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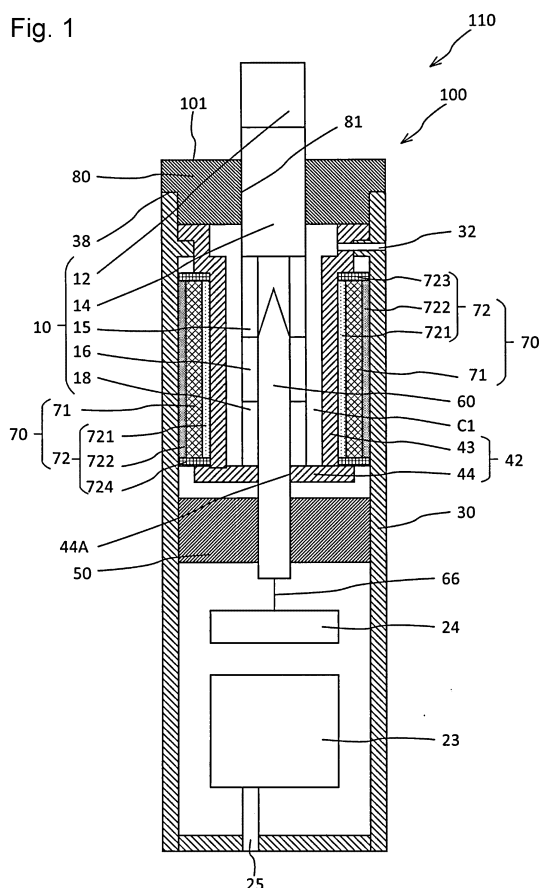
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(54) **FLAVOR INHALER, FLAVOR INHALING SYSTEM AND SMOKING SYSTEM**

(57) This flavor inhaler comprises: a housing; a receptacle that is disposed within the housing, contains a consumable material including a smokable substance and heats the consumable material by a heating section; and a heat storage portion disposed between the housing and the receptacle and containing a heat storage material, wherein the heat storage portion includes an inner support member disposed on the receptacle side and an outer support member disposed on the housing side, and the layer of the heat storage material is disposed between the inner support member and the outer support member.

Fig. 1



Description

TECHNICAL FIELD

[0001] The present invention relates to flavor inhalers, flavor inhaling systems, and smoking systems.

BACKGROUND ART

[0002] A known flavor inhaler in the related art causes a material containing a flavor component to generate, for example, an aerosol by heating the material without burning the material. In such a flavor inhaler, for example, a heat insulation material or a thermal diffusion sheet is installed in the flavor inhaler to prevent an area that a user using the flavor inhaler (simply referred to as a user hereinafter) may come into contact with from becoming hot (see Patent Literatures 1 to 3).

CITATION LIST

PATENT LITERATURE

[0003]

PTL 1: PCT International Publication No. WO 2016/026219

PTL 2: PCT International Publication No. WO 2013/104616

PTL 3: PCT International Publication No. WO 2020/084759

SUMMARY OF INVENTION

TECHNICAL PROBLEM

[0004] In a tobacco heater according to Patent Literature 1, 2 to 20 volume % of a phase change material is filled or absorbed in an aerogel porous structure of a heat insulation layer. However, the percentage of the phase change material is insufficient, making it difficult to perform heat insulation sufficiently.

[0005] In view of the above circumstances, one of the objects of the present invention is to efficiently suppress heat transfer from a heating section to the surface of the flavor inhaler.

SOLUTION TO PROBLEM

[0006] According to a first aspect, a flavor inhaler is provided. This flavor inhaler includes: a housing; a receptacle that is disposed inside the housing, accommodates a consumable material including a smokable substance, and heats the consumable material by using a heating section; and a heat storage portion that is disposed between the housing and the receptacle and that

includes a heat storage material. The heat storage portion includes an inner support member disposed toward the receptacle and an outer support member disposed toward the housing. A layer of the heat storage material is disposed between the inner support member and the outer support member.

[0007] According to the first aspect, heat storage can be performed efficiently in accordance with the layer of the heat storage material, and heat transfer from the heating section to the surface of the flavor inhaler can be efficiently suppressed.

[0008] According to a second aspect, in the first aspect, the heat storage portion is filled with the heat storage material exceeding 20% of a volume of a space defined by the inner support member and the outer support member.

[0009] According to the second aspect, heat transfer from the heating section to the surface of the flavor inhaler can be suppressed more efficiently.

[0010] According to a third aspect, in the first or second aspect, a thermal conductivity of the inner support member is lower than a thermal conductivity of the outer support member.

[0011] According to the third aspect, heat transfer from the heating section to the surface of the flavor inhaler can be suppressed by the inner support member during heating, and heat can be efficiently dissipated from the heat storage material by the outer support member after the end of heating.

[0012] According to a fourth aspect, in any one of the first to third aspects, a thermal conductivity of the inner support member at 25°C is 0.3 [W/(m·K)] or lower.

[0013] According to the fourth aspect, heat transfer from the heating section to the surface of the flavor inhaler can be suppressed more reliably by the inner support member during heating.

[0014] According to a fifth aspect, in any one of the first to fourth aspects, a thermal conductivity of the outer support member at 25°C is 1.0 [W/(m·K)] or higher.

[0015] According to the fifth aspect, heat from the heat storage material can be dissipated more reliably and efficiently by the outer support member after the end of heating.

[0016] According to a sixth aspect, in any one of the first to fifth aspects, the inner support member contains resin.

[0017] The sixth aspect can provide a flavor inhaler including a heat storage portion that utilizes the characteristics of resin, such as high electrical insulation properties or low thermal conductivity.

[0018] According to a seventh aspect, in any one of the first to sixth aspects, the inner support member is disposed integrally with an outer wall of the receptacle.

[0019] The seventh aspect can provide a flavor inhaler that is more compact than in a case where the inner support member is provided separately from the receptacle.

[0020] According to an eighth aspect, in any one of the first to seventh aspects, the outer support member con-

tains metal.

[0021] The eighth aspect can provide a flavor inhaler including a heat storage portion that utilizes the characteristics of metal, such as high thermal conductivity or high strength.

[0022] According to a ninth aspect, in the eighth aspect, the outer support member is a metal pipe extending along a central axis of the housing.

[0023] According to the ninth aspect, heat can be dissipated efficiently by the metal pipe in the direction extending along the central axis. Moreover, a more compact flavor inhaler can be provided, as compared with a case where a member for heat dissipation is provided separately from the outer support member.

[0024] According to a tenth aspect, in any one of the first to ninth aspects, the outer support member is disposed in contact with an inner side surface of the housing.

[0025] According to the tenth aspect, a temperature increase in the housing can be suppressed by the heat storage material during heating, and heat from the heat storage material can be dissipated efficiently via the outer support member and the housing after the end of heating.

[0026] According to an eleventh aspect, in any one of the first to tenth aspects, the flavor inhaler further includes a heat diffuser that is disposed inside the housing, has a higher thermal conductivity than the housing, and is in contact with the outer support member.

[0027] According to the eleventh aspect, heat can be dissipated more efficiently from the heat storage material via the heat diffuser after the end of heating.

[0028] According to a twelfth aspect, in any one of the first to eleventh aspects, the flavor inhaler includes the heating section, and the heating section is disposed within the receptacle.

[0029] According to the twelfth aspect, the consumable material containing a flavor component accommodated in the receptacle can be heated efficiently.

[0030] According to a thirteenth aspect, in any one of the first to twelfth aspects, the heat storage material undergoes a phase transition at a temperature between 40°C and 50°C.

[0031] According to the thirteenth aspect, a situation where the temperature of the surface of the flavor inhaler becomes higher than the aforementioned temperature can be suppressed, whereby difficult handling caused by high temperature can be prevented.

[0032] According to a fourteenth aspect, in any one of the first to thirteenth aspects, the heat storage material contains paraffin.

[0033] According to the fourteenth aspect, since paraffin is readily available, facilitates the manufacturing of the heat storage portion, is chemically stable, and is highly safe, the risk is low even if the paraffin leaks outside the heat storage portion.

[0034] According to a fifteenth aspect, in the fourteenth aspect, the heat storage material contains normal paraffin with a carbon number of 21, 22, or 23.

[0035] According to the fifteenth aspect, a situation

where the surface of the flavor inhaler reaches a temperature that may be felt hot for a user can be suppressed, whereby difficult handling caused by high temperature can be prevented.

[0036] According to a sixteenth aspect, in any one of the first to fifteenth aspects, the flavor inhaler further includes a control device and a temperature sensor. The temperature sensor detects a temperature of the heat storage portion. The control device allows the consumable material to be heated only when the temperature of the heat storage portion is lower than or equal to a predetermined temperature or is lower than the predetermined temperature.

[0037] According to the sixteenth aspect, based on the measured temperature of the heat storage portion, the surface of the flavor inhaler can be reliably prevented from reaching a temperature that is excessively hot for the user.

[0038] According to a seventeenth aspect, a flavor inhaling system is provided. This flavor inhaling system includes: a recharger including a holding section holding the flavor inhaler according to any one of the first to sixteenth aspects and a recharging section recharging the flavor inhaler held by the holding section; and the flavor inhaler.

[0039] The seventeenth aspect can provide a rechargeable flavor inhaler that can perform heat storage efficiently in accordance with the layer of the heat storage material and that can efficiently suppress heat transfer from the heating section to the surface of the flavor inhaler.

[0040] According to an eighteenth aspect, in the seventeenth aspect, an area of the recharger that is in contact with the housing of the flavor inhaler has a thermal conductivity of 1 [W/(m·K)] or higher at 25°C.

[0041] According to the eighteenth aspect, heat can be dissipated efficiently from the heat storage material during recharging.

[0042] According to a nineteenth aspect, a smoking system is provided. This smoking system includes: the flavor inhaler according to any one of the first to sixteenth aspects or the flavor inhaling system according to the seventeenth or eighteenth aspect; and a consumable material including a smokable substance.

[0043] The nineteenth aspect can provide a smoking system that can perform heat storage efficiently in accordance with the layer of the heat storage material and that can efficiently suppress heat transfer from the heating section to the surface of the flavor inhaler.

BRIEF DESCRIPTION OF DRAWINGS

[0044]

[Fig. 1] Fig. 1 is a schematic sectional side view of a smoking system according to an embodiment.

[Fig. 2] Fig. 2 is a schematic sectional side view of a

flavor inhaler according to the above embodiment.

[Fig. 3A] Fig. 3A is a side view schematically illustrating an example of a heating section according to the above embodiment.

[Fig. 3B] Fig. 3B is a side view schematically illustrating the heating section inserted in a consumable material.

[Fig. 4] Fig. 4 is a cross-sectional view taken along line A-A in Fig. 2.

[Fig. 5] Fig. 5 is a schematic sectional side view of a smoking system according to a first modification.

