



**EUROPEAN PATENT APPLICATION**  
published in accordance with Art. 153(4) EPC

(43) Date of publication:  
**02.10.2024 Bulletin 2024/40**

(51) International Patent Classification (IPC):  
**A24F 40/46** <sup>(2020.01)</sup>

(21) Application number: **21965563.6**

(52) Cooperative Patent Classification (CPC):  
**A24F 40/46; A24F 40/20; A24F 40/40; A24F 40/42; A24F 47/00**

(22) Date of filing: **24.11.2021**

(86) International application number:  
**PCT/JP2021/042899**

(87) International publication number:  
**WO 2023/095189 (01.06.2023 Gazette 2023/22)**

(84) Designated Contracting States:  
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR**  
Designated Extension States:  
**BA ME**  
Designated Validation States:  
**KH MA MD TN**

- **INOUE, Yasunobu**  
Tokyo 130-8603 (JP)
- **SUMII, Tateki**  
Tokyo 130-8603 (JP)
- **YAMADA, Manabu**  
Tokyo 130-8603 (JP)

(71) Applicant: **Japan Tobacco, Inc.**  
**Tokyo, 105-6927 (JP)**

(74) Representative: **Hoffmann Eitle**  
**Patent- und Rechtsanwälte PartmbB**  
**Arabellastraße 30**  
**81925 München (DE)**

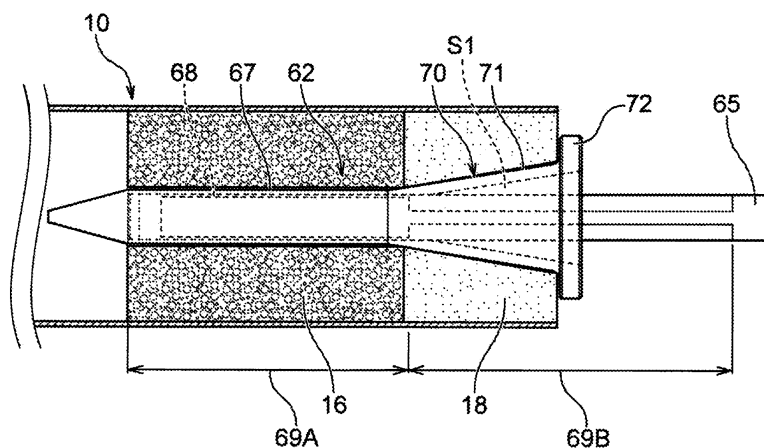
(72) Inventors:  
• **KAWABE, Masami**  
Tokyo 130-8603 (JP)

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

(57) This flavor inhaler comprises: a housing part that houses the smokable substance of a consumable containing a smokable substance and a stopper element; a heater that is configured to be inserted into the smokable

substance housed in the housing part and heat the smokable substance from the interior; and a gap between the heater and the stopper element that is formed when the heater is inserted into the smokable substance.

Fig. 2C



## Description

### TECHNICAL FIELD

**[0001]** The present invention relates to a flavor inhaler, and a smoking system.

### BACKGROUND ART

**[0002]** In the related art, flavor inhalers for inhaling, for example, flavor without combusting a material are known. A known example of such flavor inhalers is an electric-heating aerosol generation system whose housing includes a chamber for accommodating a smoking article (PTL 1).

### CITATION LIST

#### PATENT LITERATURE

**[0003]** PTL 1: Japanese Patent No. 5963375

### SUMMARY OF INVENTION

#### TECHNICAL PROBLEM

**[0004]** With an electric-heating aerosol generation system such as one disclosed in PTL 1, a pin- or blade-shaped heating device is inserted into the smokable substance, and the smokable substance is heated by the heating device. As the smokable substance is inserted into or removed from the heating device, stress acts on the smokable substance in the axial direction (the direction of insertion of the heating device). Accordingly, to ensure that the smokable substance does not spill from a consumable as the heating device is inserted or removed, the tip of the consumable may in some cases be provided with a stopper element such as a filter. A stopper element such as a filter, however, is susceptible to melting or damage when exposed to heat. It is thus desirable to reduce heat transfer to the stopper element while allowing for sufficient heating of the smokable substance. In some cases, the tip of the consumable is provided with no stopper element, and the smokable substance thus extends to the tip of the consumable. In such cases, if the upstream end of the smokable substance is heated in the same manner as other portions, this may lead to the risk that an aerosol flows backward from the upstream end toward an upstream portion of an airflow path.

