2.

[0197] Next, as shown in FIG. 14 (D), the first contact CP 1 is formed by connecting the lead wire drawn downstream from the heating portion 13 A to the outer side surface of the cylindrical member 14_1. For example, the lead wires are fixed to the outer side surface of the cylindrical member 14_1 by welding or soldering. The first contact CP 1 may be formed by connecting a lead wire to the end face of the cylindrical member 14_1.

[0198] Then, by sliding the liquid holding member 12 along the axis X, the liquid holding member 12 is disposed on the outer side surface of the heating element 13 and the cylindrical member 14. That is, the liquid holding member 12 is disposed to contact or come close to the heating portion 13 A of the heating element 13 (step C).

[0199] Next, in FIG. 14 (E), the base member 300 (jig) is rotated about the axis X as a rotation axis to separate the whole heating element 13 from the groove or projection of the base member 300 (step B). The aerosol intake and the air flow path are formed in the step shown in FIG. 14 (E). This is the same as in the embodiment.

[0200] In FIG. 14, the lead wire is inflated for convenience of illustration, but it should be noted that the lead wire is actually laid between the liquid holding member 12 and the cylindrical member 14.

(Operation and Effect)

[0201] In the modification 9, the first contact CP 1 is formed by connecting the lead wire drawn downstream from the heating portion 13 A to the outer side surface or the end face of the cylindrical member 14_1. Therefore, it is easy to form the first contact CP 1.

[0202] In the modification 9, the cylindrical member 14_1 is locked by the base portion 330, and the cylindrical member 14_2 is locked by the step portion 340. Therefore, it is easy to position the cylindrical member 14_1 and the cylindrical member 14_2, and it is easy to separate the cylindrical member 14_1 and the cylindrical member 14_2 from each other by a distance corresponding to the heating portion 13 A.

[0203] In the modification 9, the cylindrical member 14_1, the cylindrical member 14_2, and the liquid holding member 12 are slid from the side of the second support portion 320 with a small outer diameter toward the side of the first support portion 310 with a large outer diameter. Therefore, it is easy to slide these members.

[0204] In the modification 9, it is preferable to dispose the heating element 13 to be along the groove or the projection having the spiral shape and formed on the outer side surface of the first support portion 310 and the outer side surface of the cylindrical member 14_2. With such a configuration, it is difficult to form a step between the outer side surface of the cylindrical member 14_2 and the outer side surface of the first support portion 310, and it is easy to dispose the heating element 13. Further, since the heating element 13 (the second end portion 13 B_2) is disposed on the outer side surface of the cylindrical member 142, it is easy to fix the cylindrical member 14_2 and the heating element 13 (the second end portion 13 B_2).

[Modification 10]

[0205] Hereinafter, a modification 10 of the embodiment will be described. Differences from the embodiment will mainly be described below.

[0206] In the embodiment, the flange 17_1 is disposed on the downstream end face of the cap 16. In contrast, in the modification 10, as shown in FIG. 15, the flange 17_1 is not particularly provided, and the lead wire 18 extending from the first pole of the power source is connected to the inner side surface of the cylindrical member 14_1. The lead wire 18 may be guided to the cylindrical member 14_1 through the inside of the atomizing unit housing 111 X.

[0207] In the modification 10, the lead wire 18 is provided downstream of the cap 16 in a separating direction that separates the cap 16 from the reservoir 11. In other words, when attempting to separate the cap 16 from the reservoir 11, the lead wire 18 is caught by the cap 16. Therefore, since the lead wire 18 is pulled by the cap 16, deformation of the heating element 13 occurs due to detachment of the lead wire 18 from the cylindrical member 14_1, disconnection of the lead wire 18, or the pulling of the cylindrical member 14_1 by the lead wire 18.

[0208] Further, the cap 16 is fixed or fitted to the cylindrical member 14_1. Therefore, when attempting to separate the cap 16 from the reservoir 11, deformation of the heating element 13 occurs due to the pulling of the cylindrical member 14_1.

(Operation and Effect)

[0209] In the modification 10, the lead wire 18 is provided downstream of the cap 16 in the separating direction that separates the cap 16 from the reservoir 11. Therefore, when attempting to separate the cap 16 from the reservoir 11, since the heating element 13 and the power supply member are broken, it is possible to effectively decrease the use of the flavor inhaler 100 accompanied by reinjection of the aerosol source to the reservoir 11.

[Modification 11]

[0210] Hereinafter, a modification 11 of the embodiment will be described below. Differences from the embodiment will mainly be described below.

[0211] In the embodiment, the flange 17_1 is disposed on the downstream end face of the cap 16. In contrast, in the modification 11, the flange 17_1 is disposed on the upstream end face of the cap 16, as shown in FIG. 16. Here, a lead wire 18 extending from the first pole of the power source is connected to the flange 17_1. The lead wire 18 may be guided to the flange 17_1 through the inside of the cap 16.

(Operation and Effect)

[0212] In the modification 11, the lead wires 18 is arranged to pass through the interior of the cap 16 in the same manner as in the modification 10. Therefore, when attempting to separate the cap 16 from the reservoir 11, since the heating element 13 and the power supply member are broken, it is possible to effectively decrease the use of the flavor inhaler 100 accompanied by reinjection of the aerosol source to the reservoir 11.

[Modification 12]

[0213] Hereinafter, a modification 12 of the embodiment will be described. Differences from the embodiment will mainly be described below. In the modification 12, it should be noted that except for the atomizing unit 111, the configuration of the flavor inhaler 100 is similar to that of the embodiment.

[0214] In the embodiment, the inlet 112 A is provided in the electrical component unit housing 112 X, the liquid holding member 12 is disposed on the outer side surface of the cylindrical member 14, and the cylindrical member 14 forms an air flow path. On the other hand, in the modification 12, the inlet 112 A is provided in the atomizing unit housing 111 X, the liquid holding member 12 is disposed inside the cylindrical member 14, and the air flow path is formed outside the cylindrical member 14.

[0215] Specifically, as shown in FIG. 17, the atomizing unit 111 includes a reservoir 11, a liquid holding member 12, a heating element 13, and a cylindrical member 14. Specifically, as shown in FIG. 17, the atomizing unit 111 includes a reservoir 11, a liquid holding member 12, a heating element 13, and a cylindrical member 14. The reservoir 11, the liquid holding member 12, the heating element 13, and the cylindrical member 14 are housed in the atomizing unit housing 111 X having the inlet 112 A. The liquid holding member 12 has an insertion portion inserted in the cylindrical member 14 and an exposed portion exposed from the cylindrical member 14. The insertion portion contacts the aerosol source stored in the reservoir 11. The exposed portion inflates in the orthogonal direction B than the insertion portion.

[0216] The heating element 13 is disposed over the outer side surface of the cylindrical member 14 and the outer side surface of the exposed portion of the liquid holding member 12. The heating element 13 is disposed to contact or come close to the exposed portion of the liquid holding member 12.

[0217] In the modification 12, the air introduced from the inlet 112 A is guided to the downstream side through the outer side surface of the exposed portion of the cylindrical member 14 and the liquid holding member 12, and the aerosol atomized by the heating element 13 is delivery to the downstream side. In the modification 12, the cylindrical member 14 is not formed of a conductive member, and the heating element 13 is connected to a power source by a power supply member such as a lead wire.

[Modification 13]

[0218] Hereinafter, a modification 13 of the embodiment will be described. Differences from the embodiment will mainly be described below.

[0219] In the modification 13, the manufacturing method of the atomizing unit 111 described in the modification 12 will be described. FIG. 18 is a diagram for explaining a method of manufacturing the atomizing unit 111 according to the modification 13. In FIG. 18, it should be noted that the atomizing unit housing 111 X, the cap 16, the flange 17, and the like are omitted.

[0220] Specifically, as shown in FIG. 18 (A), a heating element 13 is formed to follow a helical groove or projection formed on the outer side surface of the cylindrical member 14 having an axis X extending along a predetermined direction A (step A). Further, the cylindrical member 14 and the heating element 13 are electrically connected (step D). It should be noted here that the liquid holding member 12 is disposed inside the cylindrical member 14 in the orthogonal direction B.

[0221] Next, in FIG. 18 (B), the cylindrical member 14 is rotated about the axis X as a rotation axis, and a part of the heating element 13 is separated from the groove or the projection of the cylindrical member 14 (step B).

[0222] In the modification 13, by separating a part of the heating element 13 from the groove or the projection of the cylindrical member 14, restriction of expansion of the liquid holding member 12 in the outward direction is released, and the liquid holding member 12 is disposed to contact or come close to the heating element 13 (step C).

[0223] In other words, in the step shown in FIG. 18 (B), a part of the heating element 13 is separated from the cylindrical member 14 by the rotation of the cylindrical member 14, a part of the liquid holding member 12 disposed inside the cylindrical member 14 is separated from the cylindrical member 14, and a part of the liquid holding member 12 is brought into contact with or close to a part of the heating element 13 by expansion of a part of the liquid holding member 12 (step B and step C). In the case where a part of the holding member 12 is brought into contact with a part of the heating element 13, the step shown in FIG. 18B is a step of disposing the liquid holding member 12 while the liquid holding member 12 presses the inner side surface of a part (heating portion 13 A) of the heating element 13. Further, the step shown in FIG. 18 (B) is a step of disposing the liquid holding member 12 to contact the entire circumference of the inner side surface of a part (heating portion 13 A) of the heating element 13.

[0224] Here, when a part of the heating element 13 is separated from the groove or projection of the cylindrical member 14, it should be noted that at least the liquid holding member 12 is preferably fixed to prevent the liquid holding member 12 from moving along the predetermined direction A accompanied by the rotation of the cylindrical member 14. A counterpart to which the liquid holding member 12 is fixed may be any one that does not move along with the rotation of the cylindrical member 14.

[0225] In the case of fixing the heating element 13 to the cylindrical member 14, such a fixing step is performed after a part of the heating element 13 is separated from the groove or the projection of the cylindrical member 14.

[0226] In the modification 13, a part of the heating element 13 is separated from the groove or the projection of the cylindrical member 14 in a state where the liquid holding member 12 is disposed inside the cylindrical member 14. However, the liquid holding member 12 may be disposed to contact or come close to the heating element 13 after separating a part of the heating element 13 from the groove or the projection of the cylindrical member 14. For example, in a state where a part of the heating element 13 is separated from the groove or the projection of the cylindrical member 14, the exposed portion of the liquid holding member 12 may contact or come close to the heating element 13 by pushing the liquid holding member 12 into the cylindrical member 14 from the side where the heating element 13 is not provided to the side where the heating element 13 is provided.

[Modification 14]

[0227] Hereinafter, a modification 14 of the embodiment will be described. Differences from the embodiment will mainly be described below.

[0228] In the embodiment, the base member 300, which is a jig having a cylindrical shape, is not included in the atomizing unit 111 as a part of the atomizing unit 111. However, in the modification 14, the base member 300 is included in the atomizing unit 111 as a part of the atomizing unit 111.

[0229] That is, in the modification 14, the atomizing unit 111 is, as shown in FIG. 19, is disposed to contact or come close to the base member 300 having an axis extending along a predetermined direction A, the heating element 13 disposed to be along the helical groove or projection formed on the side surface of the base member 300, and at least a part of the heating element 13. The atomizing unit 111 includes at least the liquid holding member 12 holding an aerosol source, and the atomizing unit housing 111 X accommodating the heating element 13 and the liquid holding member 12. At least a part of the base member 300 is preferably exposed from the atomizing unit housing 111 X. However, the atomizing unit 111 may include other parts (for example, the reservoir 11, the cylindrical member 14, the cover member 15, the cap 16, the flange 17, etc.) as in the embodiment.

[0230] The method of manufacturing the atomizing unit 111 according to the modification 14 includes a step (step F) of housing the heating element 13 and the liquid holding member 12 in the atomizing unit housing 111 X in a state where a part of the base member 300 is exposed from the atomizing unit housing 111 X, instead of a step (step B) of rotating the base member 300 about the axis X as a rotation axis to separate the heating element 13 from the groove or the projection. The step of separating the heating element 13 from the groove or the projection is performed, for example, when the user who acquired the atomizing unit 111 uses the atomizing unit 111.

[0231] In FIG. 19, as in the embodiment (for example, FIGS. 4 and 5) and the like, the case where the base member 300 is a jig is exemplified. However, the modification 14 is not limited to the example shown in FIG. 19. The base member 300 may be the cylindrical member 14 (the cylindrical member 14_1 and the cylindrical member 14_2) as shown in FIG. 7 (A) of the modification 2 or FIG. 8 (A) of the modification 3. In such a case, the liquid holding member 12 is disposed to be in contact with or close to at least a part of the heating element 13 by rotating the cylindrical member 14 about the axis X as a rotation axis to separate the heating element 13 from the groove or the projection. In the atomizing unit 111 with such a configuration, it is preferable that a part of the cylindrical member 14 is exposed from the atomizing unit housing 111 X.

(Operation and Effect)

[0232] In the modification 14, since the base member 300 is separated from the heating element 13 at the time of use by the user, the state where the heating element 13 is held by the base member 300 is maintained until the user uses the atomizing unit 111. Therefore, deformation of the heating element 13 is prevented until the user uses the atomizing unit 111. Further, since the base member 300 fulfills the function of the lid, leakage of the aerosol source is prevented until the user uses the atomizing unit 111. Furthermore, it is possible to clearly grasp before and after use of the atomizing unit 111.

[0233] In the modification 14, it is preferable that at least a part of the base member 300 is exposed from the atomizing unit housing 111 X. With such a configuration, it is easy to separate the heating element 13 from the groove or the projection by the rotation of the base member 300 before using the atomizing unit 111.

[0234] In the modification 14, the step of housing the heating element 13 and the liquid holding member 12 in the atomizing unit housing 111 X is preferably performed in a state in which a part of the base member 300 is exposed from the atomizing unit housing 111 X. By such a method, it becomes easy to separate the heating element 13 from the groove or the projection by the rotation of the base member 300 before using the atomizing unit 111.

[Modification 15]

[0235] Hereinafter, a modification 15 of the embodiment will be described. Differences from the embodiment will mainly be described below.

[0236] In the embodiment, the reservoir 11 is disposed outside the liquid holding member 12 in the orthogonal direction B. On the other hand, in the modification 15, the reservoir 11 is disposed side by side with the liquid holding member 12 and the heating element 13 in the predetermined direction A.

[0237] Specifically, as shown in FIG. 20, the atomizing unit 111 has a support member 21 in addition to the configuration shown in FIG. 2. As described above, the reservoir 11 is disposed side by side with the liquid holding member 12 and the heating element 13 in the predetermined direction A. The support member 21 supports the liquid holding member 12 and supports the heating element 13.