[Fig. 6] Fig. 6 is a cross-sectional view taken along line B-B in Fig. 5.

[Fig. 7] Fig. 7 is a schematic sectional side view of a smoking system according to a second modification.

[Fig. 8] Fig. 8 is a schematic sectional side view of a smoking system according to a third modification.

[Fig. 9] Fig. 9 is a schematic sectional side view of a flavor inhaler according to a fifth modification.

DESCRIPTION OF EMBODIMENTS

[0045] An embodiment of the present invention will be described below with reference to the drawings. In the drawings to be described below, identical or equivalent structural elements will be given the same reference signs, and redundant descriptions thereof will be omitted.

[0046] Figs. 1 and 2 are schematic sectional side views of a smoking system 110 and a flavor inhaler 100 according to this embodiment. The smoking system 110 has a consumable material 10 and the flavor inhaler 100 used by a user for inhaling a flavor. The flavor inhaler 100 is preferably a portable device or a handheld device. The flavor inhaler 100 serves as an aerosol generating device that generates an aerosol containing a flavor component by heating. In each of the drawings below, the dimensions of each section have been changed, where appropriate, for a simpler illustration.

[0047] The consumable material 10 has a stopper element 18, a smokable substance 16 to be heated by the flavor inhaler 100, a center hole filter 15, a paper tube 14, and a filter 12. The center hole filter 15 of the consumable material 10 is located between the smokable substance 16 and the paper tube 14. The paper tube 14 may function as a cooler that cools an aerosol or vapor that has travelled through the center hole filter 15. The paper tube 14 may be filled with a material, such as a sheet, for increasing the contact area with the aerosol or the vapor to facilitate cooling. The stopper element 18 is provided at the leading end of the consumable material

10, that is, at a location where the consumable material 10 first comes into contact with a heating section 60, to be described later, when the consumable material 10 is inserted into the flavor inhaler 100. The stopper element 18 has a function for preventing the smokable substance 16 from falling out of the leading end of the consumable material 10, and may be, for example, an acetate filter, a center hole filter, a neo-filter, or a paper filter. The stopper element 18 may have a tubular wrapping sheet and a stopper sheet whose opposite ends are connected to different circumferential positions on the inner surface of the wrapping sheet. The stopper sheet may be a paper sheet whose length between the ends thereof is greater than the diameter of the wrapping sheet.

[0048] The flavor inhaler 100 is configured to heat the smokable substance 16 in a solid or liquid state to atomize the smokable substance 16. For example, the smokable substance 16 serves as a part of the pillar-shaped consumable material 10 extending in the longitudinal direction. The consumable material 10 may be, for example, a tobacco stick in which the smokable substance 16 contains tobacco. The smokable substance 16 included in the consumable material 10 may contain an aerosol source that generates vapor by being heated at a predetermined temperature and that becomes an aerosol as a result of cooling of the vapor. The type of aerosol source is not particularly limited and may be selected from extracts from various natural sources and/or components thereof in accordance with the intended purpose. Examples of the aerosol source include glycerine, propylene glycol, triacetin, 1,3-butanediol, and a mixture thereof. The smokable substance 16 used may be, for example, lamina or midrib tobacco or another known plant. The smokable substance 16, such as tobacco, may be in a shredded form, a sheet-like form, a string-like form, a powder form, a granular form, a pellet-like form, a slurry-like form, or a porous form. The flavor component included in the smokable substance 16 also vaporizes by being heated, and is included in the vapor and the aerosol.

[0049] The flavor inhaler 100 has a battery 23 and a PCB (printed circuit board) 24. The battery 23 stores electric power to be used in the flavor inhaler 100. For example, the battery 23 is a lithium ion battery. In the shown example, the battery 23 is rechargeable by an external power supply, and the flavor inhaler 100 includes a connector 25 having a connectable terminal for recharging. The connector 25 includes an external connection terminal of the flavor inhaler 100 and is electrically connected to the battery 23. The flavor inhaler 100 does not necessarily have to be rechargeable.

[0050] The PCB 24 is constituted of, for example, a CPU and a memory and functions as a control device that controls the operation of the flavor inhaler 100. For example, the PCB 24 starts to heat the smokable substance 16 by controlling the heating section 60 in response to a user operation performed on an input device, such as a push button or a slidable switch (not shown), and termi-

notes the heating of the smokable substance 16 when a certain time period elapses. When the number of puff actions performed by the user exceeds a certain value, the PCB 24 may terminate the heating of the smokable substance 16 even if the certain time period has not elapsed yet after the start of the heating of the smokable substance 16. For example, a puff action is detected by a sensor (not shown).

[0051] Alternatively, the PCB 24 may start heating the smokable substance 16 in accordance with the start of a puff action, and may terminate the heating of the smokable substance 16 in accordance with the end of the puff action. When a certain time period elapses from the start of a puff action, the PCB 24 may terminate the heating of the smokable substance 16 even before the end of the puff action. Any control device other than the PCB may be used so long as each operation of the flavor inhaler 100 can be controlled.

[0052] In the shown example, the flavor inhaler 100 has an insertion end 101 into which the consumable material 10 is inserted, and is configured to receive the consumable material 10 that is stick-shaped. As shown in the drawings, the battery 23 and the PCB 24 may be arranged in the direction in which the consumable material 10 is inserted into the flavor inhaler 100. A circumferential direction and a radial direction in this description refer to the circumferential direction and the radial direction centered on an axis (e.g., a central axis AX) in the insertion direction of the consumable material 10 or the longitudinal direction of the flavor inhaler 100.

[0053] The flavor inhaler 100 has a housing 30, a receptacle 42, the heating section 60, and a cap 80. The heating section 60 is configured to heat the smokable substance 16. In detail, for example, the heating section 60 has a shape that is insertable into the smokable substance 16 and is configured to heat the smokable substance 16 from the inside. In more detail, as in the shown example, the heating section 60 may be a rod-shaped heater that is inserted into the smokable substance 16. The heating section 60 is disposed within the receptacle 42, so that the smokable substance 16 accommodated in the receptacle 42 can be heated efficiently.

[0054] The heating section 60 is disposed along the central axis AX, extending in the longitudinal direction of the flavor inhaler 100, of the housing 30. The heating section 60 is supported by a base 50 at the opposite side of an opening 81, into which the consumable material 10 is inserted along the central axis AX, with reference to the receptacle 42. The base 50 is attached to the housing 30. The heating section 60 may be secured to the housing 30 in this manner. In each drawing below, hatching has been appropriately omitted from each of the consumable material 10, the heating section 60, the base 50, the battery 23, and the PCB 24.

[0055] The heating section 60 is preferably a heater, particularly, a pin heater from the standpoint of facilitating the insertion into the consumable material 10. The pin

heater serving as the heating section 60 may have, for example, a circular cylindrical shape. The shape of a cross section orthogonal to the insertion direction of the pin heater does not have to be a perfect circle and may be, for example, an ellipse. Although the shape of the pin heater in the cross section orthogonal to the insertion direction of the consumable material 10 may be rectangular, a circular shape or an elliptic shape is preferable from the standpoint of reducing the resistance when the heating section 60 is inserted into the consumable material 10.

[0056] The heating section 60 has a resistance heater 68 (Fig. 3A) to be described later. The resistance heater 68 is supplied with electric power from the battery 23. In detail, the heating section 60 is provided with a lead wire 66, and may be electrically connected to the PCB 24 and/or the battery 23 via the lead wire 66. The flavor inhaler 100 may have an induction coil that inductively heats the heating section 60. In this case, the heating section 60 may be inductively heated by the induction coil as a susceptor. In detail, the heating section 60 is inserted into the smokable substance 16 and is inductively heated by the induction coil (not shown), whereby the smokable substance 16 is heated. If the flavor inhaler 100 has the induction coil, at least one of the housing 30, the receptacle 42, and the cap 80 preferably has magnetic permeability and non-conductive properties (electrical insulation properties). Accordingly, at least one of the housing 30, the receptacle 42, and the cap 80 is less likely to produce heat in accordance with the induction coil, so that the heating section 60 can be caused to produce heat efficiently. Examples of a material having magnetic permeability and non-conductive properties (electrical insulation properties) include glass, a plant, wood, paper, and resin, such as PEEK. The induction coil may be, for example, a flat coil or a cylindrical coil. The induction coil may be provided at the opposite side of the consumable material 10 via a bottom wall 44, to be described later, of the receptacle 42 or to surround a receptacle sidewall 43, to be described later, of the receptacle 42 in a state where the consumable material 10 is positionally set at a desired position within the receptacle 42. For inductively heating the heating section 60, the heating section 60 may be preliminarily installed within the consumable material 10, and the heating section 60 may be accommodated together with the consumable material 10 within the receptacle 42. Accordingly, the heating section 60 does not necessarily have to be disposed in the receptacle 42 in advance so long as the consumable material 10 can be heated by the receptacle 42.

[0057] Fig. 3A is a side view schematically illustrating an example of the heating section 60 according to this embodiment. Fig. 3B is a side view schematically illustrating the heating section 60 inserted in the consumable material 10. The heating section 60 has a heat generating section 69A, a non-heat-generating section 69B, and a tapered section 69C. The heat generating section 69A is disposed inside the receptacle 42. The heat generating

section 69A and the non-heat-generating section 69B are arranged in the insertion direction (i.e., the longitudinal direction of the heating section 60). In detail, for example, the heat generating section 69A corresponds to an area of the heating section 60 where the resistance heater 68 is disposed, and the non-heat-generating section 69B corresponds to an area where the lead wire 66 (i.e., a conductor area with lower resistance than the resistance heater 68) connected to the resistance heater 68 is disposed.

[0058] The heat generating section 69A is preferably located toward the leading end of the heating section 60 relative to the non-heat-generating section 69B. Accordingly, in the longitudinal direction (i.e., the insertion direction of the heating section 60) of the flavor inhaler 100, the non-heat-generating section 69B and the heat generating section 69A can be positioned to overlap the stopper element 18 and the smokable substance 16, respectively. In the heating section 60, the tapered section 69C provided at the leading end of the heat generating section 69A has a protruding shape whose diameter decreases toward the tip thereof, so that the heating section 60 can be readily inserted into the consumable material 10.

[0059] The heating section 60 includes a substrate 65, a cover 67, and the resistance heater 68. The substrate 65 is disposed throughout the heat generating section 69A along an inner side surface of the cover 67 (and is schematically indicated by a single-dot chain line in Fig. 3B). For example, the resistance heater 68 may be disposed at the outer peripheral surface of the substrate 65, and the cover 67 may be disposed to cover the outer surface of the resistance heater 68. Accordingly, the resistance heater 68 does not directly come into contact with the smokable substance 16, so that, for example, contamination of the resistance heater 68 by the smokable substance 16 and physical damage to the resistance heater 68 can be suppressed. The resistance heater 68 is not particularly limited in terms of configuration so long as it produces heat as a result of electric current flowing through a resistor, and may be an electric heating wire, such as a heating track.