**[0005]** An object of the invention is to reduce heat transfer to a stopper element. Another object of the invention is to reduce heat transfer to the upstream end of a smokable substance.

#### SOLUTION TO PROBLEM

**[0006]** According to a first aspect, a flavor inhaler is provided. The flavor inhaler includes an accommodation

part, a heater, and a gap. The accommodation part accommodates a smokable substance of a consumable that includes the smokable substance and a stopper element. The heater is configured to be inserted into the smokable substance accommodated in the accommodation part, and heat the smokable substance from inside the smokable substance. The gap is located between the heater and the stopper element. The gap is formed when the heater is inserted into the smokable substance.

**[0007]** According to the first aspect, the heater is at least partially spaced apart from the stopper element. This makes it possible to reduce heat transfer to the stopper element while allowing the smokable substance to be heated by the heater. This in turn makes it possible to reduce melting of or damage to the stopper element, and reduce heat loss resulting from heat transfer to the stopper element. The gap preferably exists over the entire circumference of the heater. This makes it possible to further reduce heat transfer to the stopper element.

**[0008]** According to a second aspect, in the first aspect, the heater includes a heat-producing part and a non-heat-producing part that are each located in an insertion direction of the heater, and the gap is located between the non-heat-producing part of the heater, and the stopper element.

**[0009]** According to the second aspect, the gap is provided between the non-heat-producing part, which contributes relatively little to heating of the smokable substance, and the stopper element. This makes it possible to further reduce heat transfer to the stopper element while allowing a sufficient amount of aerosol to be generated through heating of the smokable substance by the heat-producing part.

**[0010]** According to a third aspect, in the second aspect, the heat-producing part is located closer to a tip of the heater than is the non-heat-producing part.

**[0011]** According to the third aspect, with respect to the axial direction (the insertion direction of the heater), the non-heat-producing part can be positioned to overlap the stopper element, and the heat-producing part can be positioned to overlap the smokable substance.

**[0012]** According to a fourth aspect, in the second or third aspect, the heat-producing part includes a heating resistor, and a cover that covers an outer face of the heating resistor.

**[0013]** According to the fourth aspect, the heating resistor is not in direct contact with the smokable substance. This makes it possible to reduce, for example, contamination of the heating resistor by the smokable substance, and potential physical damage to the heating resistor.

**[0014]** According to a fifth aspect, in any one of the first to fourth aspects, the flavor inhaler includes a wall part disposed between the heater and the stopper element. The wall part is in contact with the stopper element, and spaced apart from the heater.

**[0015]** According to the fifth aspect, the gap can be formed between the stopper element and the heater due

to the presence of the wall part. The size (volume or thickness) of the gap can be thus made constant. This results in the ability to reduce heat transfer to the stopper element in a stable manner.

**[0016]** According to a sixth aspect, in the fifth aspect as recited in the second aspect, the wall part is positioned to overlap the non-heat-producing part in the insertion direction, and spaced apart from the non-heat-producing part.

**[0017]** According to the sixth aspect, the gap is provided between the non-heat-producing part, which contributes relatively little to heating of the smokable substance, and the wall part. This makes it possible to further reduce heat transfer to the wall part while allowing a sufficient amount of aerosol to be generated through heating of the smokable substance by the heat-producing part. This results in the ability to reduce heat transfer to the stopper element in contact with the wall part.

**[0018]** According to a seventh aspect, in the fifth or sixth aspect, the wall part has a tapered face such that the wall part decreases in diameter in a direction from a rear end of the heater toward a tip of the heater.

**[0019]** According to the seventh aspect, as the heater is inserted into the smokable substance from the tip, the stopper element in contact with the wall part is pushed apart, and the gap is formed between the stopper element and the heater with the wall part interposed therebetween. At this time, the stopper element is smoothly pushed apart due to the tapered face of the wall part. This makes it possible to facilitate insertion of the heater into the smokable substance.

**[0020]** According to an eighth aspect, in any one of the fifth to seventh aspects, the flavor inhaler includes a heat insulation member disposed between the wall part and the heater.

**[0021]** According to the eighth aspect, heat transfer from the heater to the wall part can be further reduced. This results in the ability to further reduce heat transfer to the stopper element in contact with the wall part.