[0238] In the modification 15, the first end portion 13 B_1 and the power supply member 13 C are covered by a conductive member having an electric resistivity lower than that of the wire constituting the heating portion 13 A, and the second end portion 13 B_2 and the power supply member 13 D are covered by a conductive member having an electric resistivity lower than that of the wire constituting the heating portion 13 A. On the other hand, the heating portion 13 A is not covered by a conductive member having a lower electric resistivity than the wire constituting the heating portion 13 A, and the wire is exposed. With such a configuration, a portion having good quality other than the end portion of the wire constituting the heating element 13 (coil) can be used as the heating portion 13 A. The first end portion 13 B_1, the second end portion 13 B_2, the power supply member 13 C and the power supply member 13 D are preferably having a structure in which the same wire as the wire constituting the heating portion 13 A is covered by a conductive member having an electrical resistivity lower than that of the wire. With such a configuration, it is easy to integrally manufacture the first end portion 13 B_1, the second end portion 13 B_2, the power supply member 13 C, the power supply member 13 D and the heating portion 13 A having good quality. When the wire is made of a nickel-chromium alloy, for example, it is possible to use a metal having a lower electric resistivity than that of a nickel-chromium alloy such as copper, tin or silver as the conductive member.

[0239] Further, as shown in FIG. 20, the atomizing unit 111 has a liquid amount adjusting member 19. As shown in FIG. 21, the liquid amount adjusting member 19 has an opening 19 A and an opening 19 B, and is, for example, a member having a disc shape. The opening 19 A is an opening for forming an air flow path, and is an opening for communicating the inside of the cylindrical member 14 and the inside of the heating element 13. The opening 19 B is an opening for supplying an aerosol source from the reservoir 11 to the liquid holding member 12, and is an opening for communicating the reservoir 11 and the liquid holding member 12.

[0240] In the modification 15, the reservoir 11 may be a cavity for storing an aerosol source. In such a case, the aerosol source stored in the reservoir 11 is supplied to the liquid holding member 12 through the opening 19 B of the liquid amount adjusting member 19. The aerosol source supplied to the liquid holding member 12 moves to a position to contact or close to the heating portion 13 A by spreading into the liquid holding member 12 by a capillary phenomenon. Thereby, the aerosol source is atomized by the heating portion 13 A. Therefore, the liquid holding member 12 is considered to be a member for moving the aerosol source from the reservoir 11 to the liquid holding member 12 by a capillary phenomenon.

[0241] In the modification 15, the first end portion 13 B_1 and the power supply member 13 C are covered by a conductive member having an electric resistivity lower than that of the wire constituting the heating portion 13 A, and the second end portion 13 B_2 and the power supply member 13 D are covered by a conductive member having an electric resistivity lower than that of the wire constituting the heating portion 13 A. However, the modification 15 is not limited to this. The first end portion 13 B_1 and the power supply member 13 C may be formed of a conductive member having an electrical resistivity lower than that of the heating portion 13 A. Similarly, the second end portion 13 B_2 and the power supply member 13 D may be formed of a conductive member having a lower electrical resistivity than the heating portion 13 A.

[Modification 16]

[0242] Hereinafter, a modification 16 of the embodiment will be described. Differences from the embodiment will mainly be described below.

[0243] In the modification 16, a manufacturing method of the atomization unit 111 described in the modification 15 will be described. FIG. 22 is a diagram for explaining a method of manufacturing the atomization unit 111 according to the modification 16.

[0244] As shown in FIG. 22 (A), the heating element 13 is disposed to follow a helical groove or projection formed on the side surface of the base member 300 (jig) having the axis X extending along the predetermined direction A (step A). Then, the liquid holding member 12 is disposed to contact or come close to at least a part of the heating element 13 (step C). Here, the liquid holding member 12 may be disposed in a state of being incorporated in the support member 21, and the support member 21 may be disposed after the liquid holding member 12 is disposed.

[0245] As shown in FIG. 22 (B), after the step (step A and step C) shown in FIG. 22 (A), the base member 300 (jig) is rotated about the axis X as a rotation axis to heat the heating element 13 to separate the whole heating element 13 from the groove or projection of the base member 300 (step B). Further, the reservoir 11, the cylindrical member 14, the cap 16, the liquid amount adjusting member 19 and the atomizing unit housing 111 X are disposed.

[0246] Also in the modification 16, as in the embodiment, it is preferable to perform a step (step G) of disposing a member (flow path forming member) forming at least a part of the air flow path, before separating the heating element 13 from the base member 300. In the modification 16, it should be noted that at least the liquid holding member 14 corresponds to the flow path forming member. Specifically, the step shown in FIG. 22A (that is, the step of disposing the flow path forming member) includes the step of disposing the flow path forming member (liquid holding member 12) along the base member 300. As a result, in the manufacturing process of the atomization unit 111, deformation of the liquid holding member 12 is prevented.

[0247] In the modification 16, the heating element 13 may be separated from the base member 300 after disposing the reservoir 11, the cylindrical member 14, the cap 16, the liquid amount adjusting member 19 and the atomizing unit housing 111 X. In such a case, it should be noted that the cylindrical member 14 corresponds to a flow path forming member in addition to the liquid holding member 14.

[Other Embodiments]

[0248] Although the present invention has been described with reference to the above-described embodiments, it should not be understood that the description and drawings constituting a part of this disclosure limit the present invention. From this disclosure, various alternative embodiments, examples and operational techniques will be apparent to those skilled in the art.

[0249] In the embodiment, the reservoir 11 is disposed outside the liquid holding member 12 in the orthogonal direction B. However, the embodiment is not limited to this. The reservoir 11 may be in contact with the liquid holding member 12 and may not be disposed outside the liquid holding member 12 in the orthogonal direction B. In a state in which the reservoir 11 is not disposed outside the liquid holding member 12 in the orthogonal direction B, the cover member 15 can prevent the aerosol source unexpectedly leaked from the reservoir 11 from being supplied from the outer peripheral surface of the liquid holding member 12 to the liquid holding member 12, before the flavor inhaler 100 is used or while the flavor inhaler 100 is used.

[0250] In the embodiment, the liquid holding member 12 has a cylindrical shape. However, the embodiment is not limited to this. The liquid holding member 12 may have a string shape.

[0251] In the embodiment, the members such as the liquid holding member 12 and the cover member 15 have a cylindrical shape and are disposed outside the heating element 13 by sliding along the predetermined direction A. However, the embodiment is not limited to this. The members such as the liquid holding member 12 and the cover member 15 may have a sheet shape and may be wound around the heating element 13.

[0252] In the embodiment, the supply port for supplying the aerosol source to the reservoir 11 is provided at the downstream end of the reservoir 11, and the cap 16 closes the downstream end of the reservoir 11. However, the embodiment is not limited to this. The supply port is provided at the upstream end of the reservoir 11, and the cap 16 may close the upstream end of the reservoir 11.

[0253] In the embodiment, the heating element 13 is formed of a wire having a spiral shape, and is a coil having a shape extending along the predetermined direction A, and the inside of the heating element 13 is hollow. However, the embodiment is not limited to this. The inside of the heating element 13 may be solid. For example, as described in the modification 12 and modification 13, the liquid holding member 12 may be provided inside the heating element 13.

[0254] In the embodiment, the heating element 13 is formed of a wire having a spiral shape. However, the embodiment is not limited to this. The heating element 13 may be formed of a conductive member having another shape.

[0255] In the embodiment, the case where the cylindrical member 14 forming at least a part of the air flow path is formed of a conductive member has been exemplified. However, the embodiment is not limited to this. The cylindrical member 14 may be formed of a member other than a conductive member.

[0256] In the embodiment, a lead wire 18 is provided as a member for connecting the power source and the cylindrical member 14. However, the embodiment is not limited to this. For example, a member for connecting the power source and the cylindrical member 14 may form an electrical path, and may be a part of a housing or the like constituting the flavor inhaler 100.

[0257] In the modifications 4 to 6 and 7 to 9, the outer diameter of the cylindrical member 14_1 is larger than the outer diameter of the cylindrical member 14_2. However, the embodiment is not limited to this. For example, in the modifications 4, 5, 7, and 8, the outer diameter of the cylindrical member 14_1 may be equal to the outer diameter of the cylindrical member 14_2. For example, when the inner diameter of the cylindrical member 14_1 is larger than the inner diameter of the cylindrical member 14_2 and the outer diameter of the cylindrical member 14_1 is equal to the outer diameter of the cylindrical member 14_2, it should be noted that the thickness of the cylindrical member 14_2 is larger than the thickness of the cylindrical member 14_1.

[0258] Although not specifically mentioned in the embodiment, the fixing method of each member may be adhesion or welding.

[0259] Although not specifically mentioned in the embodiment, the liquid holding member 12 may be formed of, for example, a sponge-like elastic member, and may expand and may contact or come close to the heating element 13 when the slide member 400 and the cylindrical member 14 which have compressed the liquid holding member 12 are removed.

Claims

1. A manufacturing method of an atomizing unit, comprising:

a step A of disposing a resistance heating element along a groove or a projection having a spiral shape and formed on a side surface of a base member having an axis extending along a predetermined direction;

a step B of rotating the base member about the

axis as a rotation axis to separate at least a part of the resistance heating element from the groove or the projection; and
a step C of disposing a liquid holding member holding an aerosol source to contact or come close to at least a part of the resistance heating element.

2. The manufacturing method of an atomizing unit according to claim 1, wherein
the step C is performed after the step A and before the step B.

3. The manufacturing method of an atomizing unit according to claim 2, wherein
the resistance heating element includes a heating portion for heating the aerosol source, and
the step C is a step of disposing the liquid holding member while the liquid holding member presses the inner side surface or the outer side surface of the heating portion.

4. The manufacturing method of an atomizing unit according to any one of claims 1 to 3, wherein
the resistance heating element includes a heating portion for heating the aerosol source, and
the step C is a step of disposing the liquid holding member to contact the entire circumference of the inner side surface or the outer side surface of the heating portion.

5. The manufacturing method of an atomizing unit according to any one of claims 1 to 4, wherein
the step B is a step of forming an aerosol intake to pass aerosol atomized by the resistance heating element to the inside of the resistance heating element by separating of the resistance heating element.

6. The manufacturing method of an atomizing unit according to any one of claims 1 to 5, wherein
the step B is a step of forming at least a part of an air flow path inside the resistance heating element by separating of the resistance heating element.

7. The manufacturing method of an atomizing unit according to any one of claims 1 to 6, wherein
the step C is a step of disposing the liquid holding member on the outside of the resistance heating element in a case where the resistance heating element is disposed on the outer side surface of the base member.

8. The manufacturing method of an atomizing unit according to any one of claims 1 to 7, wherein
the base member is a jig, and
the step B is a step of separating the whole resistance heating element from the jig and forming at least a part of the air flow path inside the resistance heating element by separating of the resistance heating element, and
the manufacturing method comprising:

a step G of disposing a flow path forming member forming at least a part of the air flow path, before the step B.

9. The manufacturing method of an atomizing unit according to claim 8, wherein
the step G includes a step of disposing the flow path forming member along the outer side surface of the jig.

10. The manufacturing method of an atomizing unit according to any one of claims 1 to 9, wherein
the base member is a jig, and
the step B is a step of separating the whole resistance heating elements from the jig, and
the manufacturing method comprising:

a step E of disposing a cylindrical member having a tubular shape and forming at least a part of an air flow path on the outer side surface or the inner side surface of the resistance heating element in the orthogonal direction perpendicular to the predetermined direction, before the step B.

11. The manufacturing method of an atomizing unit according to claim 10, wherein
the step B is performed after fixing the cylindrical member to a housing of the atomizing unit and / or after fixing the resistance heating element to the cylindrical member.

12. The manufacturing method of an atomizing unit according to claim 11, wherein
the cylindrical member is constituted by a first cylindrical member and a second cylindrical member, and
the step E is a step of disposing the first cylindrical member and the second cylindrical member in a state of being separated from each other.

13. The manufacturing method of an atomizing unit according to claim 12, wherein
a part or a whole of the first cylindrical member is formed of a conductive member, and
a part or a whole of the second cylindrical member is formed of a conductive member.

14. The manufacturing method of an atomizing unit according to claim 12 or 13, wherein
the jig includes a first locking portion for locking the first cylindrical member and a second locking portion for locking the second cylindrical member, and
the step E includes a step E_1 of pacing the first cylindrical member at a position where the first cylin-

drical member is locked by the first locking portion, and a step E_2 of placing the first cylindrical member at a position where the second cylindrical member is locked by the second locking portion.

15. The manufacturing method of an atomizing unit according to any one of claims 12 to 14, wherein
the jig includes a first support portion having a first outer diameter and a second support portion having a second outer diameter smaller than the first outer diameter,
the inner diameter of the first cylindrical member corresponds to the first outer diameter,
the inner diameter of the second cylindrical member corresponds to the second outer diameter, and
the step E includes a step E 3 of disposing the first cylindrical member on an outer side face of the first support portion in the orthogonal direction, and a step E 3 of disposing the second cylindrical member on the outer side face of the second support portion in the orthogonal direction.

16. The manufacturing method of an atomizing unit according to any one of claims 12 to 15, wherein
the jig includes a first support portion having a first outer diameter and a second support portion having a second outer diameter smaller than the first outer diameter,
the step E or E 1 or E 3 is a step of sliding the first cylindrical member from the second support portion side to the first support portion side, and
the step E or E 2 or E 4 is a step of sliding the second cylindrical member from the second support portion side to the first support portion side.

17. The manufacturing method of an atomizing unit according to any one of claims 12 to 16, wherein
the jig includes a first support portion having a first outer diameter and a second support portion having a second outer diameter smaller than the first outer diameter, and
the step C is a step of sliding the liquid holding member from the second support portion side to the first support portion side.

18. The manufacturing method of an atomizing unit according to any one of claims 12 to 16, wherein
the jig includes a first support portion having a first outer diameter and a second support portion having a second outer diameter smaller than the first outer diameter,
the groove or the projection is provided on a side surface of the first support portion, and
the step A is a step of disposing the resistance heating element on the outer side surface of the first support portion and the outer side surface of the second cylindrical member.

19. The manufacturing method of an atomizing unit according to any one of claims 1 to 18, wherein
the step C includes:

a step C 1 of sliding a sliding member along an outer side surface of the resistance heating element in an orthogonal direction perpendicular to the predetermined direction;
a step C 2 of disposing the liquid holding member along the outer side surface of the sliding member in the orthogonal direction; and
a step C 3 of removing the sliding member by sliding from between the liquid holding member and the resistance heating element after the step C 1 and the step C 2.

20. The manufacturing method of an atomizing unit according to any one of claims 1 to 8, wherein
the base member is a cylindrical member having a tubular shape forming at least a part of an air flow path.

21. The manufacturing method of an atomizing unit according to claim 20, wherein
the cylindrical member is constituted by a first cylindrical member and a second cylindrical member, and
the manufacturing method comprising:

a step D of electrically connecting the cylindrical member and the resistance heating element.

22. The manufacturing method of an atomizing unit according to claim 20 or 21, wherein
the cylindrical member is constituted by a first cylindrical member and a second cylindrical member,
the step A is a step of disposing the resistance heating element across both the first cylindrical member and the second cylindrical member, and
the step B is a step of separating the first cylindrical member and the second cylindrical member from each other, while maintaining a state in which the resistance heating element is disposed over both the first cylindrical member and the second cylindrical member.