[0060] The substrate 65 is an electrical insulation substrate having electrical insulation properties. The resistance heater 68 may be selectively heated in accordance with the electrical insulation properties of the substrate 65. In the example according to this embodiment, the substrate 65 has a cylindrical shape around the central axis Ax (Fig. 2) of the housing 30. The substrate 65 is a cylindrical member around the central axis Ax. The substrate 65 and the cover 67 including the tapered section 69C are not limited in terms of material so long as they are resistant to the heat of the resistance heater 68 and have electrical insulation properties. The substrate 65 and the cover 67 may be composed of, for example, an easily processable ceramic material or metal, such as stainless steel, or a material with low heat conductivity (e.g., resin material). The substrate 65 preferably includes a ceramic

material from the standpoint of facilitating processing.

[0061] As shown in Fig. 3B, in this embodiment, the flavor inhaler 100 is configured such that a gap S2 is formed between the substrate 65 and the stopper element 18 when the heating section 60 is inserted into the smokable substance 16. Accordingly, the heating section 60 is at least partially separated from the stopper element 18, so that heat transfer to the stopper element 18 can be suppressed while the smokable substance 16 is heated by the heating section 60. Thus, melting of or damage to the stopper element 18 can be suppressed, and heat loss caused by heat transfer to the stopper element 18 can also be suppressed. The heating section 60 may include a wall having a circular conical shape that is formed around the non-heat-generating section 69B and that widens toward the base. In this case, the gap between the wall and the substrate 65 widens, so that the heat transfer to the stopper element 18 can be further suppressed. The gap S2 does not have to be provided if the heat transfer from the substrate 65 to the stopper element 18 is within a permissible range.

[0062] The heating section 60 in the shown example is formed as follows. The resistance heater 68 is formed on the outer surface of the substrate 65, and the cover 67 formed integrally with the tapered section 69C is disposed on the outer surface of the resistance heater 68. The substrate 65, the resistance heater 68, the tapered section 69C, and the cover 67 are sintered, whereby the heating section 60 as a single unit is formed.

[0063] Referring back to Fig. 1, the receptacle 42 may entirely be tubular, and is configured to accommodate at least the smokable substance 16 of the consumable material 10. In the shown example, the receptacle 42 has the tubular receptacle sidewall 43 and the bottom wall 44. The receptacle sidewall 43 surrounds the smokable substance 16 and the stopper element 18 of the consumable material 10 positionally set at the desired position within the receptacle 42. The bottom wall 44 is provided with an opening 44A, and the heating section 60 extends through the opening 44A.

[0064] It is preferable that a gap C1 is provided along the entire circumference between the smokable substance 16 of the consumable material 10 accommodated in the receptacle 42 and the receptacle sidewall 43. Accordingly, heat transfer from the heating section 60 and the heated consumable material 10 to the receptacle 42 and the housing 30 may be suppressed, as compared with a case where the side surface of the consumable material 10 is in contact with the receptacle 42. As a result, a temperature increase of the surface of the flavor inhaler 100 can be reduced, and surrendering of heat from the smokable substance 16 to the receptacle 42 can be reduced.

[0065] The housing 30 is provided to surround at least the outer periphery of the receptacle 42. As shown in Fig. 1, the housing 30 has an air inlet 32 and an end 38. The end 38 is provided with an opening in which the cap 80 is disposed.

[0066] The air inlet 32 allows the receptacle 42 to communicate with the outside of the flavor inhaler 100. During inhalation by the user, air flowing in through the air inlet 32 travels through the smokable substance 16 and flows into the center hole filter 15. In the shown example, the air inlet 32 is provided closer toward the cap relative to a heat storage portion 70, to be described later, and is configured such that the air flowing in through the air inlet 32 flows through the gap C1 in the insertion direction of the consumable material 10 and flows into the center hole filter 15 via the smokable substance 16. Accordingly, heat transfer from the heating section 60 to the receptacle 42 and the surface of the flavor inhaler 100 is suppressed. The air inlet 32 is not particularly limited in terms of position so long as it allows the receptacle 42 to communicate with the outside of the flavor inhaler 100.

[0067] The end 38 serves as one end of the housing 30. When the flavor inhaler 100 is assembled, the receptacle 42 and the cap 80 are inserted through the end 38. In detail, the cap 80 may be detachably attached to the housing 30. The cap 80 may be integrated with the housing 30 to serve as a part of the housing 30. The cap 80 has the opening 81 for inserting the consumable material 10.

[0068] The flavor inhaler 100 includes the heat storage portion 70. The heat storage portion 70 includes a heat storage material 71 and a heat-storage-material receptacle 72 that accommodates the heat storage material 71. The heat-storage-material receptacle 72 includes an inner support member 721, an outer support member 722, and connection members 723 and 724. The heat storage portion 70 stores the heat from the heating section 60 and suppresses a temperature increase of, for example, the surface of the flavor inhaler 100.

[0069] Fig. 4 is a cross-sectional view taken along line A-A in Fig. 2 and illustrates an end surface orthogonal to the longitudinal direction of the flavor inhaler 100. The heat storage portion 70 is disposed between the housing 30 and the receptacle 42. In the flavor inhaler 100, the heating section 60, the receptacle sidewall 43, the heat storage portion 70, and the housing 30 are disposed in this order in the radial direction from the central axis AX. In the shown example, the outer wall of the heating section 60, the receptacle sidewall 43, the inner support member 721, the heat storage material 71, the outer support member 722, and the housing 30 form a cylindrical shape around the central axis AX. However, the shape of the heating section 60, the receptacle sidewall 43, the inner support member 721, the heat storage material 71, the outer support member 722, and the housing 30 is not particularly limited so long as the heat storage material 71 is disposed between the receptacle 42 and the housing 30.

[0070] The inner support member 721 is disposed at the receptacle 42 side of the heat storage portion 70, that is, at the inner side of the heat storage material 71, and supports the heat storage material 71. The outer support member 722 is disposed at the housing 30 side of the

heat storage portion 70, that is, at the outer side of the heat storage material 71, and supports the heat storage material 71. The connection member 723 (Fig. 1) is disposed at the cap 80 side of the heat storage portion 70 and connects the inner support member 721 and the outer support member 722 to each other while retaining the heat storage material 71 in the receptacle 42. The connection member 724 is disposed at the base 50 side of the heat storage portion 70 and connects the inner support member 721 and the outer support member 722 to each other while retaining the heat storage material 71 in the receptacle 42.

[0071] The heat storage material 71 is disposed in a space located inside the heat-storage-material receptacle 72 and defined by the inner support member 721 and the outer support member 722. This space will be referred to as an internal space. The shape of the heat-storage-material receptacle 72 is not particularly limited so long as the heat storage material 71 is disposed between the inner support member 721 and the outer support member 722. The internal space is a space surrounded by the inner support member 721, the outer support member 722, and another wall. In the shown example, the internal space is a space surrounded by the inner support member 721, the outer support member 722, and the connection members 723 and 724. The internal space may be closed by the inner support member 721, the outer support member 722, and the connection members 723 and 724 such that the heat storage material 71 does not leak out. In detail, the internal space is preferably sealed by the inner support member 721, the outer support member 722, and the connection members 723 and 724.

[0072] In the heat-storage-material receptacle 72, a layer of the heat storage material 71 is preferably disposed between the inner support member 721 and the outer support member 722. Accordingly, a larger amount of the heat storage material 71 can be injected into the heat storage portion 70, as compared with a case where the heat storage material 71 is distributively disposed in, for example, a porous body, whereby heat storage can be performed efficiently. From a similar standpoint, the amount of the heat storage material 71 injected exceeds 20% of the volume of the internal space, preferably 40% thereof, and more preferably 60% thereof. The layer of the heat storage material 71 is in contact with the inner support member 721 and the outer support member 722.

[0073] From the standpoint of suppressing a situation where the temperature of the surface of the flavor inhaler 100 increases to a temperature that may be felt hot for the user, the heat storage material 71 preferably undergoes a phase transition at a temperature between 40°C and 50°C. During the phase transition, the heat storage material 71 stores heat while maintaining the temperature, so that a temperature increase in the housing 30 is suppressed. In order to suppress, for example, damage to the heat-storage-material receptacle 72 with a small volume change, the heat storage material 71 preferably

undergoes a phase transition between solid and liquid states. The heat storage material 71 preferably contains paraffin, which is alkane with a carbon number of 20 or greater. Since paraffin is readily available, facilitates the manufacturing of the heat storage material 71, is chemically stable, and is highly safe, the risk is low even if the paraffin leaks outside the heat-storage-material receptacle 72. From the standpoint of suppressing a situation where the temperature increases to a temperature that may be felt hot for the user, the heat storage material 71 more preferably contains normal paraffin with a carbon number of 21, 22, or 23 in view of the melting point.

[0074] It is desirable that the heat storage portion 70 suppresses heat transfer from the heating section 60 to the surface of the flavor inhaler 100 and efficiently dissipates the heat stored in the heat storage material 71 after the end of heating. From this standpoint, it is preferable that the thermal conductivity of the inner support member 721 is lower than the thermal conductivity of the outer support member 722.

[0075] From the standpoint of suppressing heat transfer from the heating section 60 to the flavor inhaler 100, the thermal conductivity of the inner support member 721 at 25°C is preferably 0.3 [W/(m·K)] or lower. Alternatively, the inner support member 721 preferably contains a material with a thermal conductivity of 0.3 [W/(m·K)] or lower at 25°C.

[0076] After the end of heating, the thermal conductivity of the outer support member 722 at 25°C is preferably 1.0 [W/(m·K)] or higher from the standpoint of efficiently dissipating the heat stored in the heat storage material 71. Alternatively, the outer support member 722 preferably contains a material with a thermal conductivity of 1.0 [W/(m·K)] or higher at 25°C.

[0077] The heat-storage-material receptacle 72 may be composed of metal, such as stainless steel, a ceramic material, or a resin material from the standpoint of facilitating processing. The inner support member 721 preferably contains resin from the standpoint of, for example, low thermal conductivity or low electrical conductivity. The outer support member 722 preferably contains metal from the standpoint of high thermal conductivity or high strength. Accordingly, the inner support member 721 and the outer support member 722 may be composed of different materials. Consequently, the properties of the heat storage portion 70 can be flexibly adjusted. From the standpoint of performing heat dissipation efficiently, the outer support member 722 is preferably in contact with the housing 30.

[0078] As shown in Figs. 2 and 4, the outer support member 722 is preferably a metal pipe extending along the central axis AX of the housing 30. Accordingly, heat can be dissipated efficiently in the longitudinal direction of the flavor inhaler 100. In addition, a more compact flavor inhaler 100 can be provided, as compared with a case where a member for heat dissipation is provided at the outer side of the outer support member 722.