**[0022]** According to a ninth aspect, in any one of the first to fourth aspects, the heater includes a first portion and a second portion that are each located in an insertion direction of the heater, the second portion has a cross-sectional area less than a cross-sectional area of the first portion, the first portion is located closer to a tip of the heater than is the second portion, and the gap is located between the second portion and the stopper element.

**[0023]** According to the ninth aspect, as the heater is inserted into the consumable, a through-hole corresponding to the cross-sectional shape of the first portion is first formed in the stopper element by the first portion, and the second portion can be then positioned to overlap the stopper element in the axial direction. As a result, the gap is formed between the inner face of the through-hole, and the second portion. This makes it possible to reduce melting of or damage to the stopper element, and reduce heat loss resulting from heat transfer to the stopper element.

**[0024]** According to a tenth aspect, in the ninth aspect as recited in the second aspect, the second portion includes the non-heat-producing part.

**[0025]** According to the tenth aspect, the gap is provided between the second part, which contributes relatively little to heating of the smokable substance, and the stopper element. This makes it possible to further reduce heat transfer to the stopper element while allowing a sufficient amount of aerosol to be generated through heating of the smokable substance by the heat-producing part.

**[0026]** According to an eleventh aspect, in the ninth or tenth aspect, the first portion and the second portion are coaxial with each other.

**[0027]** If the central axis of the second portion is located outside the cross-section of the first portion, this may result in the risk of the second portion coming into contact with the inner face of the through-hole that has been formed in the stopper element by the first portion. According to the eleventh aspect, through adjustment of the shape of the second portion, the entire second portion can be positioned inside the outer circumferential face of the first portion when viewed in the insertion direction. As a result, the gap can be provided between the stopper element and the entire circumference of the second portion. This makes it possible to further reduce heat transfer to the stopper element.

**[0028]** According to a twelfth aspect, in any one of the ninth to eleventh aspects, when viewed in the insertion direction, an entirety of the second portion is located inside an outer circumferential face of the first portion.

**[0029]** According to the twelfth aspect, the gap can be provided between the stopper element and the entire circumference of the second portion. This makes it possible to further reduce heat transfer to the stopper element.

**[0030]** According to a thirteenth aspect, a flavor inhaler is provided. The flavor inhaler includes an accommodation part, a heater, a wall part, and a gap. The accommodation part accommodates a smokable substance of a consumable. The heater is configured to be inserted into the smokable substance accommodated in the accommodation part, and heat the smokable substance from inside the smokable substance. The wall part is disposed around the heater. The gap is located between the heater and the wall part.

**[0031]** According to the thirteenth aspect, the heater is at least partially spaced apart from the smokable substance. As a result, positioning the wall part at a location corresponding to the upstream end portion of the smokable substance allows the internal temperature of the smokable substance to be made somewhat lower at the upstream end of the smokable substance and in the vicinity of the upstream end. The resulting ability to reduce aerosol generation at the upstream end of the smokable substance and in the vicinity of the upstream end makes it possible to prevent the generated aerosol from condensing on the bottom portion of the accommodation part or from flowing backward through the airflow path. Further, an aerosol generated in other portions of the smok-

able substance may be allowed to condense at the upstream end of the smokable substance and in the vicinity of the upstream end. According to the thirteenth aspect, the gap can be formed between the smokable substance and the heater due to the presence of the wall part. The size (volume or thickness) of the gap can be thus made constant. This results in the ability to reduce heat transfer to the smokable substance in a stable manner.

**[0032]** According to a fourteenth aspect, a flavor inhaler is provided. The flavor inhaler includes an accommodation part, and a heater. The accommodation part accommodates a smokable substance of a consumable. The heater is configured to be inserted into the smokable substance accommodated in the accommodation part, and heat the smokable substance from inside the smokable substance. The heater includes a first portion and a second portion that are each located in an insertion direction of the heater. The second portion has a cross-sectional area less than a cross-sectional area of the first portion. The first portion is located closer to a tip of the heater than is the second portion.