23. The manufacturing method of an atomizing unit according to claim 1, wherein
the base member is a cylindrical member,
the step A is a step of disposing the resistance heating element to be along a helical groove or projection formed on an outer side surface of the cylindrical member, and
the step B and the step C comprising steps of
separating a part of the resistance heating element from the cylindrical member by rotation of the cylindrical member,
separating a part of the liquid holding member disposed inside the cylindrical member from the cylin-

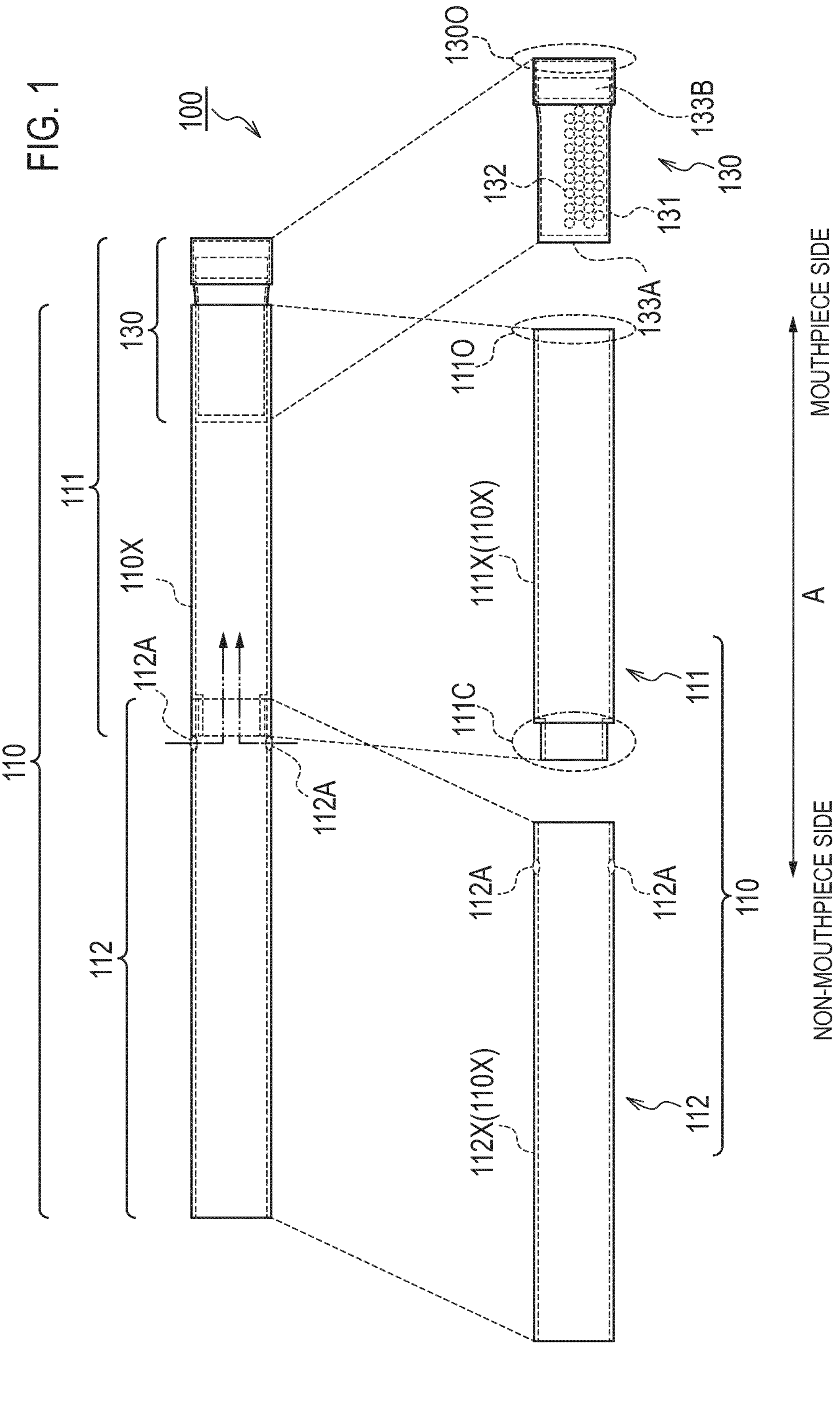
drical member, and
bringing a part of the liquid holding member into contact with or close to a part of the resistance heating element by expansion of a part of the liquid holding member.

24. A manufacturing method of an atomizing unit, comprising:

a step A of disposing a resistance heating element along a spiral groove or a projection formed on a side surface of a base member having an axis extending along a predetermined direction;
a step C of disposing a liquid holding member holding an aerosol source to contact or come close to at least a part of the resistance heating element, or a step C 4 of disposing a liquid holding member holding an aerosol source to contact or come close to a part of a resistance heating element by rotating the base member about the axis as a rotation axis to separate at least a part of the resistance heating element from the grove or the projection, and
a step F of accommodating the resistance heating element and the liquid holding member in the housing.

25. An atomizing unit comprising:

a base member having an axis extending along a predetermined direction;
a resistance heating element disposed to follow a helical groove or projection formed on a side surface of the base member,
a liquid holding member holding an aerosol source, which is disposed to contact or come close to at least a part of the resistance heating element, or disposed to contact or come close to at least a part of the resistance heating element by a step B of rotating the base member around the axis as a rotation axis to separate at least a part of the resistance heating element from the groove or the projection, and
a housing configured to accommodate the resistance heating element and the liquid holding member.


100
110
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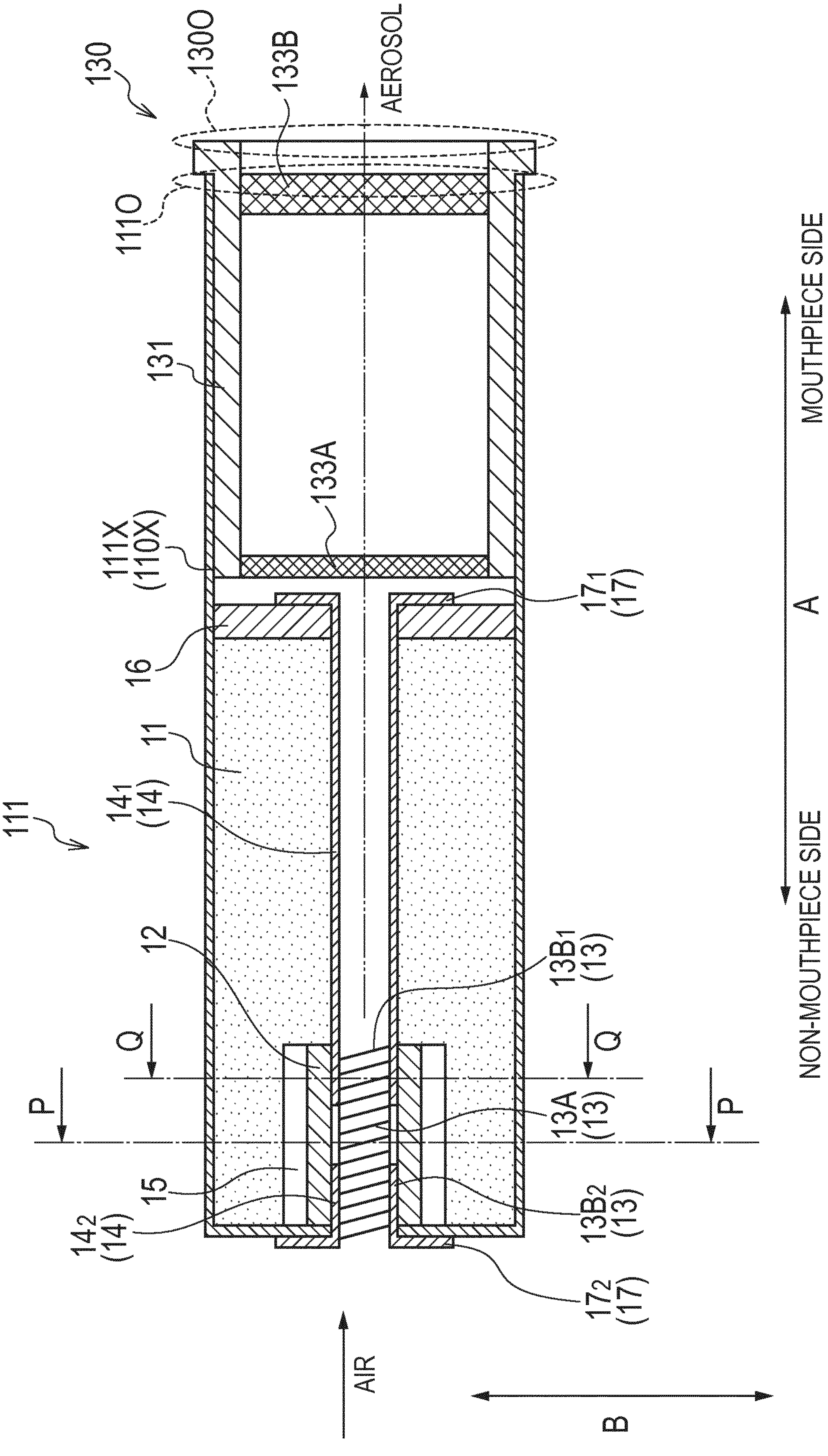
112
130
110X
112A
112A
130O
133B
132
131
130
133A
111O
111X(110X)
111C
111
110
112A
112A
112X(110X)
112
A
MOUTHPIECE SIDE
NON-MOUTHPIECE SIDE

FIG. 1

FIG. 2


130
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133B
AEROSOL
111O
131
133A
111X
(110X)
17_1
(17)
16
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(14)
111
12
$13B_1$
(13)
Q
Q
P
P
13A
(13)
15
14_2
(14)
$13B_2$
(13)
17_2
(17)
AIR
B
A
MOUTHPIECE SIDE
NON-MOUTHPIECE SIDE