[0079] For example, the heat storage portion 70 is

formed as follows. The inner support member 721, the outer support member 722, and the connection member 724 are joined by bonding or sintering, thereby forming an assembly. After being turned into a liquid by being heated, the heat storage material 71 is injected into this assembly. The assembly injected with the heat storage material 71 is joined to the connection member 723 by bonding or sintering, whereby the heat storage portion 70 is obtained. At least one of the inner support member 721, the outer support member 722, and the connection members 723 and 724 may be integrally formed by forming, for example, a recess corresponding to the internal space in metal. The manufacturing method of the heat storage portion 70 is not particularly limited so long as the heat-storage-material receptacle 72 can be formed without causing the heat storage material 71 to leak.

[0080] In the flavor inhaler 100 and the smoking system 110 according to this embodiment, the flavor inhaler 100 includes the heating section 60, the housing 30, the receptacle 42 disposed inside the housing 30 and accommodating the consumable material 10 including the smokable substance 16, and the heat storage portion 70 disposed between the housing 30 and the receptacle 42 and including the heat storage material 71. The heat storage portion 70 includes the inner support member 721 disposed toward the receptacle and the outer support member 722 disposed toward the housing, and the layer of the heat storage material 71 is disposed between the inner support member 721 and the outer support member 722. Accordingly, the layer of the heat storage material 71 can efficiently store heat, and heat transfer from the heating section 60 to the surface of the flavor inhaler 100 can be efficiently suppressed.

[0081] Each of the following modifications is also within the scope of the present invention and may be combined with the above embodiment or another modification. In each of the following modifications, sections indicating similar structures and functions as those in the above embodiment are referred to using the same reference signs, and descriptions thereof will be omitted, where appropriate.

(First Modification)

[0082] In the above embodiment, the heat storage portion may be in contact with a heat diffuser. Accordingly, heat can be dissipated efficiently from the heat storage material via the heat diffuser after the end of heating.

[0083] Fig. 5 is a schematic sectional side view of a smoking system 110A according to this modification. Fig. 6 is a cross-sectional view taken along line B-B in Fig. 5 and illustrates an end surface orthogonal to the longitudinal direction of the smoking system 110A. The smoking system 110A according to this modification includes a flavor inhaler 100A. The flavor inhaler 100A has a configuration substantially similar to that of the flavor inhaler 100 according to the above embodiment, but differs from

the flavor inhaler 100 in that the flavor inhaler 100A includes a heat diffuser 74.

[0084] The heat diffuser 74 is in contact with the outer support member 722 and is configured to diffuse heat of the heat storage material 71 via the outer support member 722. The heat diffuser 74 is disposed between the outer support member 722 and the housing 30. The heat diffuser 74 is preferably configured to diffuse heat by also being in contact with the housing 30. In the shown example, the heat diffuser 74 is a cylindrical member extending along the central axis AX and extends toward the base 50 in the longitudinal direction of the flavor inhaler 100. In the shown example, the heat diffuser 74 extends to a lateral side of the battery 23. Although the heat diffuser 74 is preferably longer than the outer support member 722 in the longitudinal direction in this manner, the length of the heat diffuser 74 is not particularly limited. By extending long in the longitudinal direction in this manner, the heat diffuser 74 can diffuse heat more efficiently. The heat diffuser 74 preferably has higher thermal conductivity than the housing 30. From the standpoint of high thermal conductivity, the heat diffuser 74 is preferably composed of metal, such as aluminum. The base 50 may extend through the heat diffuser 74 and be attached to the housing 30, or may be attached to the heat diffuser 74. The heat diffuser 74 is not particularly limited in terms of position and shape so long as it is in contact with the outer support member 722 and can diffuse heat.

[0085] The flavor inhaler 100A according to this modification further includes the heat diffuser 74 that is disposed inside the housing 30, has higher thermal conductivity than the housing 30, and is in contact with the outer support member 722. Accordingly, after the end of heating, heat can be dissipated more efficiently from the heat storage material 71 via the heat diffuser 74.

(Second Modification)

[0086] In the above embodiment, the inner support member may be disposed integrally with the receptacle sidewall serving as an outer wall of the receptacle. Accordingly, the receptacle sidewall also functions as the inner support member, so that the flavor inhaler can be made compact.

[0087] Fig. 7 is a schematic sectional side view of a smoking system 110B according to this embodiment. The smoking system 110B includes a flavor inhaler 100B. The flavor inhaler 100B has a configuration substantially similar to that of the flavor inhaler 100A according to the first modification described above, but differs from the flavor inhaler 100A in that the flavor inhaler 100B includes a receptacle 42A in place of the receptacle 42 and the inner support member 721, as well as a heat diffuser 74A in place of the heat diffuser 74 and the outer support member 722.

[0088] The receptacle 42A includes a receptacle sidewall 43A. In addition to accommodating the consumable material 10 within the receptacle sidewall 43A, the re-

ceptacle sidewall 43A also supports the heat storage material 71 at the outer side surface to also function as the inner support member 721. From the standpoint of suppressing heat transfer from the heating section 60, the receptacle sidewall 43A preferably contains a material, such as resin, with low thermal conductivity. However, the material used for forming the receptacle sidewall 43A is not particularly limited so long as it can resist heat during inhalation, can accommodate the consumable material 10, and can support the heat storage material 71.

[0089] In addition to extending along the flavor inhaler 100B and diffusing heat from the heat storage material 71, the heat diffuser 74A supports the heat storage material 71 at the inner side surface to also function as the outer support member 722. From the standpoint of efficiently diffusing the heat from the heat storage material 71 after the end of heating, the heat diffuser 74A preferably contains metal with high thermal conductivity, such as aluminum, or carbon fiber, but is not limited thereto. Because the heat diffuser 74A also functions as the outer support member 722 in this manner, the flavor inhaler 100B can be made compact. As an alternative to this modification in which the receptacle 42A also functions as the inner support member 721 and the heat diffuser 74A also functions as the outer support member 722 so that the flavor inhaler 100B is made more compact than in a case where either of the two is applied, only one of the two may be applied.

(Third Modification)

[0090] In the above embodiment, the smoking system may further include a recharger.

[0091] Fig. 8 schematically illustrates the configuration of a smoking system 110C according to this modification. The smoking system 110C includes the consumable material 10 and a flavor inhaling system 120. The flavor inhaling system 120 includes the flavor inhaler 100 according to the above embodiment and a recharger 200. The recharger 200 includes a recharging section 210 and a holding section 220.

[0092] The recharging section 210 includes a terminal electrically connectable to the connector 25 of the flavor inhaler 100. The terminal is connected to an adaptor (not shown) of the recharger 200. The recharging section 210 supplies electric power to the battery 23.

[0093] The holding section 220 holds the flavor inhaler 100 while being in contact therewith. In the shown example, the holding section 220 is in contact with the housing 30 via a surface S1 located toward the flavor inhaler. The holding section 220 is preferably in contact with a surface of the flavor inhaler 100, particularly, a surface of the housing 30 located at a position facing the outer support member 722. The holding section 220 dissipates heat from the heat storage material 71 while holding the flavor inhaler 100 during recharging. From the standpoint of performing heat dissipation efficiently, the

holding section 220 is preferably composed of metal with high thermal conductivity, such as aluminum. The thermal conductivity of the holding section 220 at 25°C is preferably 1 [W/(m·K)] or higher. Alternatively, the holding section 220 preferably contains a material with a thermal conductivity of 1 [W/(m·K)] or higher at 25°C.

[0094] The flavor inhaling system 120 according to this modification includes the recharger 200 equipped with the holding section 220 for holding the flavor inhaler 100 and the recharging section 210 for recharging the flavor inhaler 100 held by the holding section 220, and also includes the flavor inhaler 100. Accordingly, a flavor inhaling system including the rechargeable flavor inhaler 100 in which heat transfer from the heating section 60 to the surface of the flavor inhaler 100 can be efficiently suppressed can be provided.

[0095] In the flavor inhaling system 120 according to this modification, the thermal conductivity of the holding section 220 serving as an area that is in contact with the housing 30 of the flavor inhaler 100 can be set to 1 or higher at 25°C. Accordingly, the user can efficiently perform recharging and heat dissipation from the heat storage material 71 at the same time. The recharging section 210 and the holding section 220 are not particularly limited in terms of position and shape so long as an area of the flavor inhaler 100 where the temperature increases during heating is in contact with the holding section 220.

(Fourth Modification)

[0096] In the above embodiment, when a predetermined number of units of consumable material 10 are successively heated, the PCB 24 serving as a control device of the flavor inhaler 100 may perform control to not allow heating of the flavor inhaler 100 for a predetermined time period. The expression "units of consumable material 10 are successively heated" implies that a time period (referred to as "smoking interval" hereinafter) from the end of heating of a first unit of consumable material 10 to the start of heating of a second unit of consumable material 10 is shorter than or equal to a predetermined time period. This predetermined time period may be set to, for example, 1 minute. Alternatively, the expression implies that the total smoking interval for the aforementioned predetermined number of units of consumable material 10 is shorter than or equal to a predetermined time period. This predetermined time period may be set to, for example, 3 minutes. The PCB 24 stores an integer value. While the units of consumable material 10 are being successively heated, the PCB 24 increments the integer value by 1 every time one unit of consumable material 10 is heated. If the added integer value exceeds the predetermined number of units of consumable material 10, the PCB 24 controls the heating section 60 so as not to perform heating. By performing control in this manner, the surface of the flavor inhaler 100 can be prevented from becoming excessively hot due to continuous inhalation.

[0097] The aforementioned predetermined number of units may be five or fewer, and is preferably five. The aforementioned predetermined number of units is preferably set in accordance with the amount of the heat storage material 71 of the heat storage portion 70. The aforementioned predetermined number of units may be set to a larger value as the amount of heat storage material 71 increases. Alternatively, the amount of heat storage material 71 is preferably set in accordance with the aforementioned predetermined number of units to be set. Accordingly, a compact flavor inhaler 100 can be provided with a reduced amount of heat storage material 71 required, while the surface of the flavor inhaler 100 can be prevented from reaching a temperature that may be felt hot for the user in accordance with control. The aforementioned predetermined time period may be appropriately set based on, for example, a time period required for heat dissipation.

(Fifth Modification)

[0098] In the above embodiment, the flavor inhaler 100 may have a temperature sensor for monitoring the temperature of the heat storage portion 70.