FIG. 3A

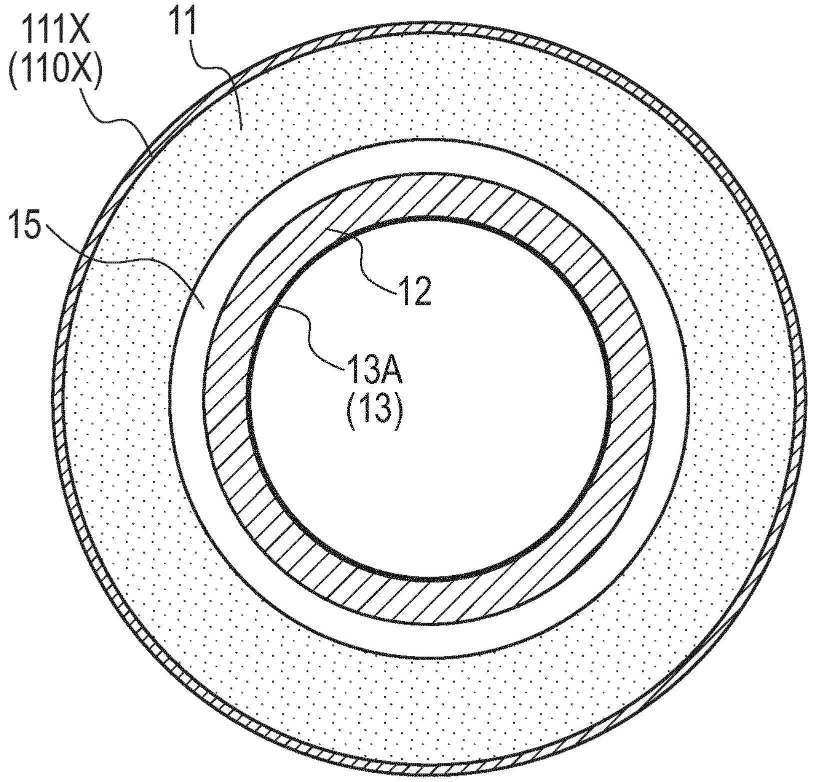


FIG. 3B

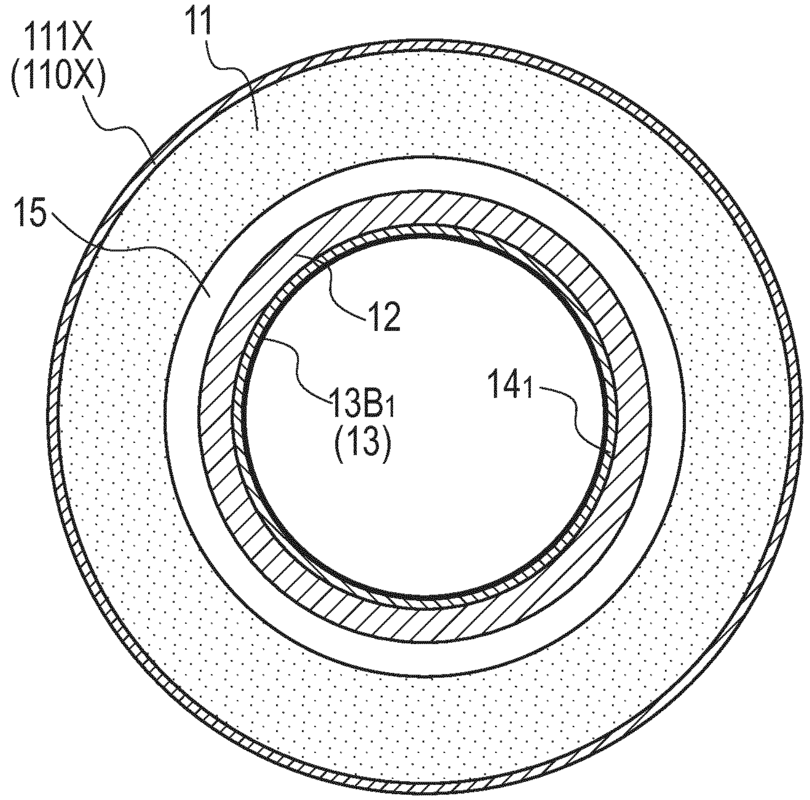


FIG. 4A

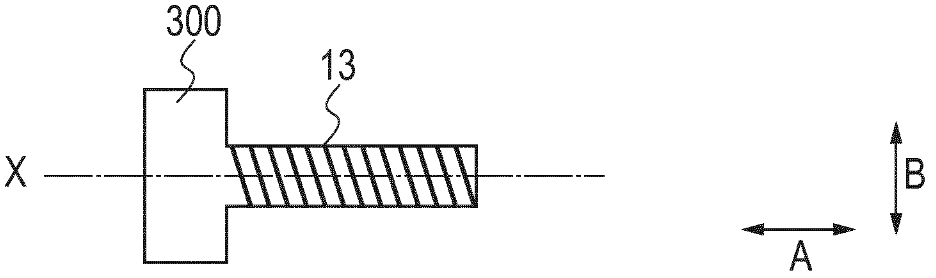


FIG. 4B

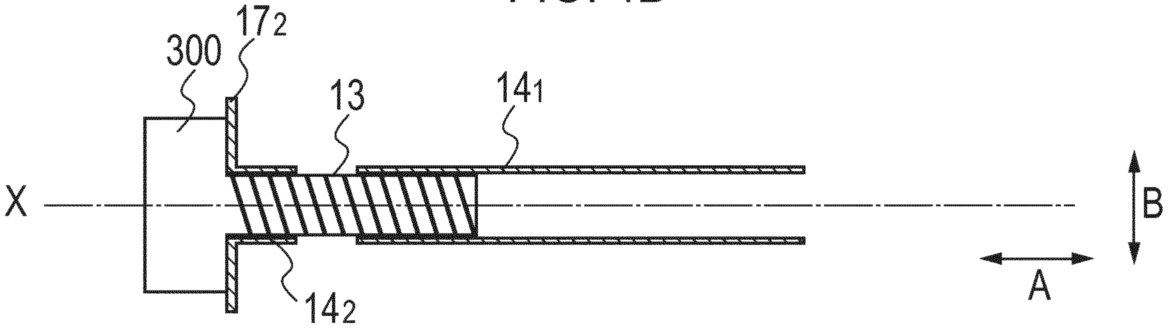


FIG. 4C

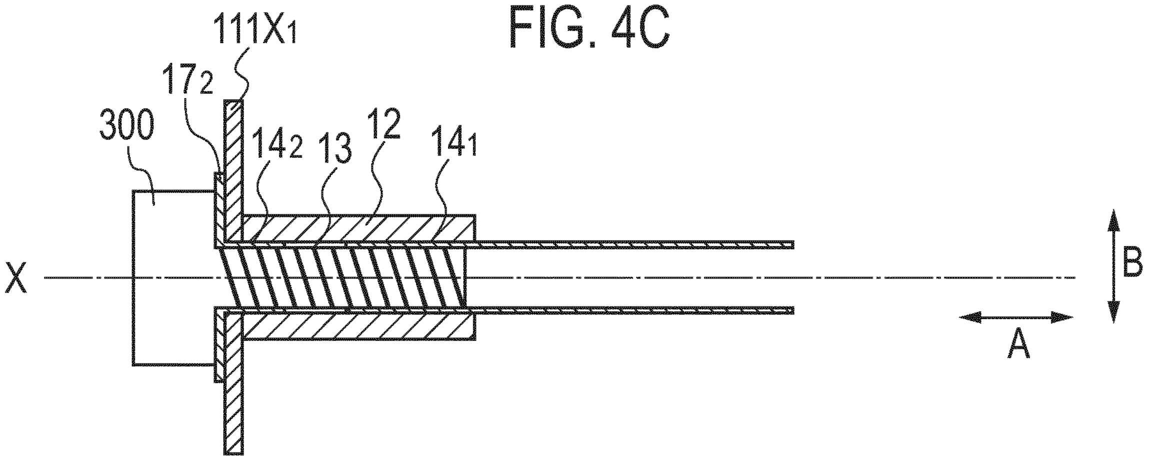


FIG. 4D

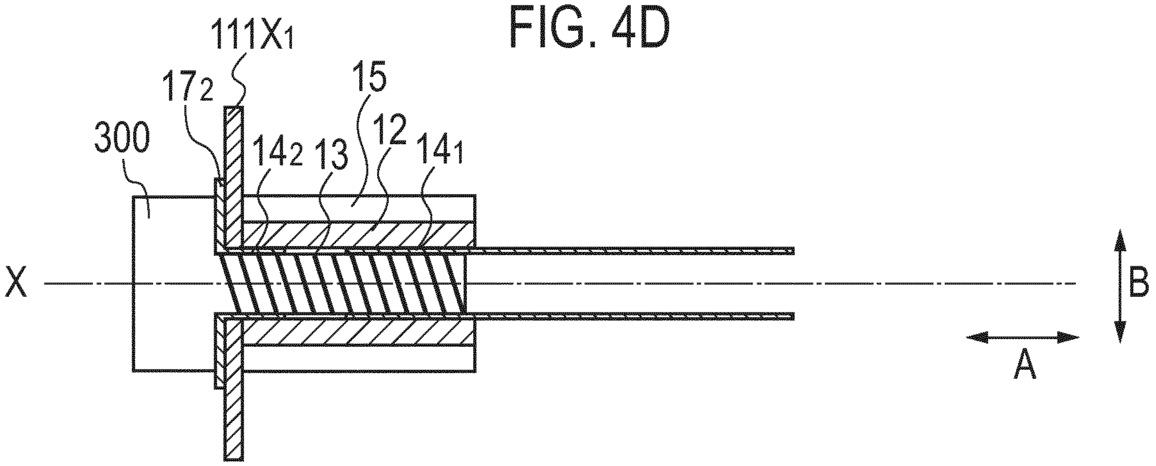


FIG. 5A

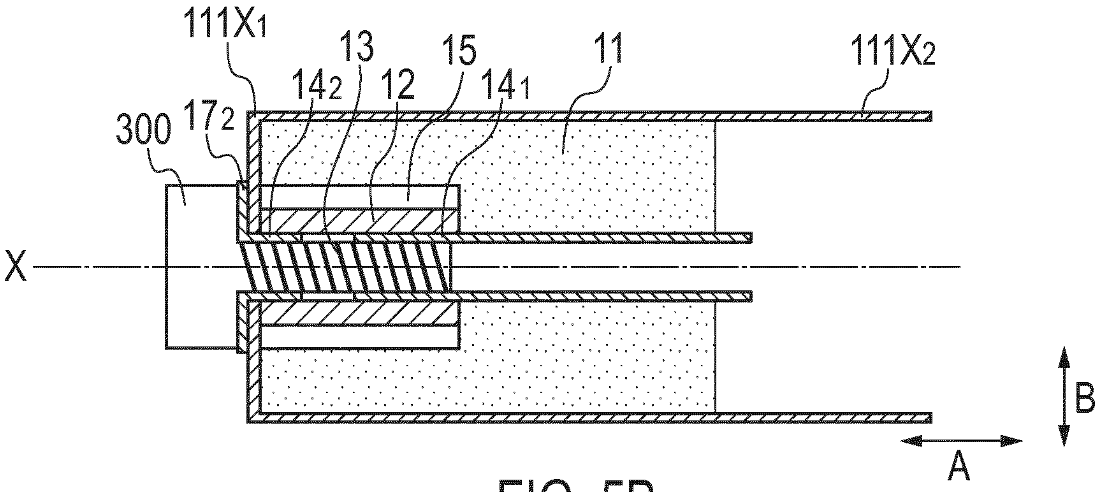


FIG. 5B

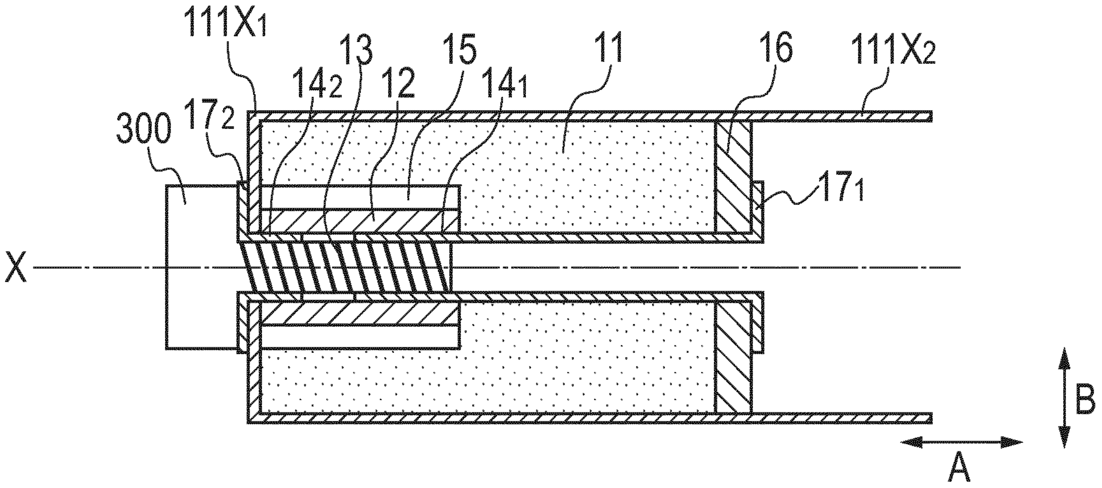


FIG. 5C

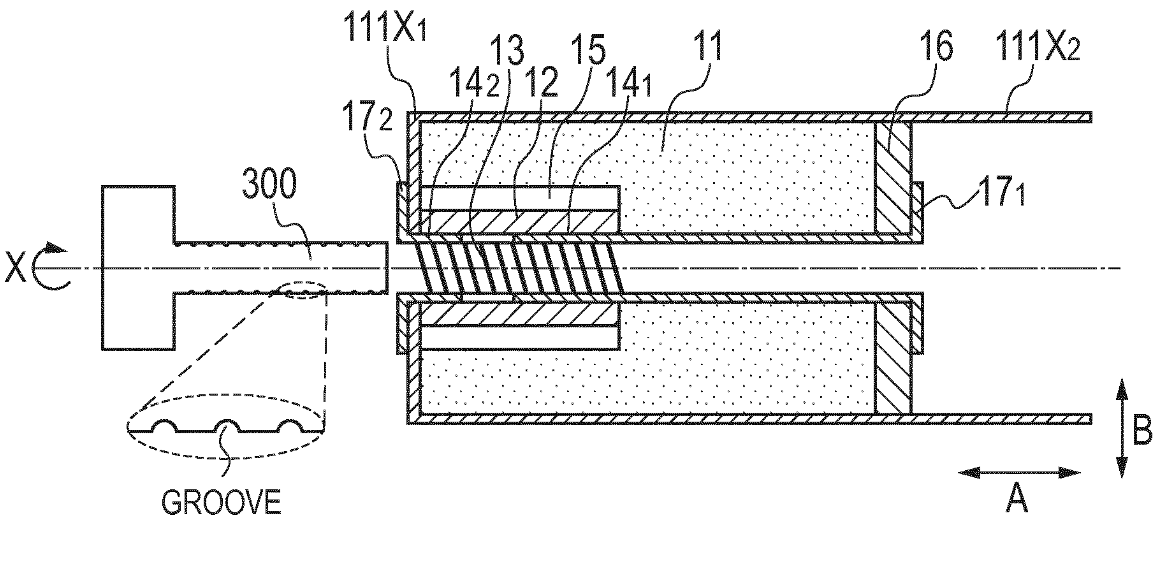


FIG. 6A

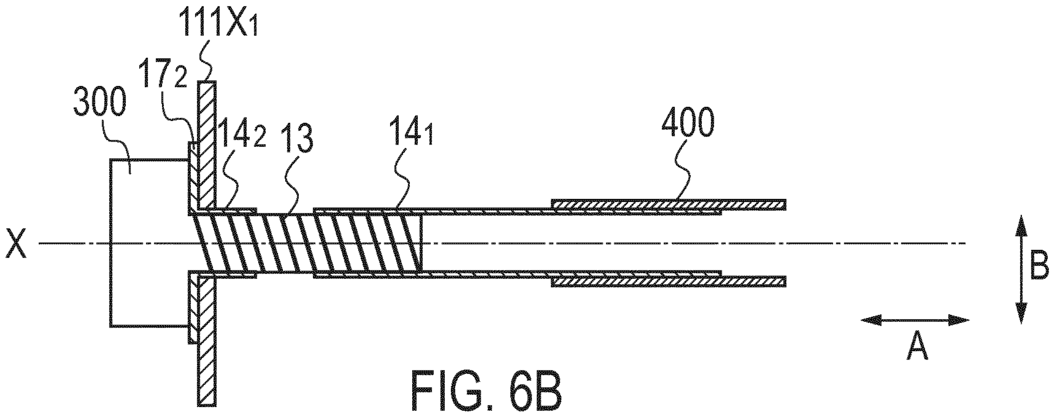


FIG. 6B

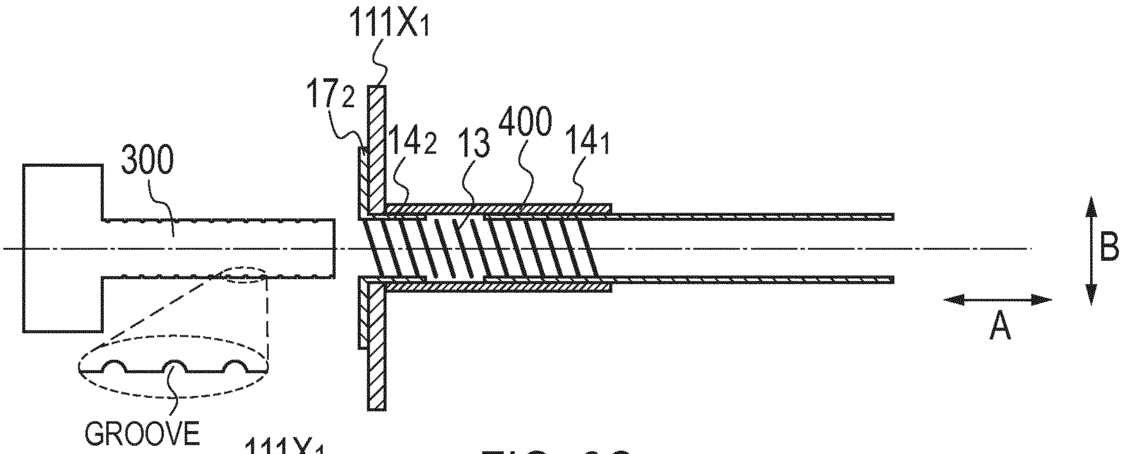


FIG. 6C

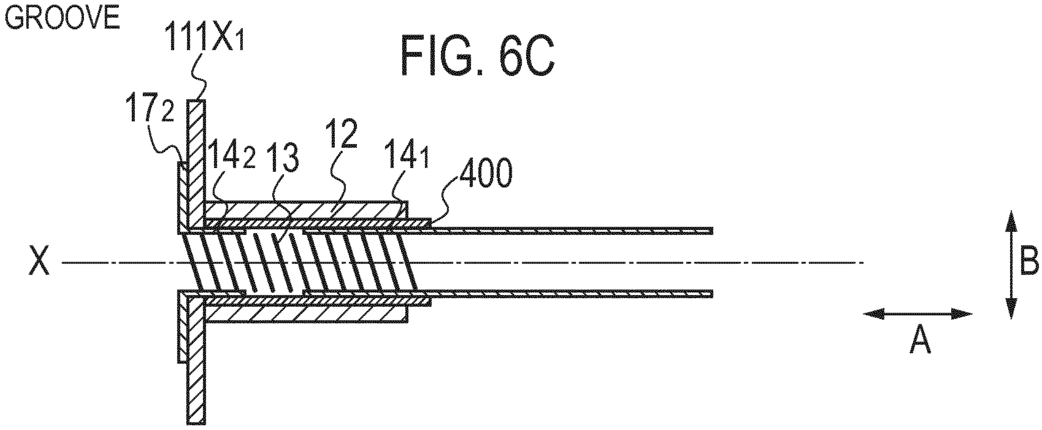


FIG. 6D

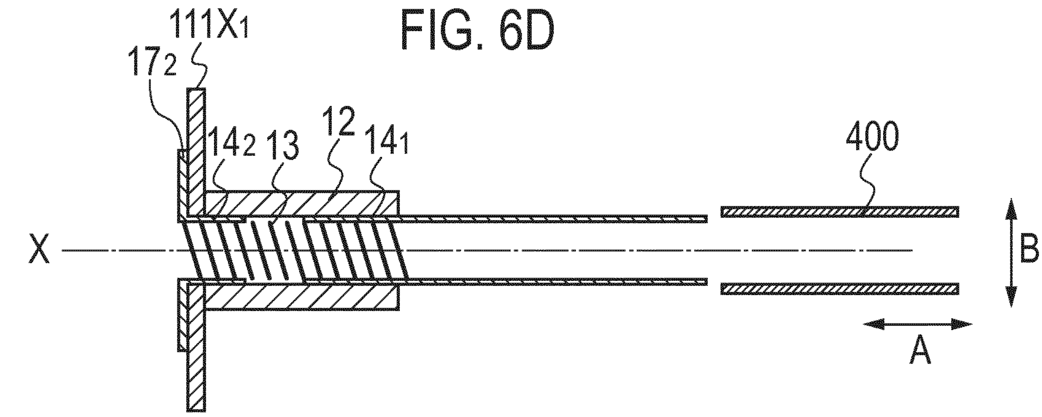


FIG. 7A

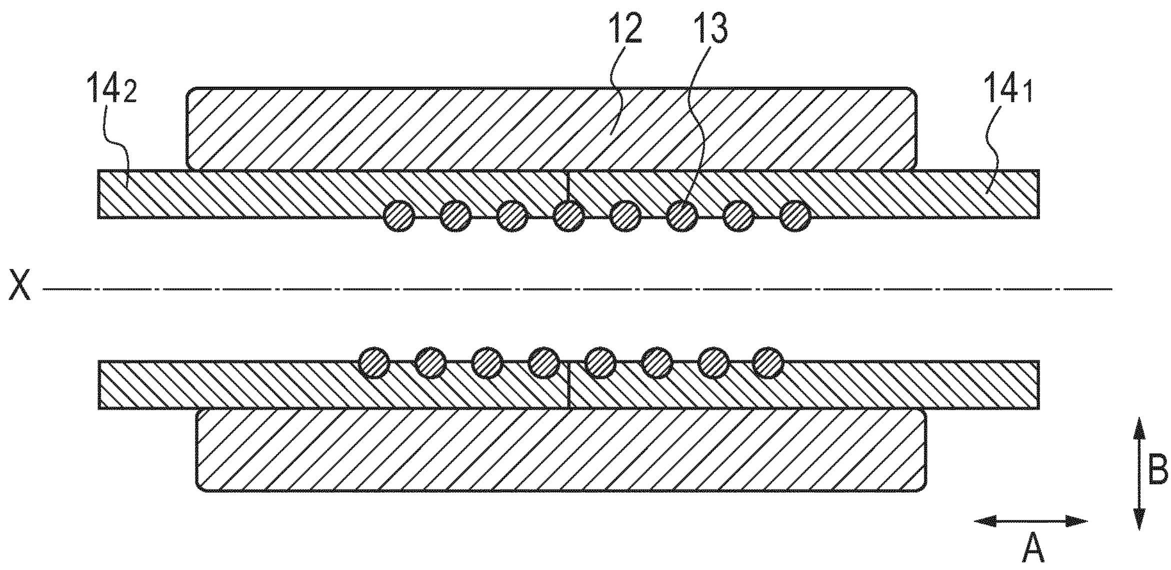


FIG. 7B

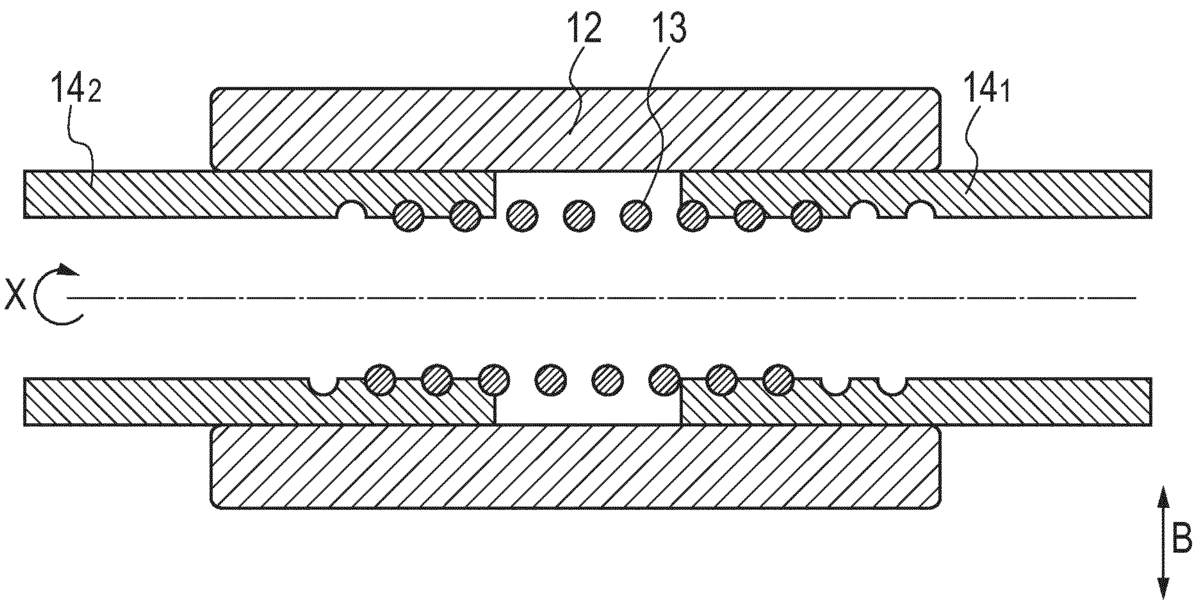


FIG. 8A