[0099] Fig. 9 is a schematic sectional side view of a flavor inhaler 100C according to this modification. The flavor inhaler 100C includes a temperature sensor 300. Temperature-related information or detection signal obtained as a result of detection by the temperature sensor 300 is input to the PCB 24 serving as a control device of the flavor inhaler 100C. The PCB 24 can control heating of the consumable material 10 in accordance with the temperature of the heat storage portion 70 detected by the temperature sensor 300. For example, the PCB 24 performs control to allow the flavor inhaler 100C to start heating the consumable material 10 only if the temperature sensor 300 detects that the temperature of the heat storage portion 70 is lower than or equal to a first predetermined temperature or is lower than the first temperature. By performing the control in this manner, the surface of the flavor inhaler 100C can be more reliably prevented from becoming excessively hot due to continuous usage, and the first temperature is appropriately set from this standpoint. When the temperature sensor 300 detects that the heat storage portion 70 has reached an operating point, the PCB 24 performs control to allow the flavor inhaler 100C to start heating the consumable material 10 only if the temperature sensor 300 detects that the temperature of the heat storage portion 70 is lower than or equal to a second temperature, which is lower than the first temperature, or is lower than the second temperature. By performing the control in this manner, heat can be reliably dissipated from the heat storage portion 70, and the number of units of consumable material 10 that can be smoked successively by using the flavor inhaler 100C can be recovered. The second temperature is appropriately set from this standpoint. The PCB 24 can correct a temperature-related value obtained

as a result of detection by the temperature sensor 300 by using preliminarily-stored data based on a theoretical value or an experimental value. Therefore, if the temperature of the heat storage portion 70 can be estimated by the PCB 24 using this correction, the temperature sensor 300 can be installed at any location of the flavor inhaler 100C.

[0100] The flavor inhaler 100C according to this modification includes the PCB 24 and the temperature sensor 300. The temperature sensor 300 detects the temperature of the heat storage portion 70. The PCB 24 may be configured to allow the consumable material 10 to be heated only if the temperature of the heat storage portion 70 is lower than or equal to a predetermined temperature or is lower than the predetermined temperature. Accordingly, the surface of the flavor inhaler 100C can be more reliably prevented from becoming hot.

[0101] Although the embodiment of the present invention has been described above, the present invention is not limited to the above embodiment, and various modifications are permissible within the technical scope defined in the claims, the description, and the drawings. Any shape or material not directly mentioned in the description and the drawings is within the technical scope of the present invention so long as it exhibits the function and the effect of the present invention.

REFERENCE SIGNS LIST

[0102]

10 consumable material
16 smokable substance
23 battery
24 PCB
25 connector
30 housing
32 air inlet
42 receptacle
43, 43A receptacle sidewall
50 base
60 heating section
65 substrate
67 cover
68 resistance heater
69A heat generating section
69B non-heat-generating section
69C tapered section
70 heat storage portion
71 heat storage body
72 heat-storage-material receptacle
74, 74A heat diffuser
100, 100A, 100B flavor inhaler
110, 110A, 110B, 110C smoking system
120 flavor inhaling system
200 recharger
210 recharging section
220 holding section

300 temperature sensor
721 inner support member
722 outer support member
723, 724 connection member
Ax central axis of housing
C1 gap

Claims

1. A flavor inhaler comprising:

a housing;
a receptacle that is disposed inside the housing, accommodates a consumable material including a smokable substance, and heats the consumable material by using a heating section; and
a heat storage portion that is disposed between the housing and the receptacle and that includes a heat storage material,
wherein the heat storage portion comprises an inner support member disposed toward the receptacle and an outer support member disposed toward the housing, and
wherein a layer of the heat storage material is disposed between the inner support member and the outer support member.

2. The flavor inhaler according to claim 1, wherein the heat storage portion is filled with the heat storage material exceeding 20% of a volume of a space defined by the inner support member and the outer support member.

3. The flavor inhaler according to claim 1 or 2, wherein a thermal conductivity of the inner support member is lower than a thermal conductivity of the outer support member.

4. The flavor inhaler according to any one of claims 1 to 3, wherein a thermal conductivity of the inner support member at 25°C is 0.3 [W/(m·K)] or lower.

5. The flavor inhaler according to any one of claims 1 to 4, wherein a thermal conductivity of the outer support member at 25°C is 1.0 [W/(m·K)] or higher.

6. The flavor inhaler according to any one of claims 1 to 5, wherein the inner support member contains resin.

7. The flavor inhaler according to any one of claims 1 to 6, wherein the inner support member is disposed integrally with an outer wall of the receptacle.

8. The flavor inhaler according to any one of claims 1 to 7, wherein the outer support member contains metal.

9. The flavor inhaler according to claim 8, wherein the outer support member is a metal pipe extending along a central axis of the housing.
10. The flavor inhaler according to any one of claims 1 to 9, wherein the outer support member is disposed in contact with an inner side surface of the housing. 5
11. The flavor inhaler according to any one of claims 1 to 10, further comprising a heat diffuser that is disposed inside the housing, has a higher thermal conductivity than the housing, and is in contact with the outer support member. 10
12. The flavor inhaler according to any one of claims 1 to 11, 15
- wherein the flavor inhaler comprises the heating section, and
- wherein the heating section is disposed within the receptacle. 20
13. The flavor inhaler according to any one of claims 1 to 12, wherein the heat storage material undergoes a phase transition at a temperature between 40°C and 50°C. 25
14. The flavor inhaler according to any one of claims 1 to 13, wherein the heat storage material contains paraffin. 30
15. The flavor inhaler according to claim 14, wherein the heat storage material contains normal paraffin with a carbon number of 21, 22, or 23. 35
16. The flavor inhaler according to any one of claims 1 to 15, further comprising:
- a control device and a temperature sensor, wherein the temperature sensor detects a temperature of the heat storage portion, and 40
- wherein the control device allows the consumable material to be heated only when the temperature of the heat storage portion is lower than or equal to a predetermined temperature or is lower than the predetermined temperature. 45
17. A flavor inhaling system comprising:
- a recharger comprising a holding section and a recharging section, the holding section holding the flavor inhaler according to any one of claims 1 to 16, the recharging section recharging the flavor inhaler held by the holding section; and the flavor inhaler. 50 55
18. The flavor inhaling system according to claim 17, wherein an area of the recharger that is in contact

with the housing of the flavor inhaler has a thermal conductivity of 1 [W/(m·K)] or higher at 25°C.

19. A smoking system comprising:

the flavor inhaler according to any one of claims 1 to 16 or the flavor inhaling system according to claim 17 or 18; and
a consumable material including a smokable substance.

Fig. 1

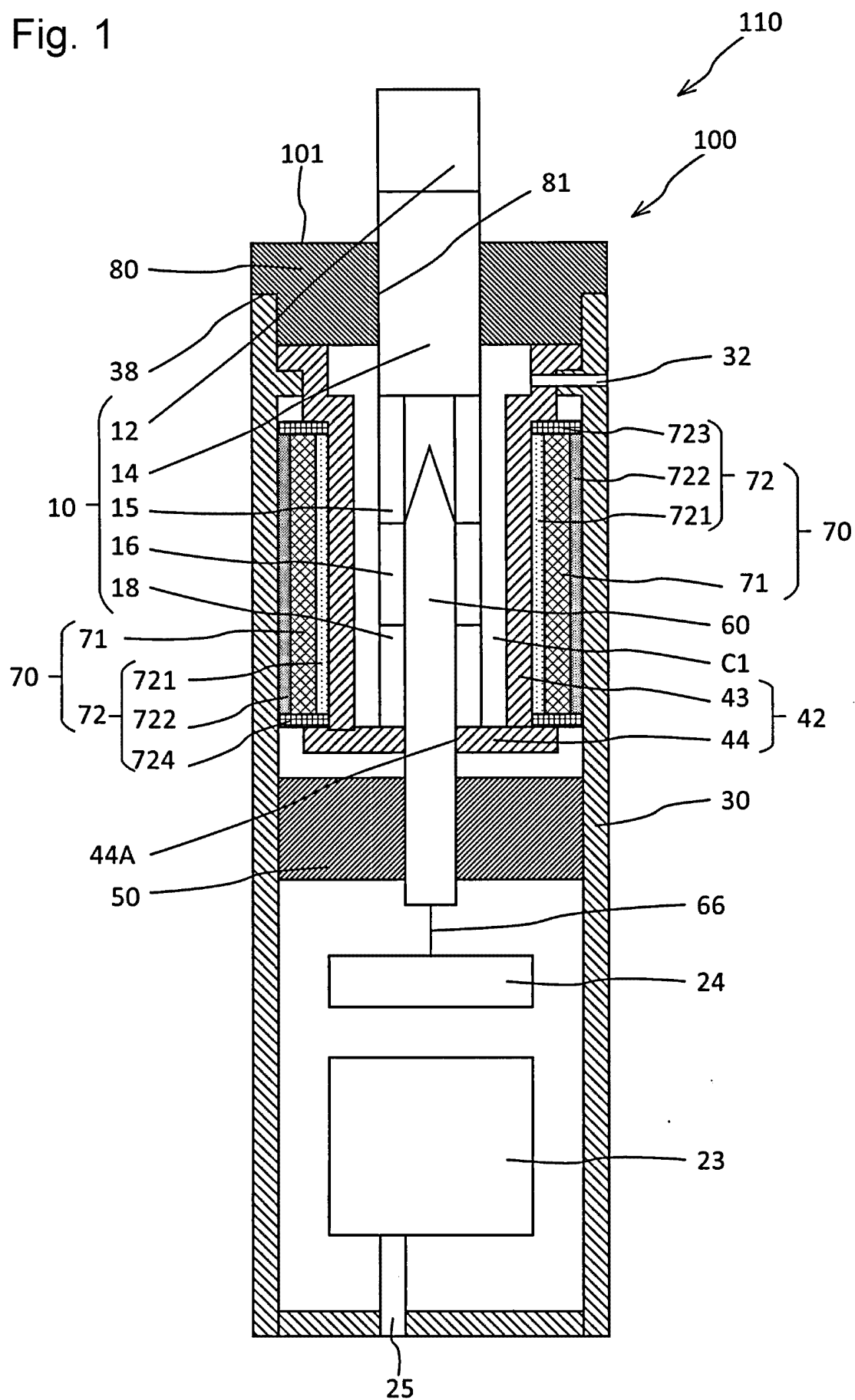


Fig. 2

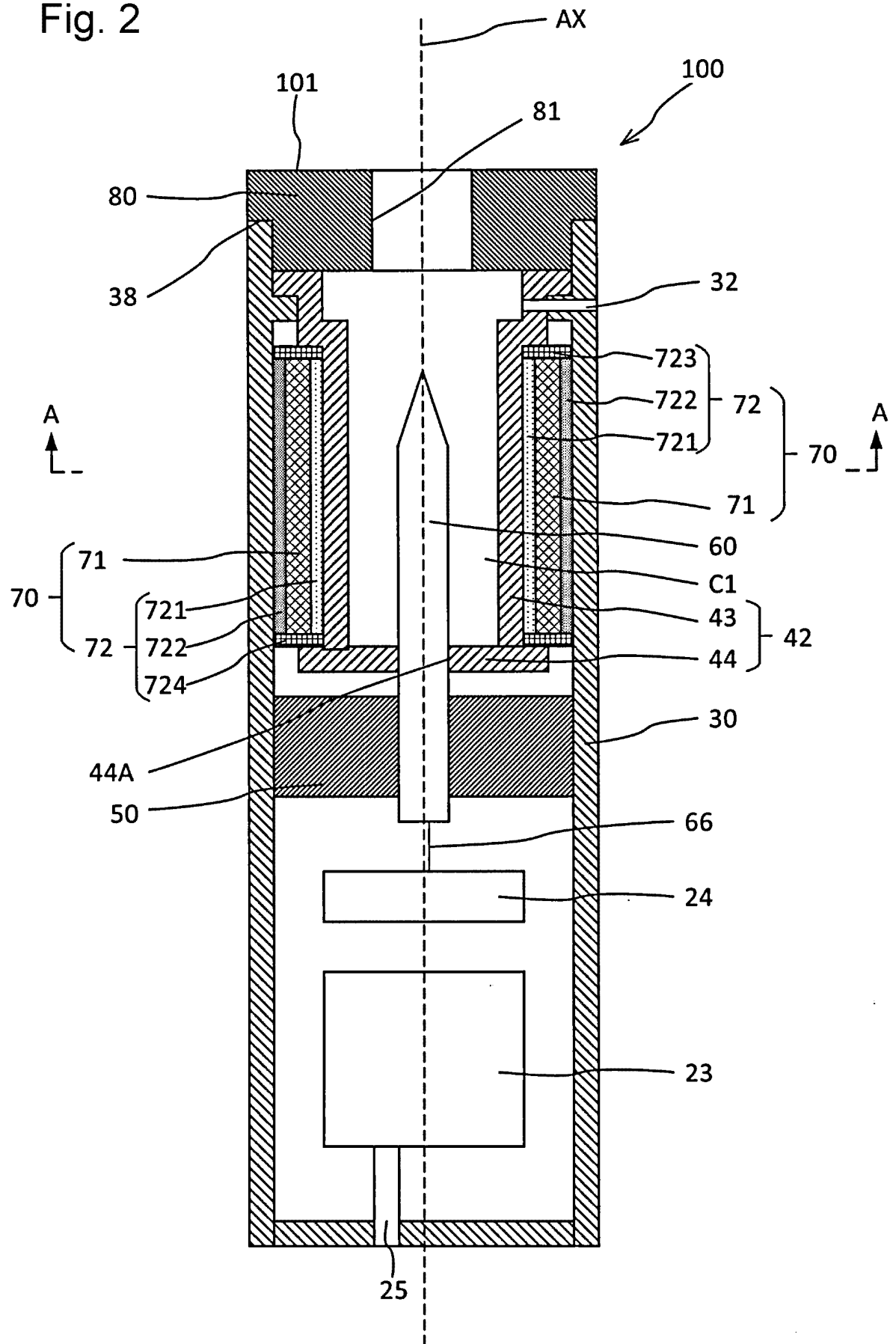


Fig. 3A

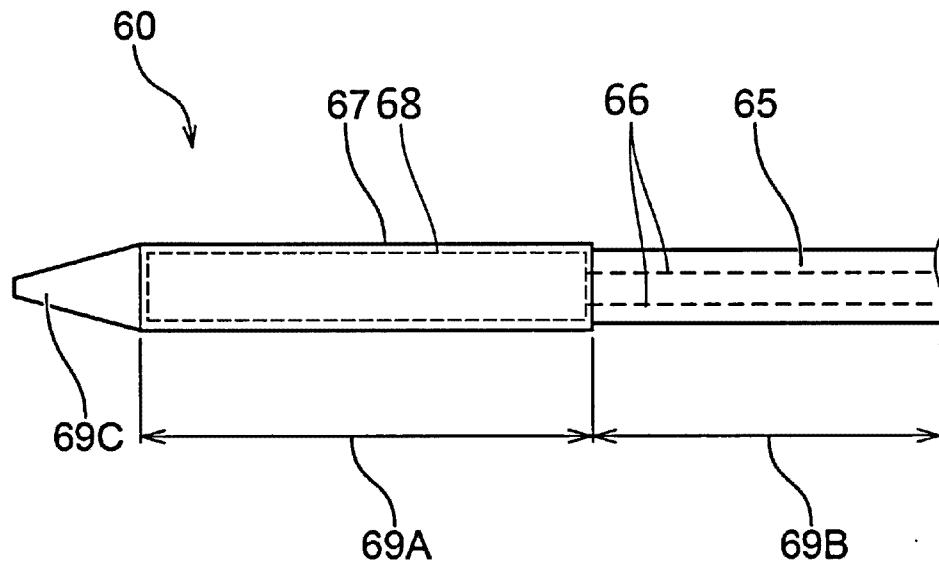


Fig. 3B

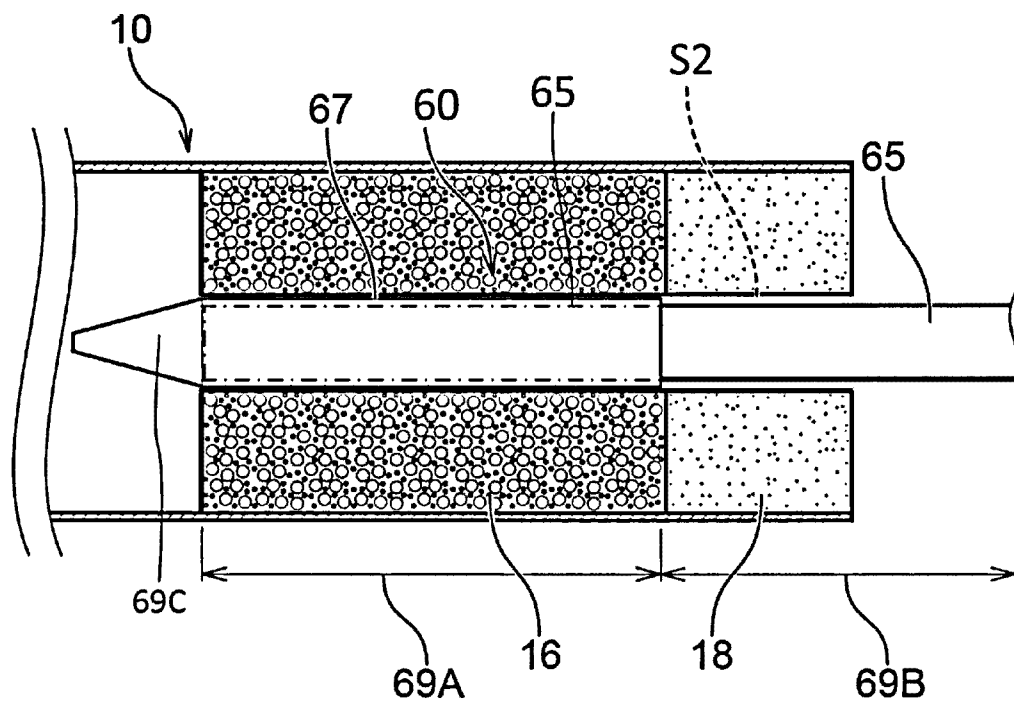


Fig. 4

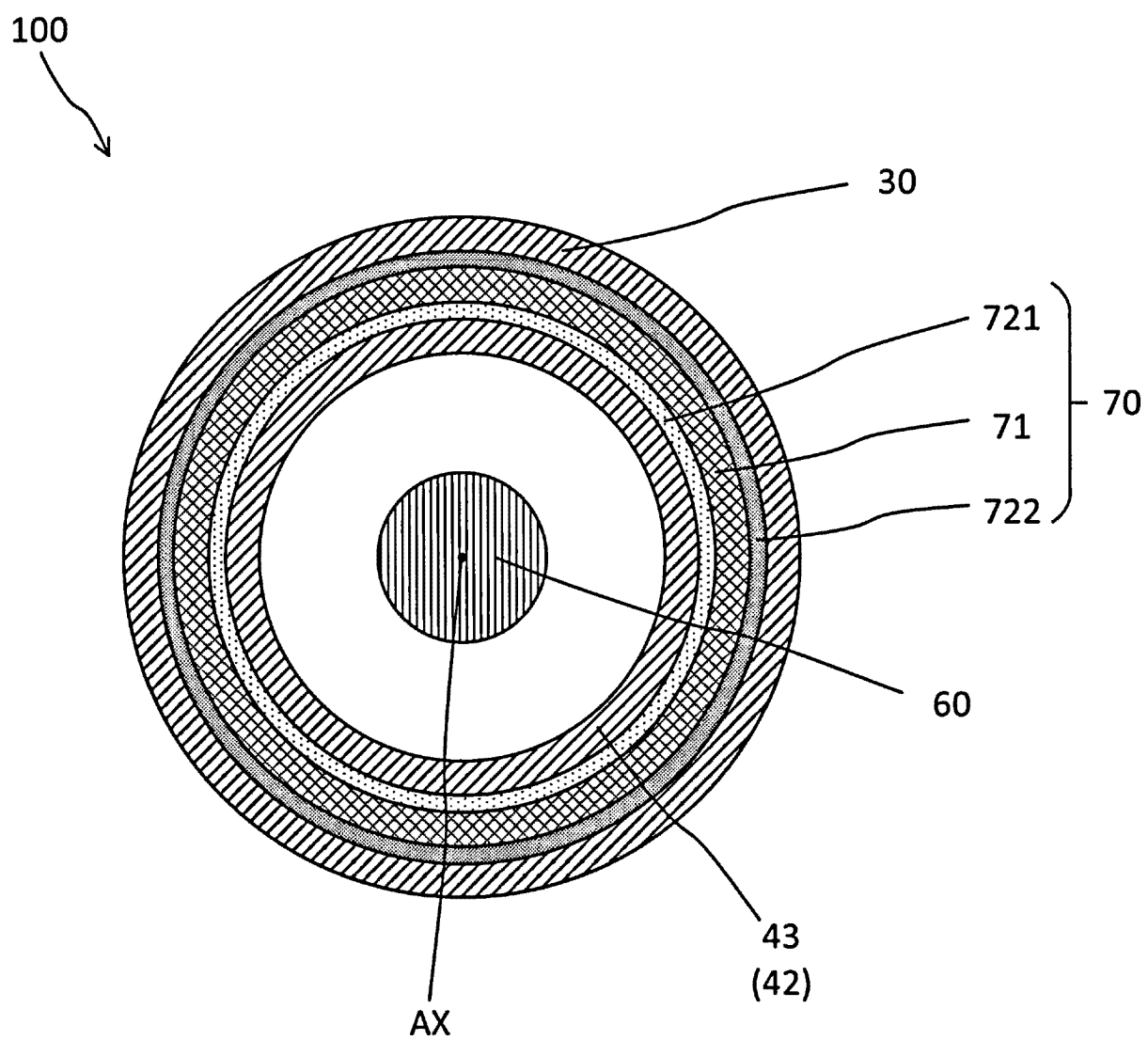


Fig. 5

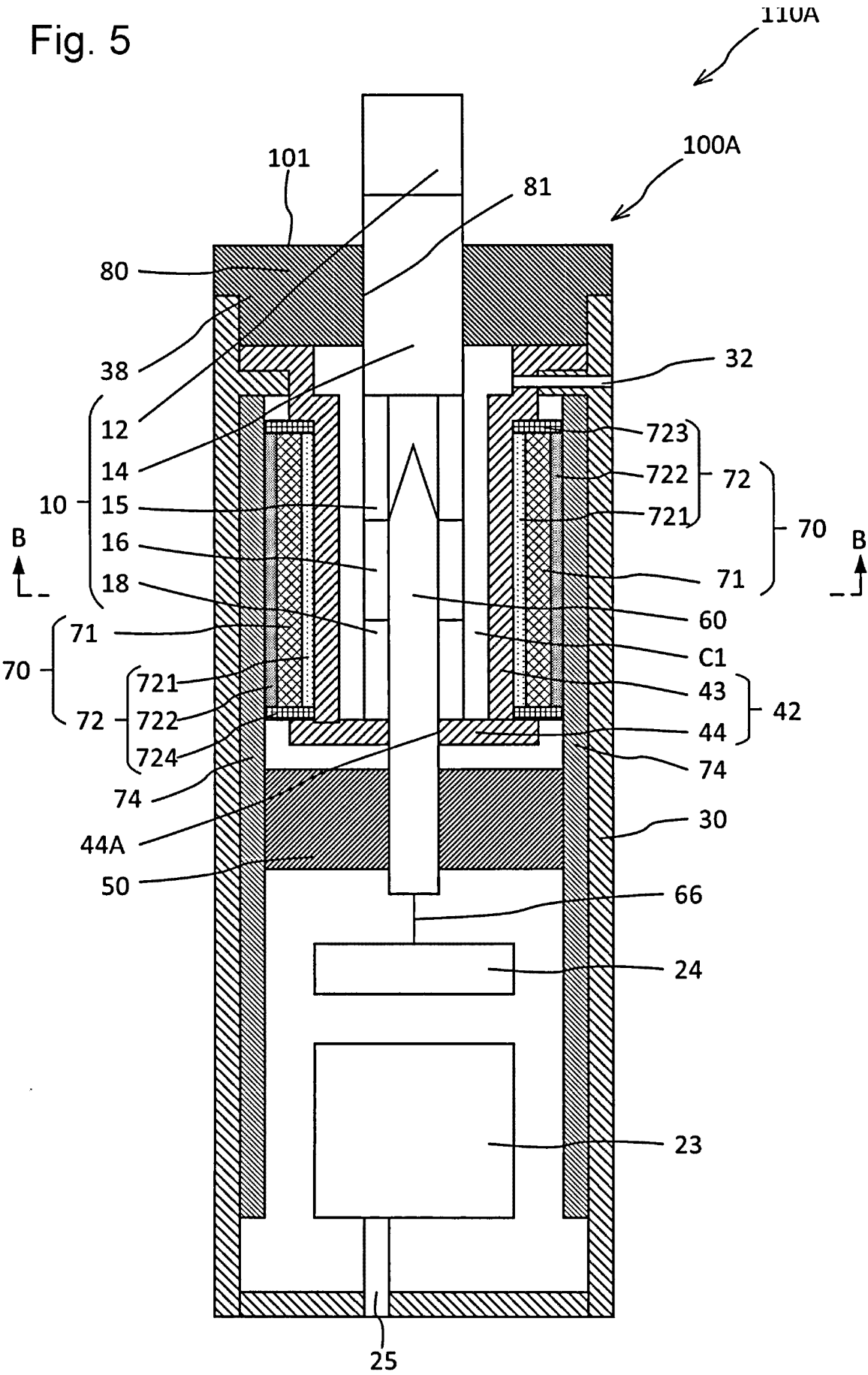


Fig. 6

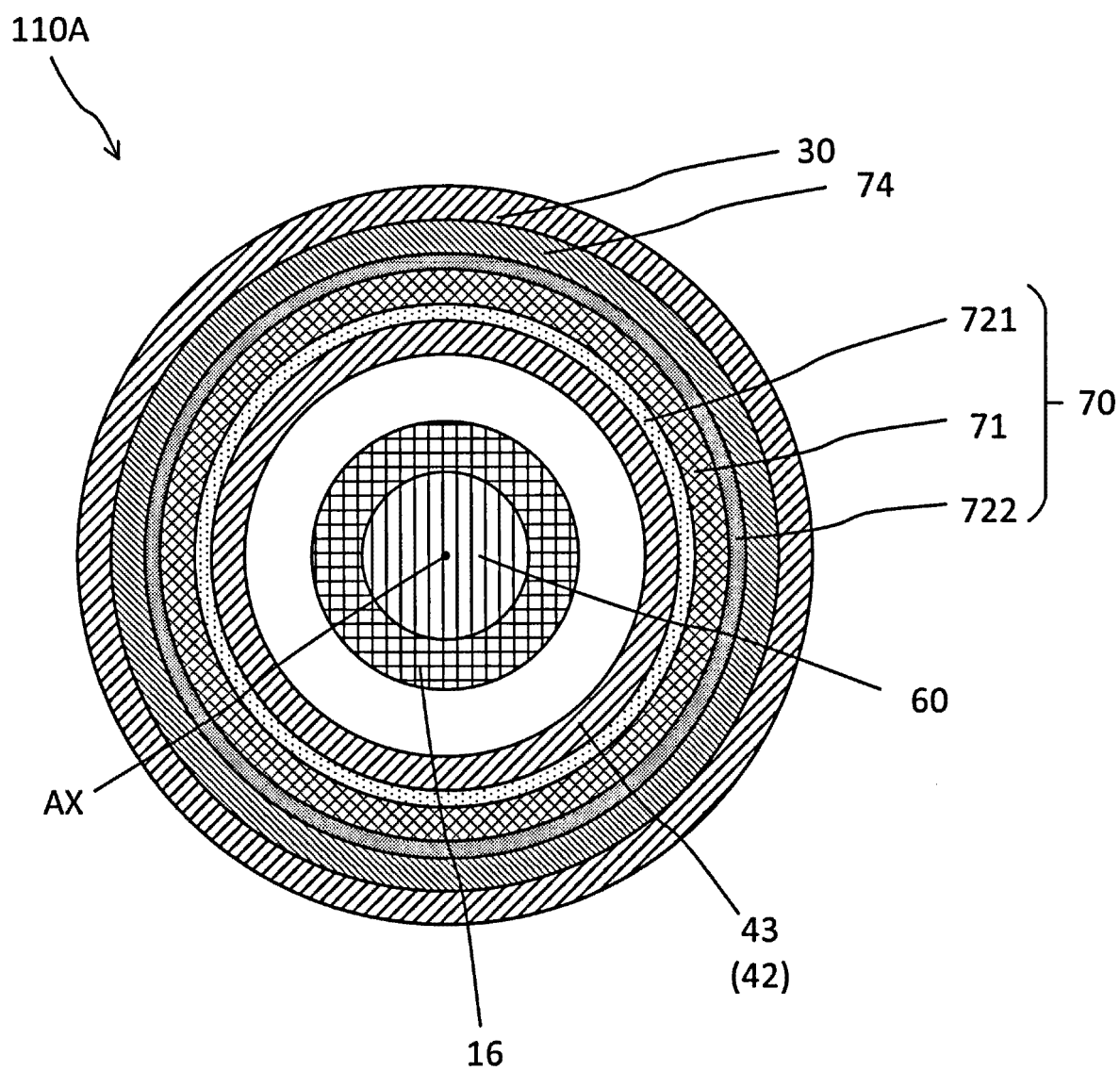


Fig. 7

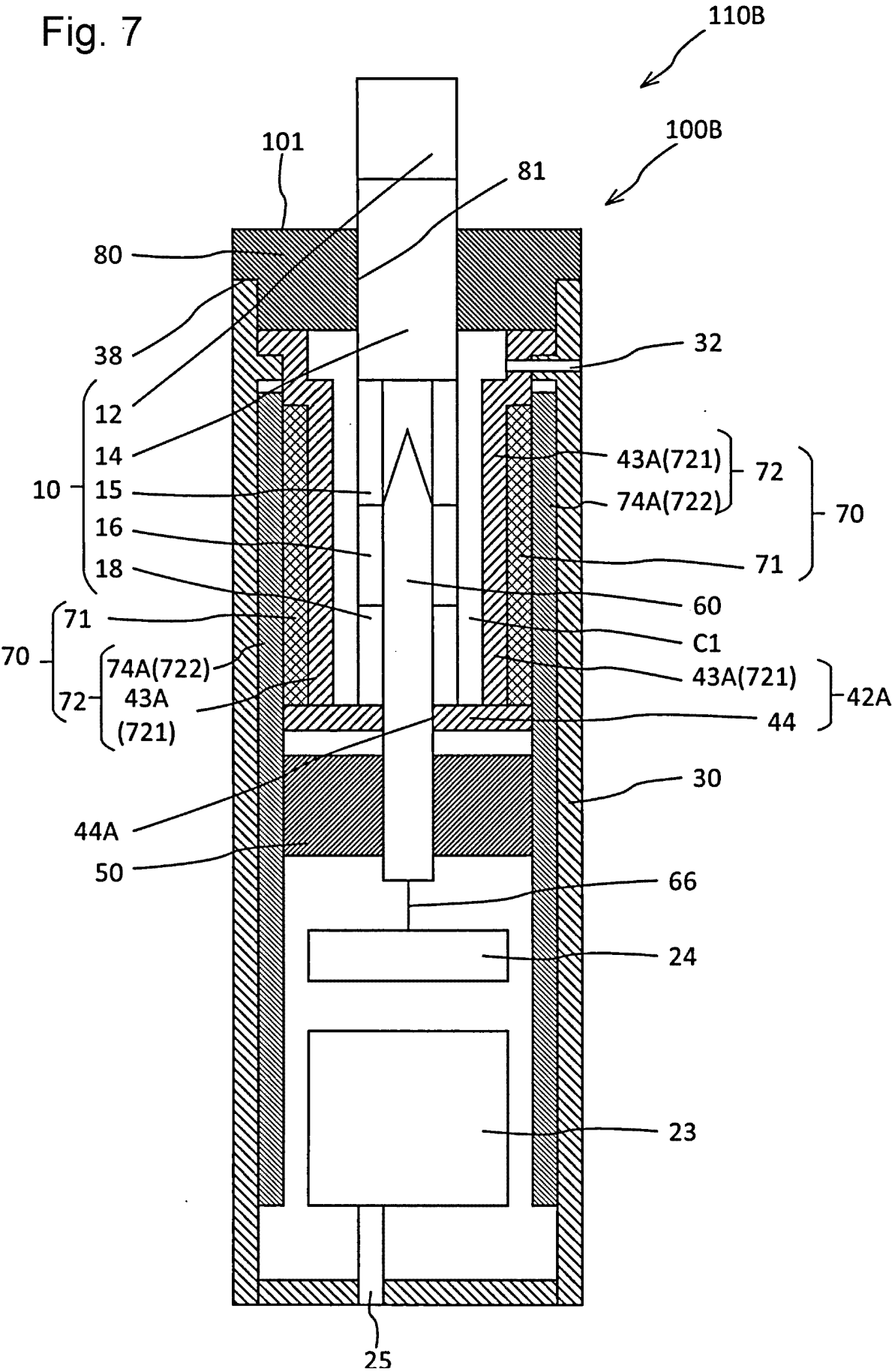


Fig. 8

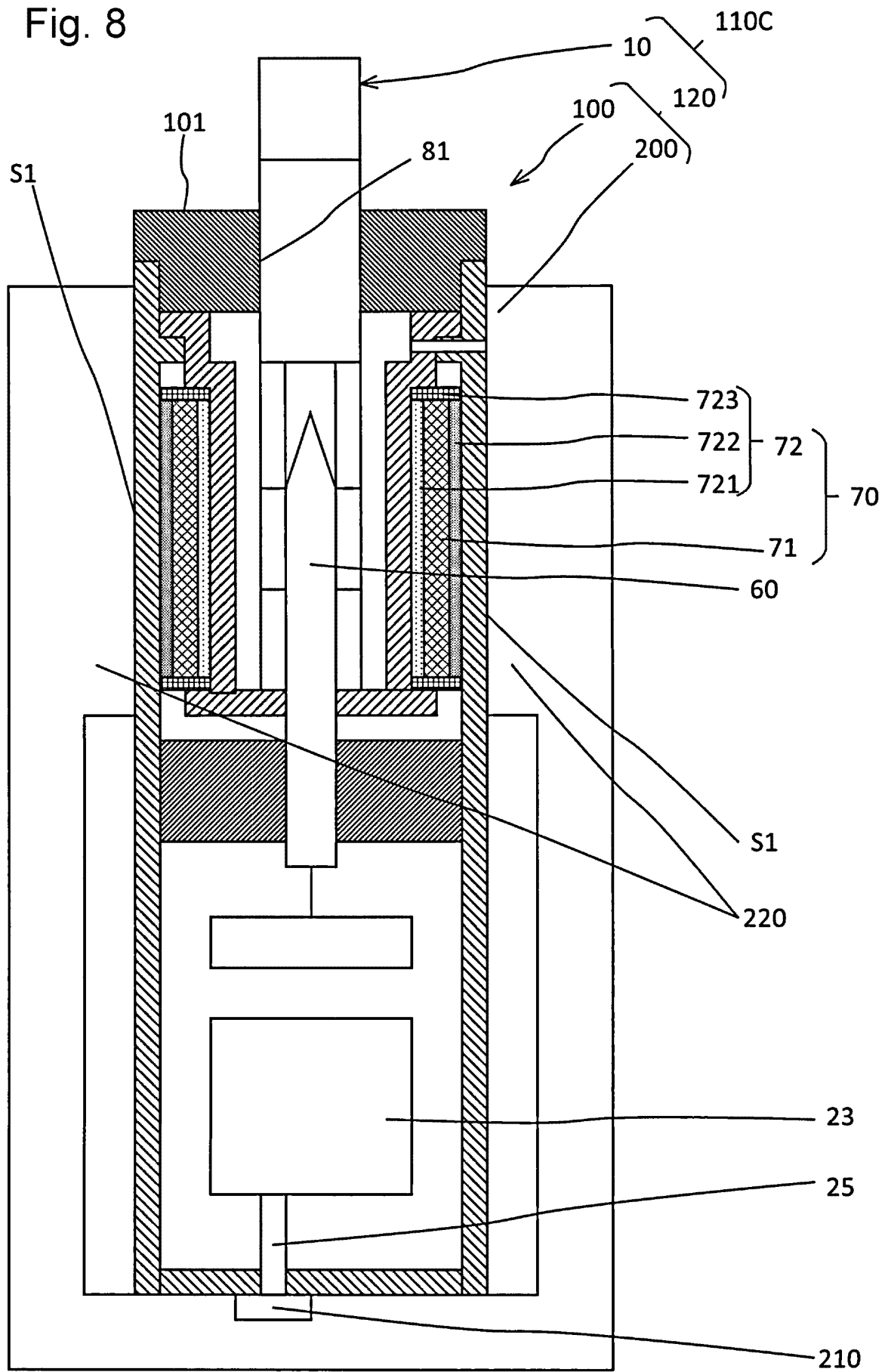
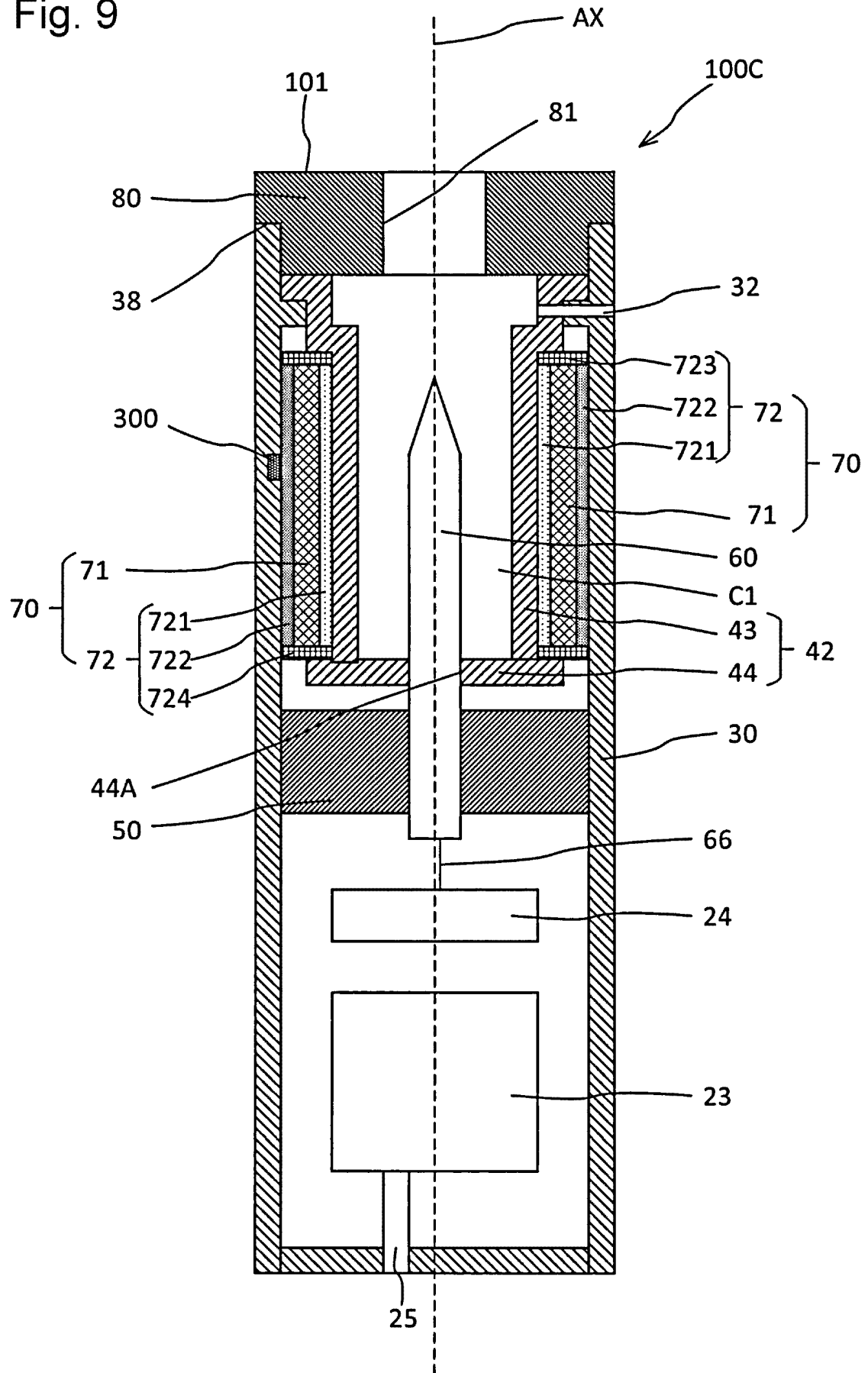


Fig. 9



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2022/020953

A. CLASSIFICATION OF SUBJECT MATTER**A24F 40/20**(2020.01)i; **A24F 40/40**(2020.01)i

FI: A24F40/40; A24F40/20

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A24F40/20; A24F40/40

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