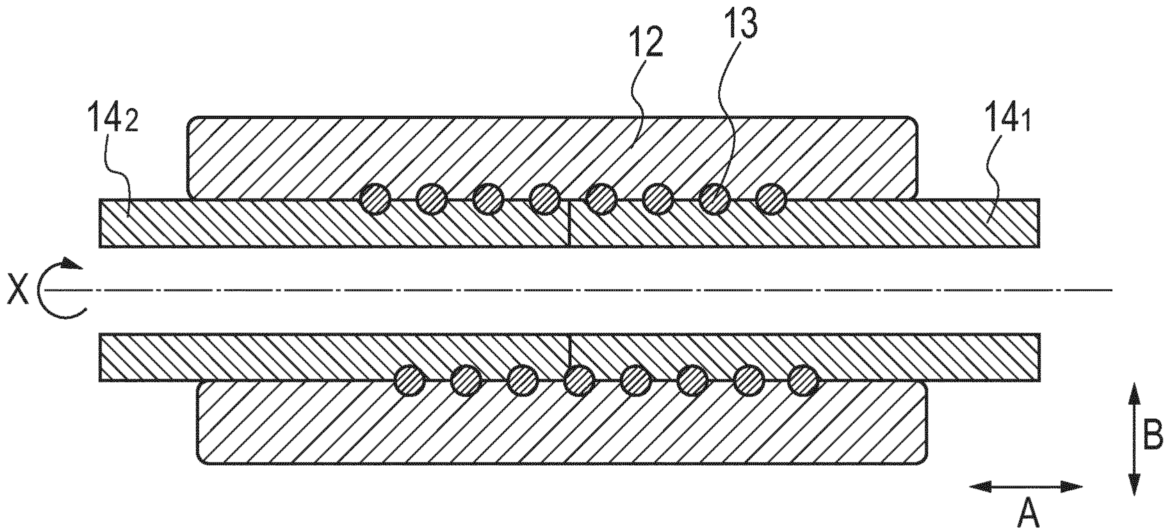


FIG. 8B

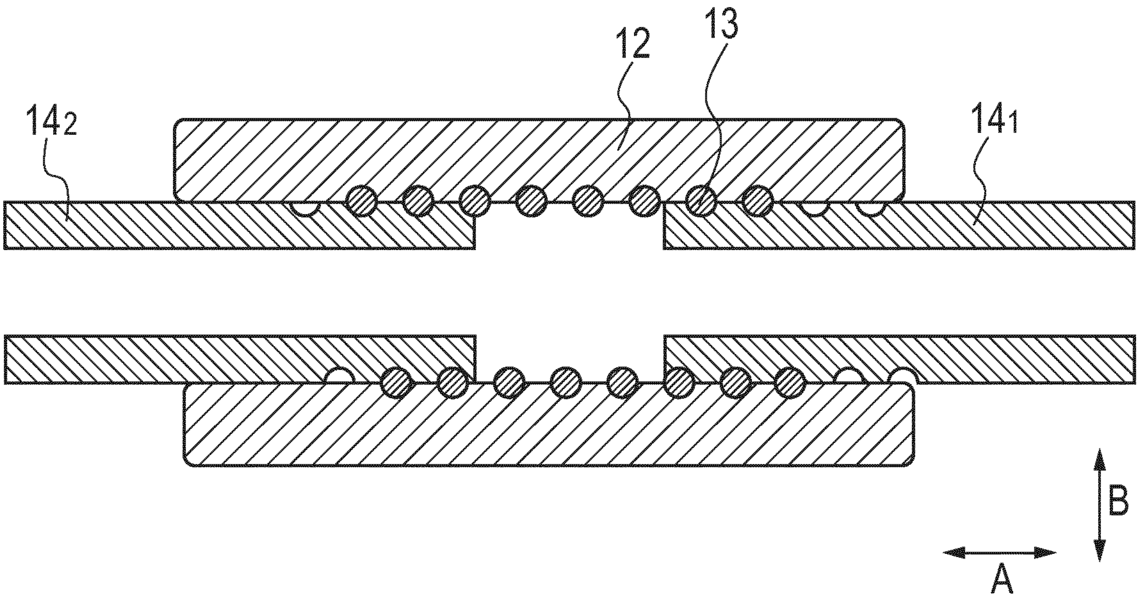


FIG. 9

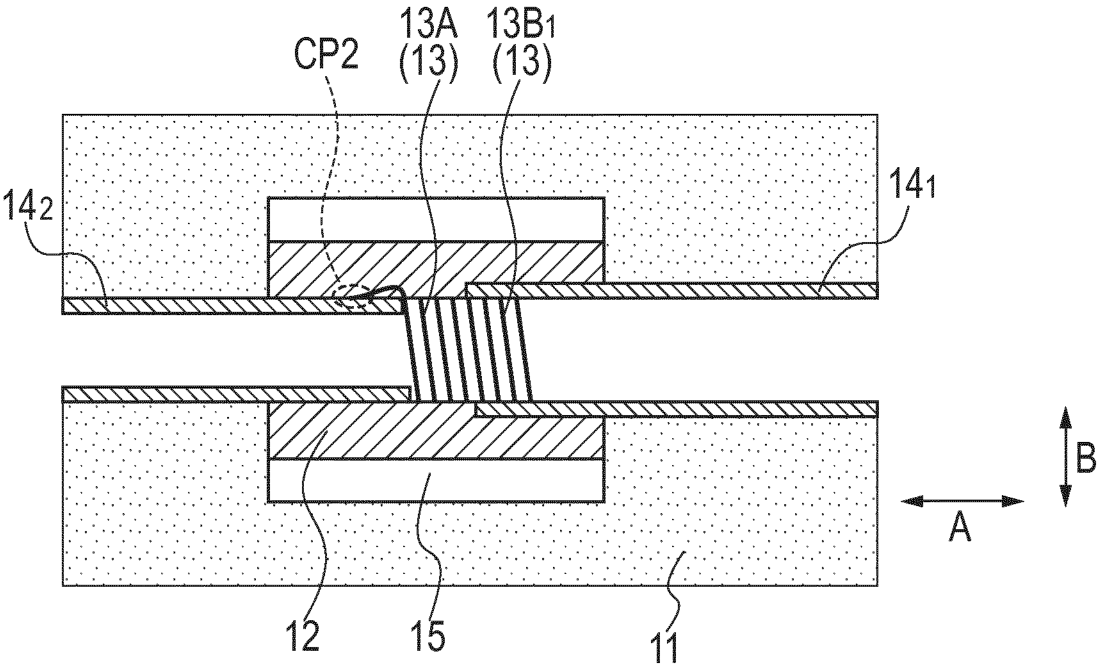


FIG. 10

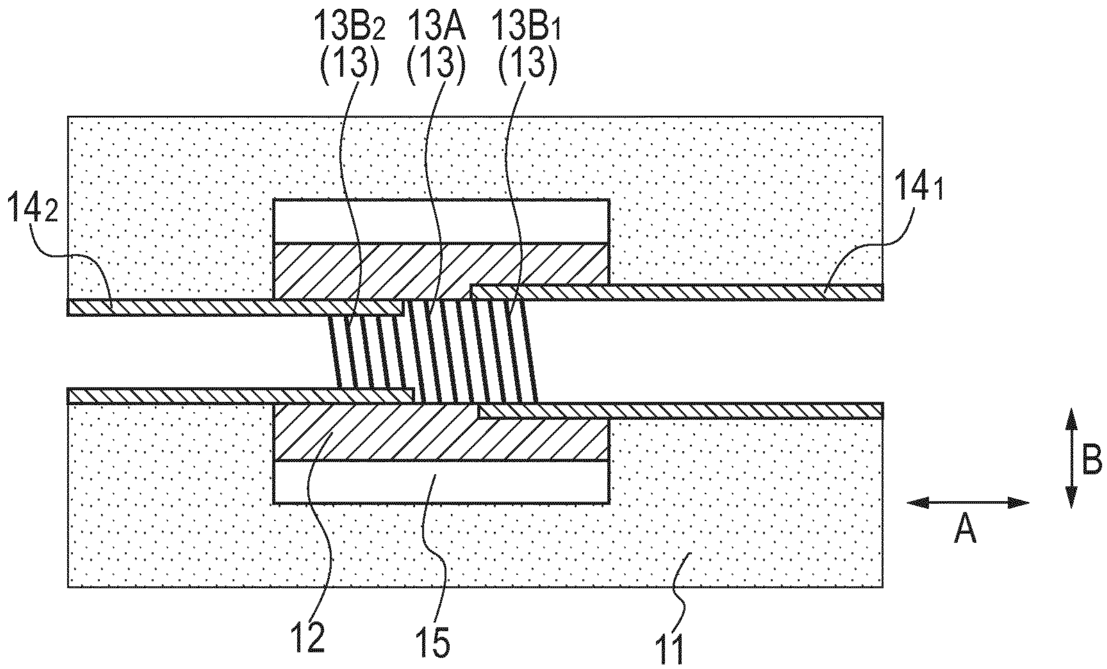


FIG. 11

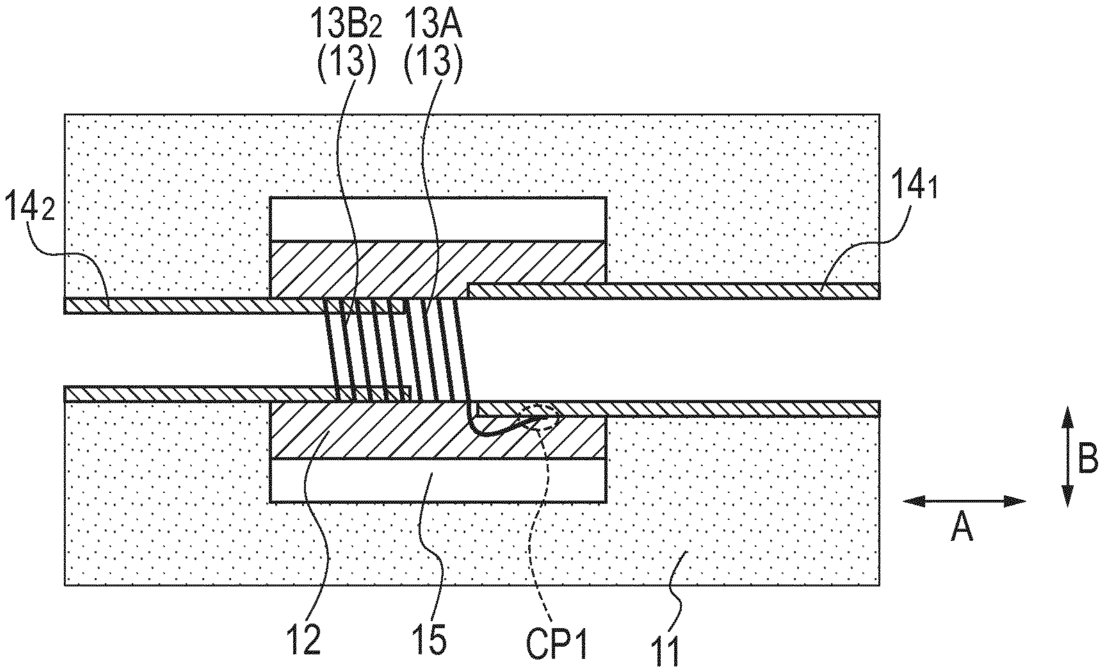


FIG. 12A

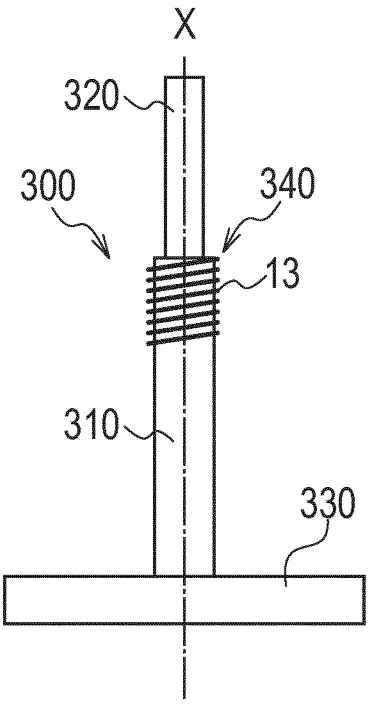


FIG. 12B

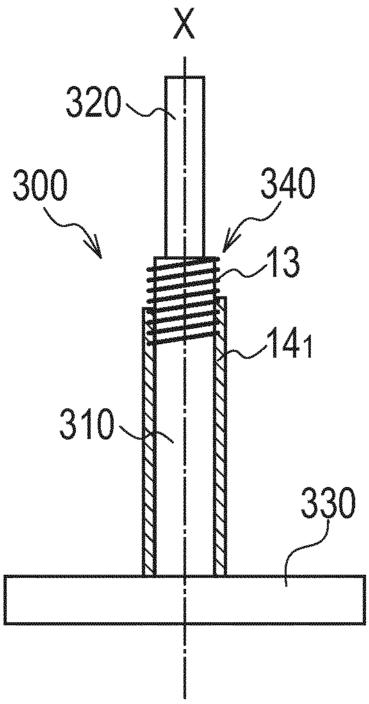


FIG. 12C

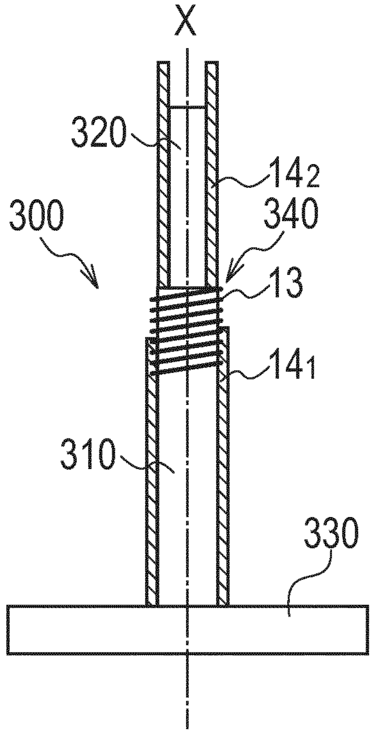


FIG. 12D

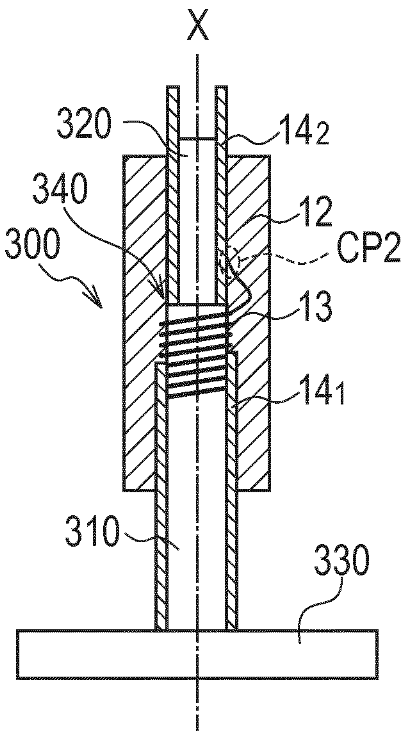


FIG. 12E

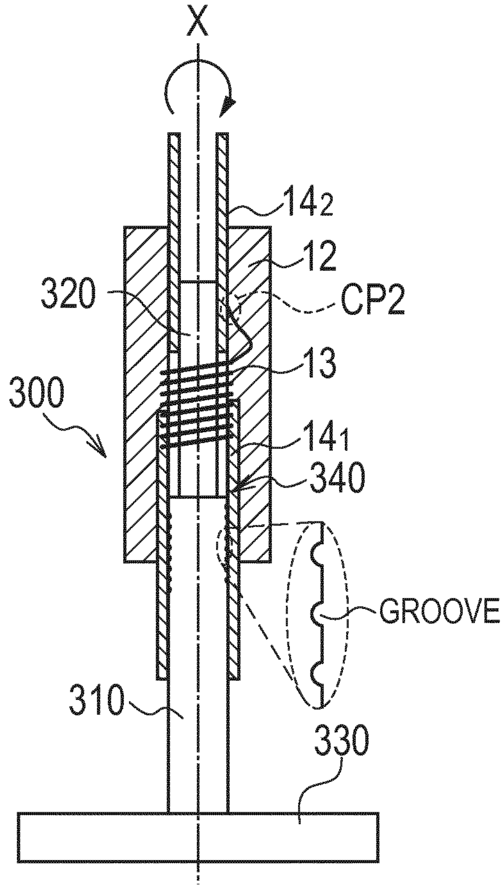


FIG. 13A

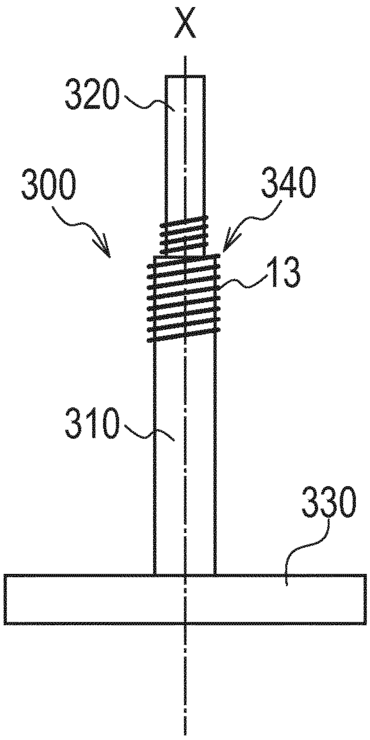


FIG. 13B

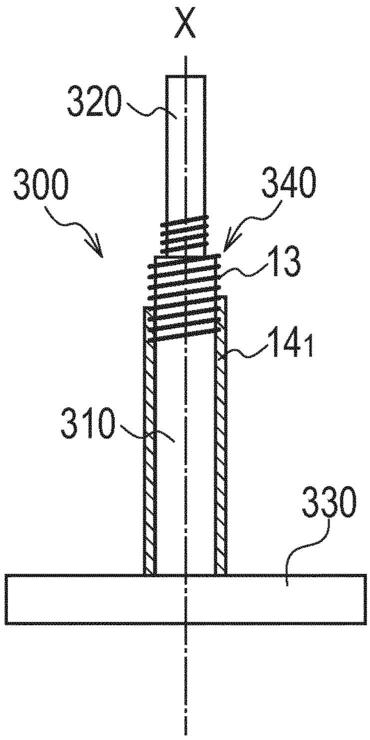


FIG. 13C

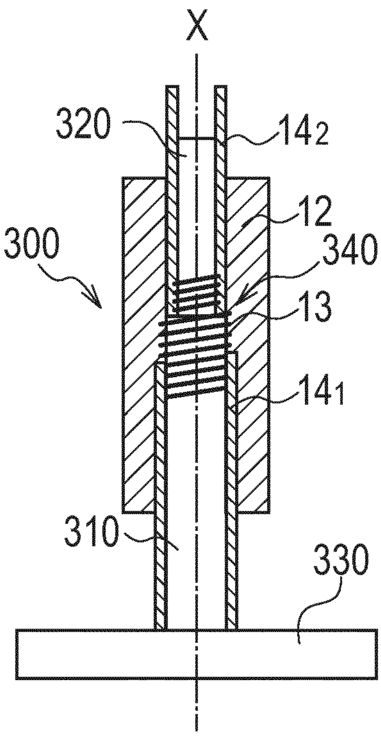


FIG. 13D

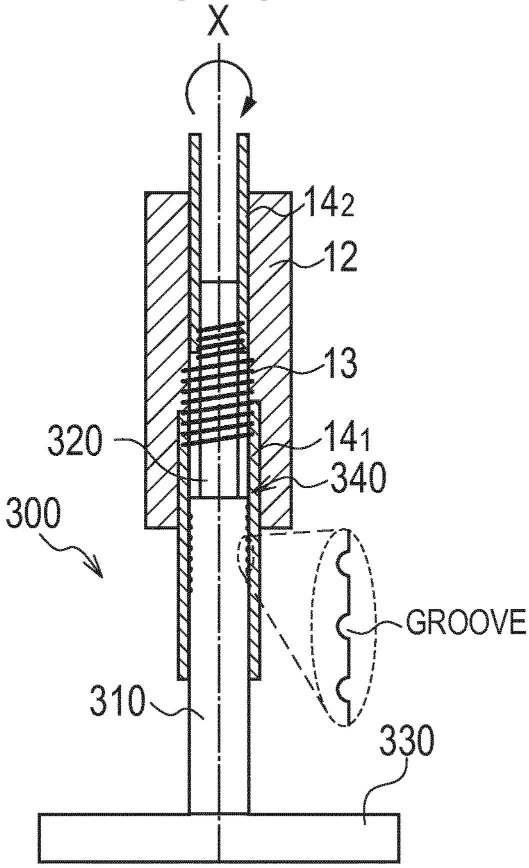


FIG. 14A

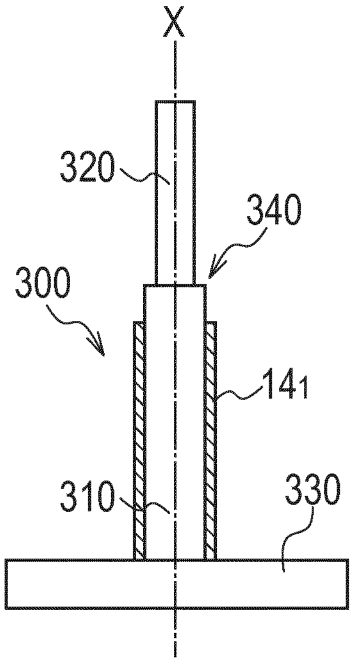


FIG. 14B

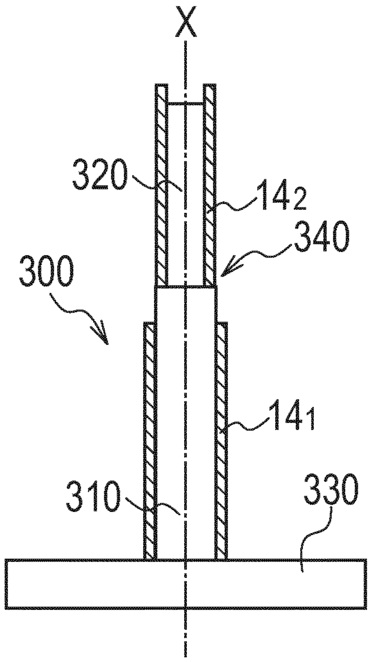


FIG. 14C

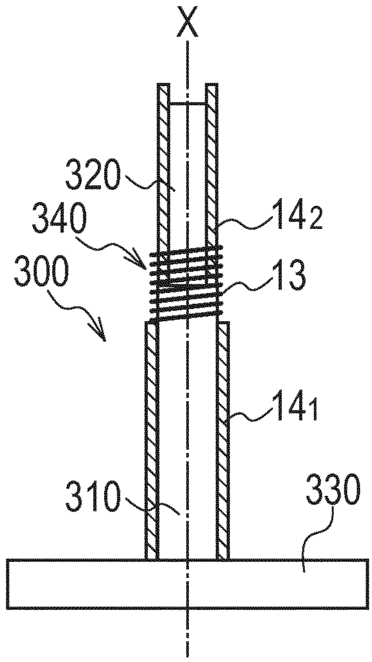


FIG. 14D

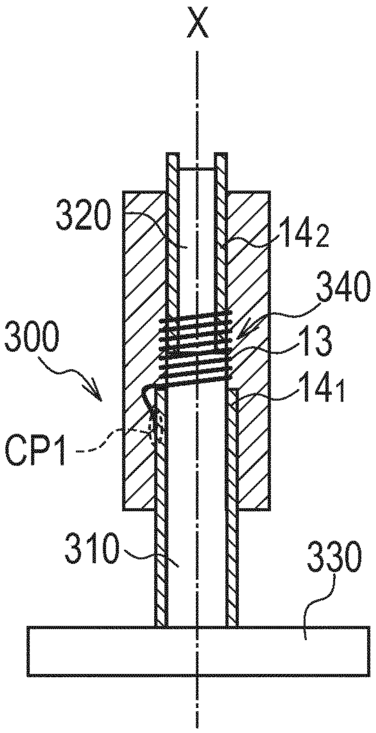


FIG. 14E

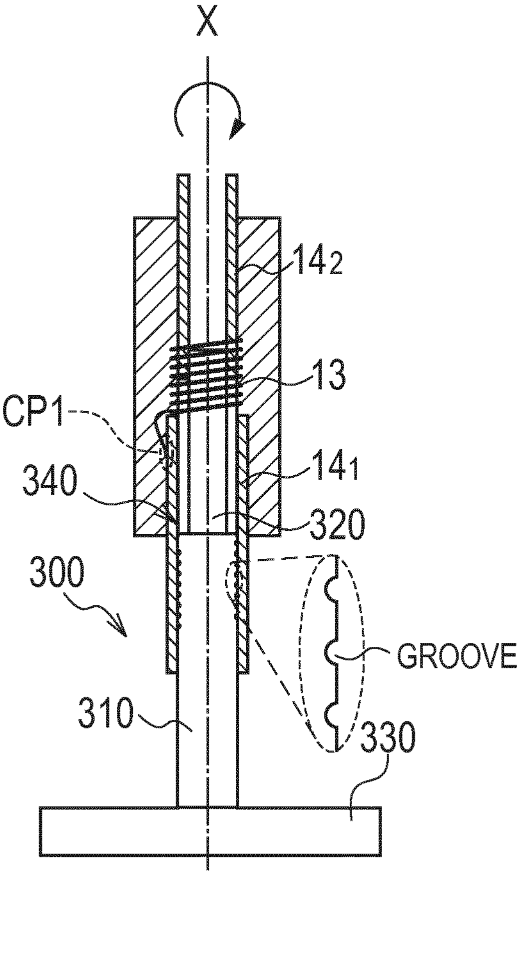


FIG. 15

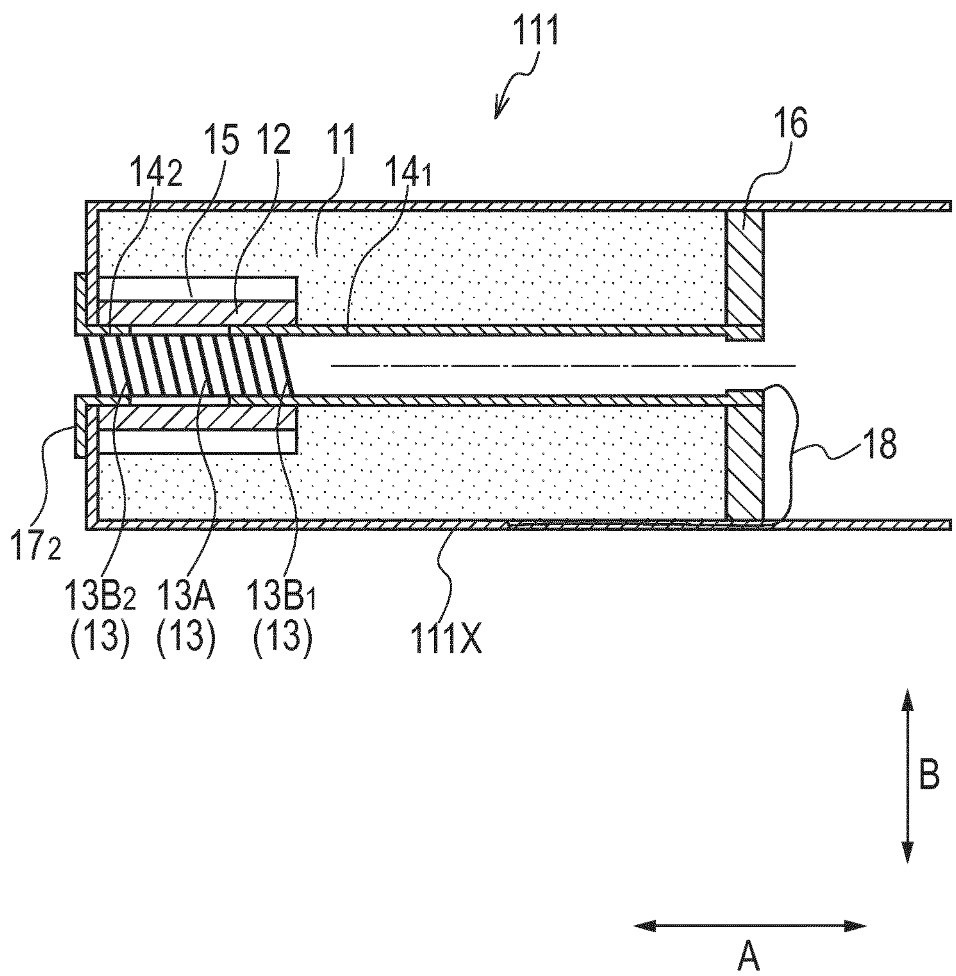


FIG. 16

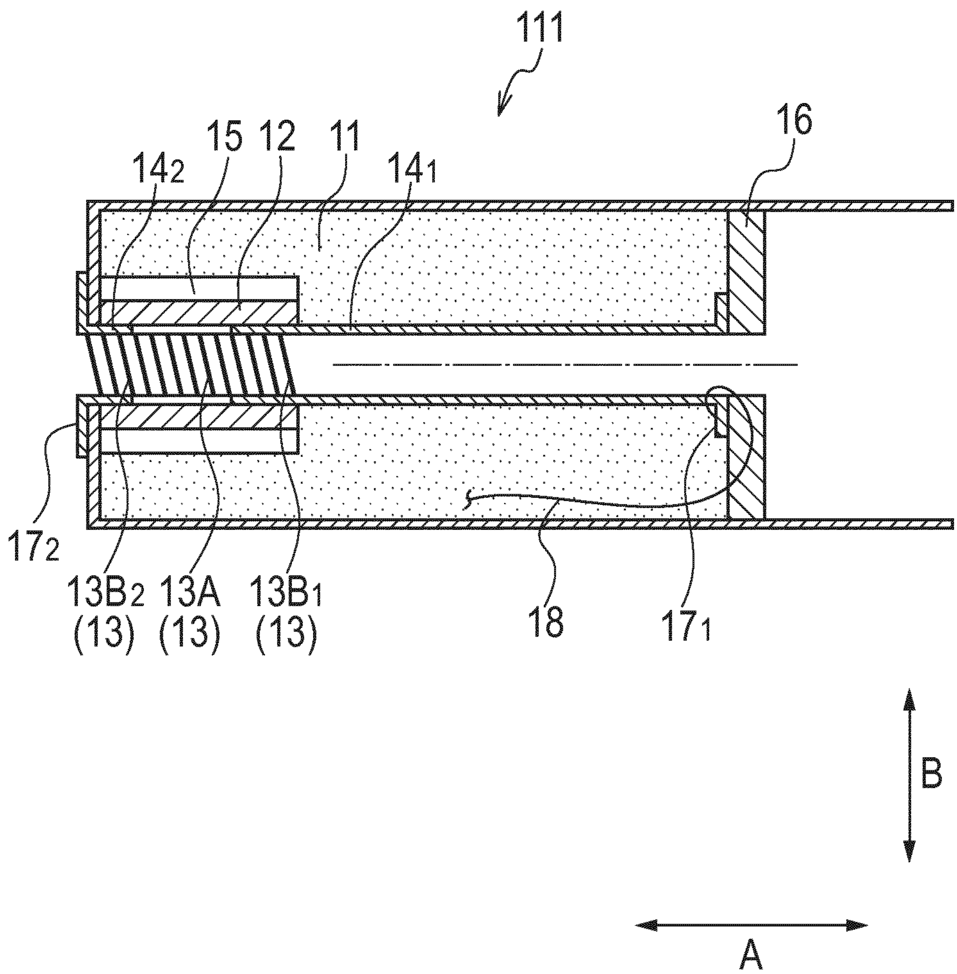


FIG. 17

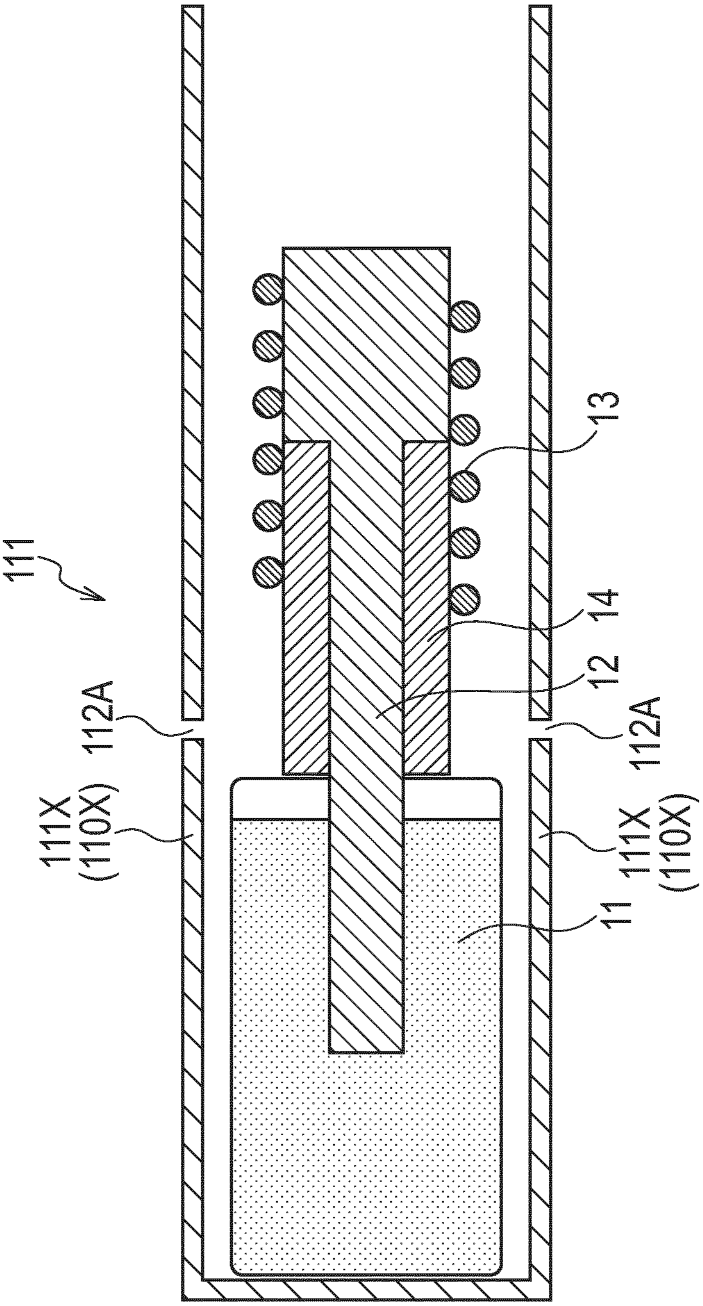


FIG. 18A

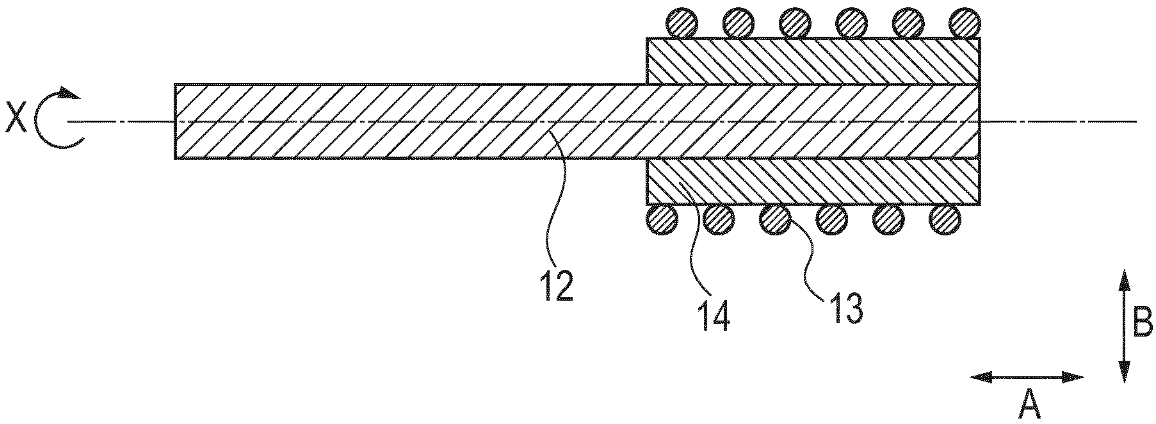


FIG. 18B

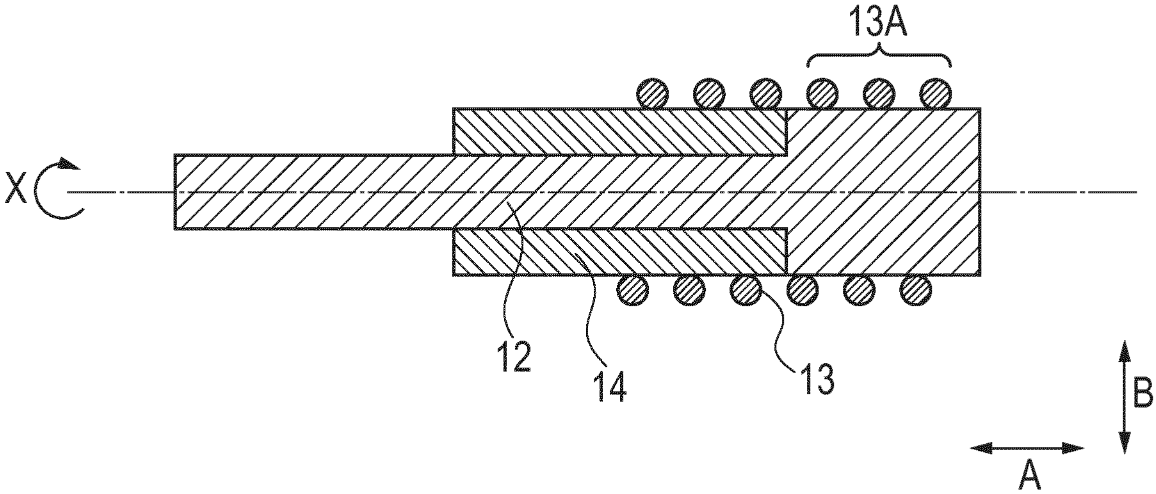


FIG. 19

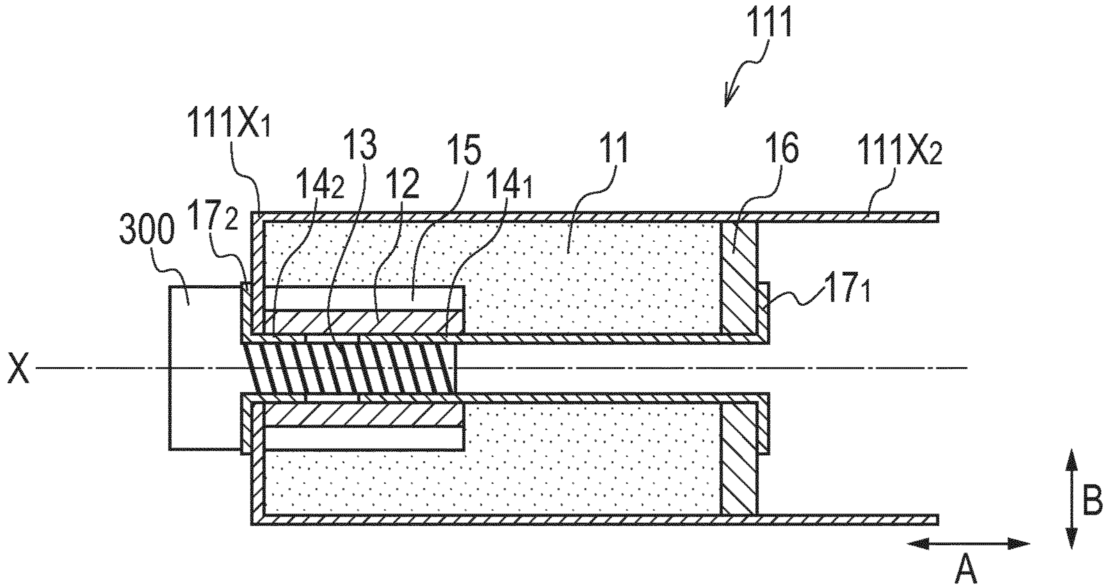
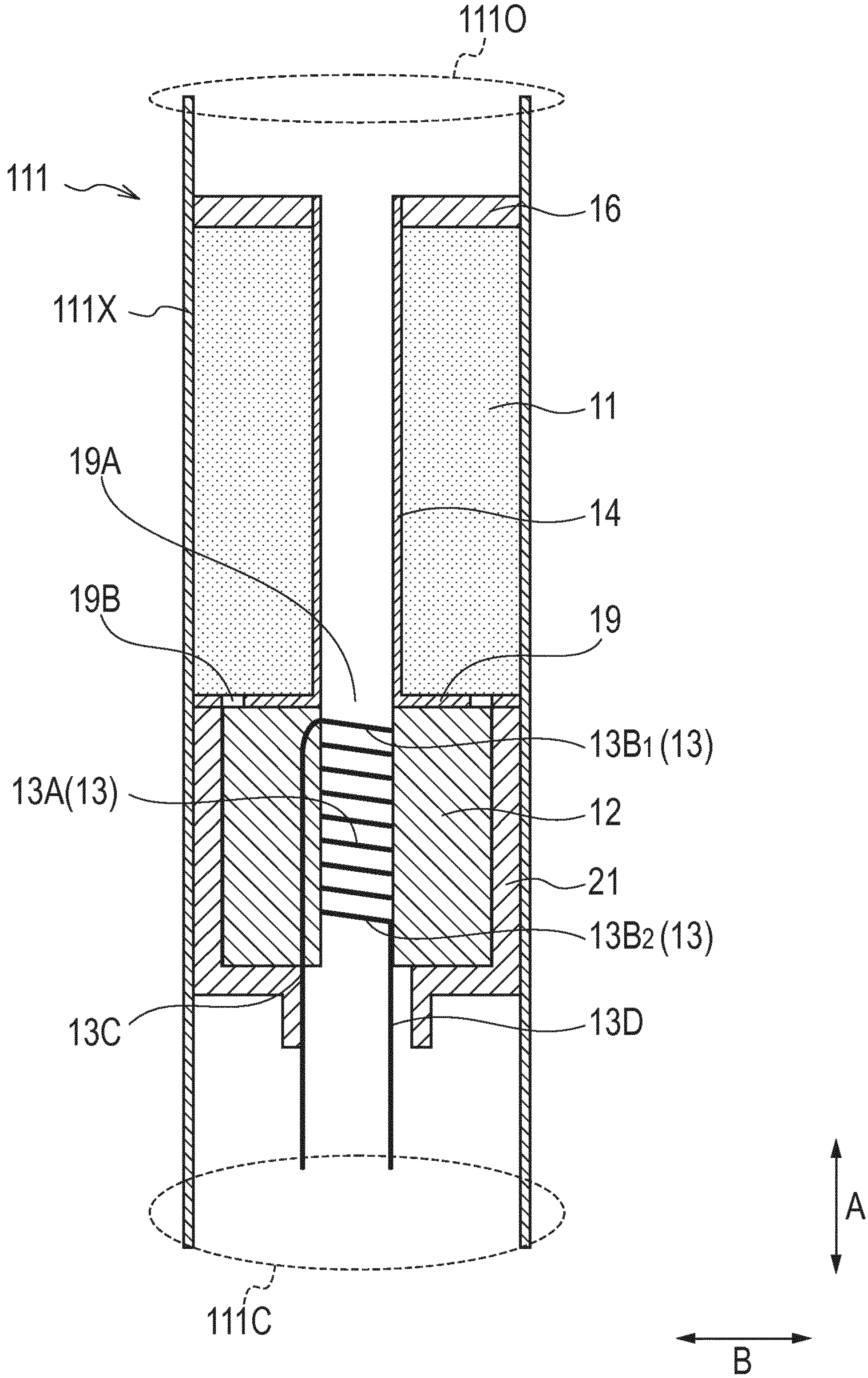


FIG. 20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13C
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111C
B

FIG. 21

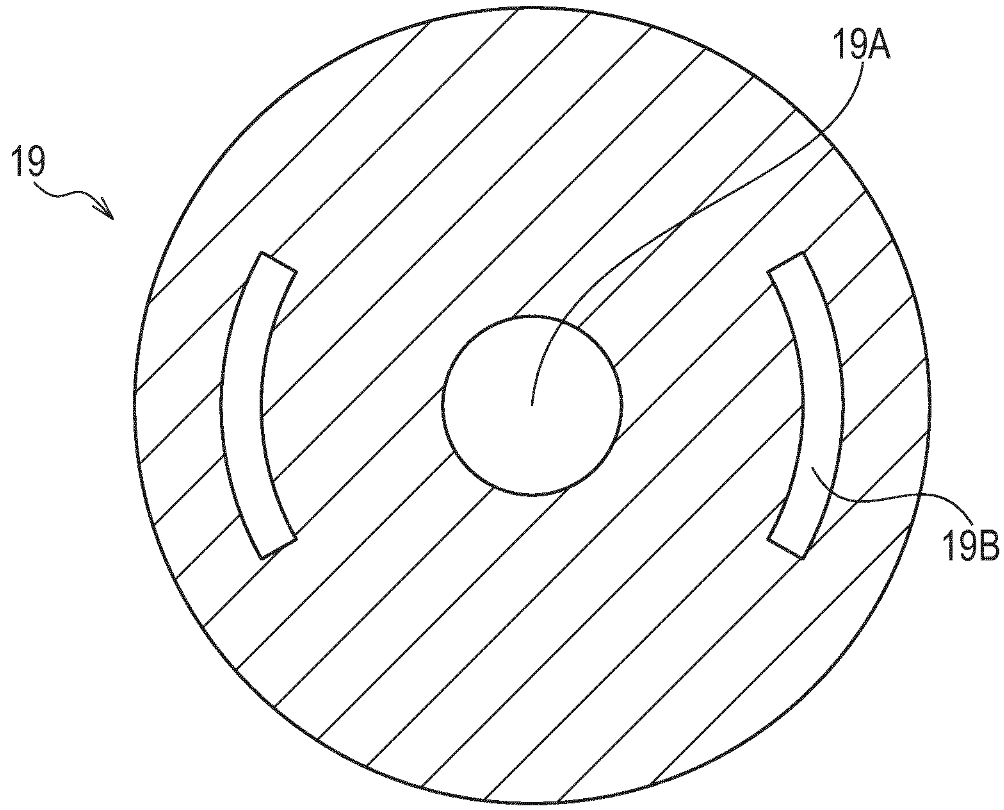


FIG. 22A

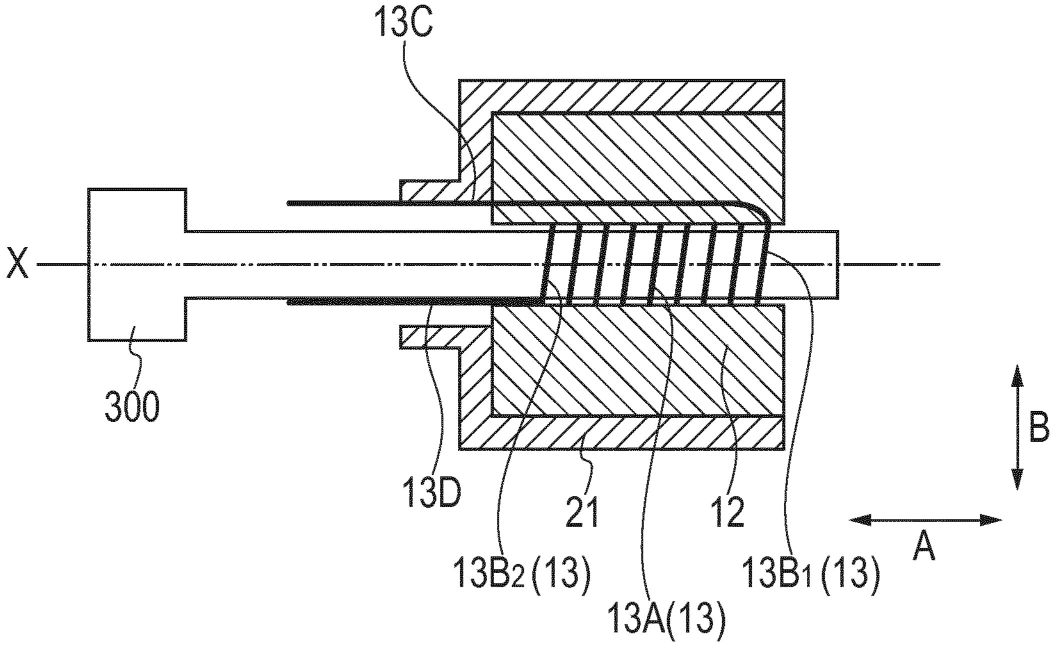