Published examined utility model applications of Japan 1922-1996

Published unexamined utility model applications of Japan 1971-2022

Registered utility model specifications of Japan 1996-2022

Published registered utility model applications of Japan 1994-2022

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 212393867 U (KUNSHAN LIANTAO ELECTRONIC CO., LTD.) 26 January 2021 (2021-01-26) paragraphs [0028]-[0035], fig. 2, 4	1-2, 4-8
Y		9-10, 12-15, 17-19
A		3, 11, 16
Y	CN 111150115 A (TONGJI UNIVERSITY) 15 May 2020 (2020-05-15) fig. 1	9-10, 12-15, 17-19
A		1-8, 11, 16
A	CN 211794337 U (XIAMEN FENGTAO CERAMICS CO., LTD.) 30 October 2020 (2020-10-30) fig. 1, 7-8	1-19
A	CN 104366697 A (CHINA TOBACCO YUNNAN INDUSTRIAL CO., LTD.) 25 February 2015 (2015-02-25) fig. 1	1-19

☐ 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

04 July 2022

Date of mailing of the international search report

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Name and mailing address of the ISA/JP

Japan Patent Office (ISA/JP)
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Japan

Authorized officer

Telephone No.

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/JP2022/020953

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Patent document cited in search report			Publication date (day/month/year)	Patent family member(s)			Publication date (day/month/year)
CN	212393867	U	26 January 2021	(Family: none)			
CN	111150115	A	15 May 2020	(Family: none)			
CN	211794337	U	30 October 2020	WO	2020/228805	A1	
CN	104366697	A	25 February 2015	WO	2016/074481	A1	

REFERENCES CITED IN THE DESCRIPTION

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- WO 2013104616 A [0003]
- WO 2020084759 A [0003]