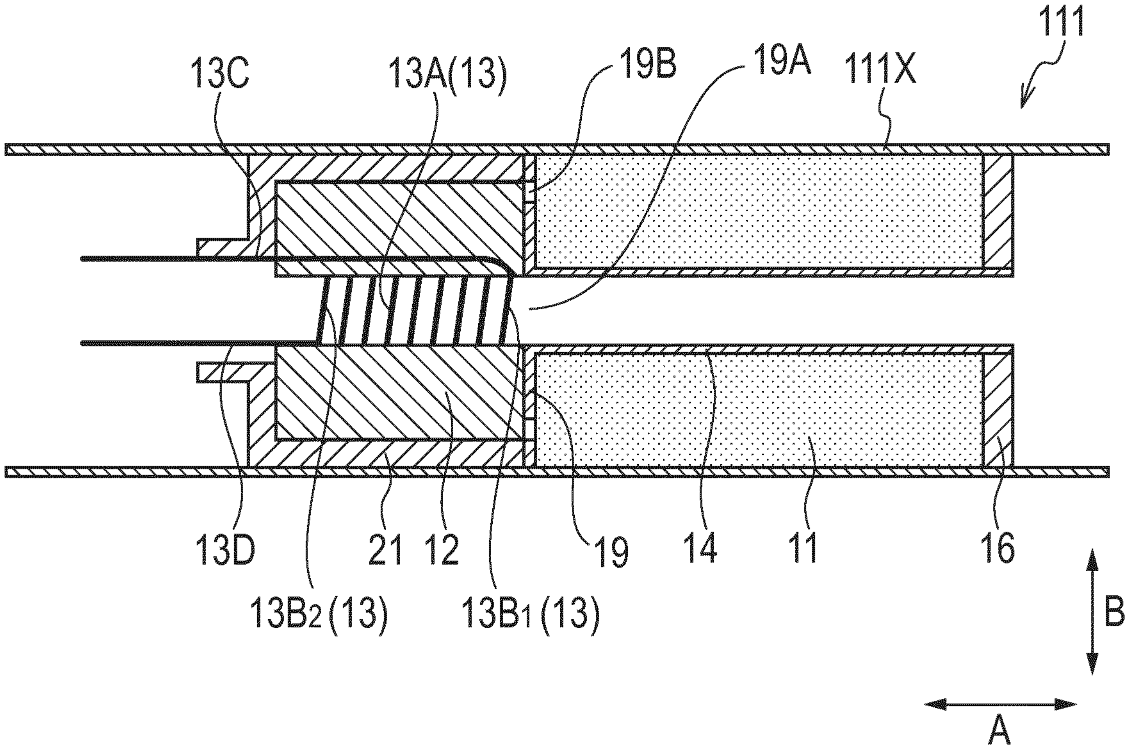


FIG. 22B



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2016/068933

A. CLASSIFICATION OF SUBJECT MATTER
A24F47/00(2006.01)i

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A24F47/00

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

Jitsuyo Shinan Koho	1922-1996	Jitsuyo Shinan Toroku Koho	1996-2016
Kokai Jitsuyo Shinan Koho	1971-2016	Toroku Jitsuyo Shinan Koho	1994-2016

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 A	JP 3413208 B2 (Japan Tobacco Inc.), 03 June 2003 (03.06.2003), entire text; all drawings & US 6125853 A entire text; all drawings & WO 1997/048295 A1 & EP 857431 A1 & DE 69719719 D & DE 69719719 T & KR 10-0267462 B & CN 1195270 A	1,2,24,25 3-23
Y	JP 2011-049831 A (Mitsubishi Electric Corp.), 10 March 2011 (10.03.2011), claim 8 (Family: none)	1,2,24,25

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

* Special categories of cited documents:
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"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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"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
12 September 2016 (12.09.16)

Date of mailing of the international search report
20 September 2016 (20.09.16)

Name and mailing address of the ISA/
Japan Patent Office
3-4-3,Kasumigaseki,Chiyoda-ku,
Tokyo 100-8915,Japan

Authorized officer

Telephone No.

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

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- WO 2012517229 A **[0003]**
- WO 2015504652 A **[0003]**