**[0033]** According to the fourteenth aspect, as the heater is inserted into the smokable substance, a through-hole corresponding to the cross-sectional shape of the first portion is first formed in the smokable substance by the first portion, and the second portion can be then positioned to overlap the smokable substance in the axial direction. As a result, the gap is formed between the inner face of the through-hole, and the second portion. This allows the internal temperature of the smokable substance to be made somewhat lower at the upstream end of the smokable substance and in the vicinity of the upstream end. The resulting ability to reduce aerosol generation at the upstream end of the smokable substance and in the vicinity of the upstream end makes it possible to prevent the generated aerosol from condensing on the bottom portion of the accommodation part or from flowing backward through the airflow path. Further, an aerosol generated in other portions of the smokable substance may be allowed to condense at the upstream end of the smokable substance and in the vicinity of the upstream end. According to the fourteenth aspect, an excessive increase in the insertion resistance encountered by the heater can be reduced.

**[0034]** According to a fifteenth aspect, a smoking system is provided. The smoking system includes the flavor inhaler according to any one of the first to fourteenth aspects, and the consumable mentioned above.

#### BRIEF DESCRIPTION OF DRAWINGS

##### **[0035]**

[Fig. 1] Fig. 1 is a schematic side cross-section of a smoking system according to an embodiment of the invention.

[Fig. 2A] Fig. 2A is a schematic side view of an exemplary heating part according to the embodiment.

[Fig. 2B] Fig. 2B is a cross-section of the heating part taken along arrows 2B-2B in Fig. 2A.

[Fig. 2C] Fig. 2C is a schematic side view of the heating part when inserted in a consumable.

[Fig. 3A] Fig. 3A is a schematic side view of an exemplary heating part according to another embodiment.

[Fig. 3B] Fig. 3B is a schematic side view of the heating part when inserted in the consumable.

**[0036]** Embodiments of the invention are described below with reference to the drawings. In the descriptions below, identical or corresponding structural elements are designated by the same reference signs to omit repetitive descriptions of such structural elements.

**[0037]** Fig. 1 is a schematic side cross-section of a smoking system according to an embodiment of the invention. The smoking system according to the embodiment includes a consumable 10, and a flavor inhaler 100. The flavor inhaler 100 is preferably a portable device or a hand-held device. As illustrated in Fig. 1, the consumable 10 includes the following components: a stopper element 18; a smokable substance 16, which is a substance to be heated with the flavor inhaler 100; a center-hole filter 15; a paper tube part 14; and a filter part 12. The center-hole filter 15 of the consumable 10 is located between the smokable substance 16 and the paper tube part 14. The paper tube part 14 may serve as a cooling part that cools an aerosol that has passed through the center-hole filter 15. The paper tube part 14 may be filled with a material such as a sheet for increasing the area of contact with an aerosol to facilitate cooling of the aerosol. The stopper element 18 may be disposed near the tip of the consumable 10, that is, at a position on the consumable 10 that, upon insertion of the consumable 10 into the flavor inhaler 100, first makes contact with a heater 62 of a heating part 60, which will be described later. The stopper element 18 serves to prevent the smokable substance 16 from falling off the tip of the consumable 10. Examples of the stopper element 18 may include an acetate filter, a center-hole filter, a Neo Filter, and a paper filter. The stopper element 18 may include a tubular wrapping sheet, and a stopper sheet connected at opposite ends to different circumferential positions on the inner face of the wrapping sheet. The stopper sheet may be a sheet of paper with an end-to-end length greater than the diameter of the wrapping sheet. The consumable 10 may include no stopper element 18. In that case, the smokable substance 16 may extend to the tip of the consumable 10.

**[0038]** The flavor inhaler 100 is configured to heat the smokable substance 16, which is a solid or a liquid, and atomize the smokable substance 16. The smokable substance 16 constitutes, for example, a portion of the consumable 10, which is columnar and extends in the longitudinal direction. The consumable 10 may be, for example, a tobacco stick whose smokable substance 16 includes tobacco. The smokable substance 16 included

in the consumable 10 may contain an aerosol source that generates an aerosol when heated at a predetermined temperature. The aerosol source to be used is not limited to a particular kind but can, depending on the intended use, be selected from the group consisting of extracts from various natural products, and/or constituent components thereof. Examples of the aerosol source may include glycerine, propylene glycol, triacetin, 1, 3-butane-diol, and mixtures thereof. As the smokable substance 16, tobacco such as lamina or midrib, or other known plants may be used. The smokable substance 16 such as tobacco may be in, for example, shredded form, sheet form, string form, powder form, granular form, pellet form, slurry form, or porous form.

**[0039]** The flavor inhaler 100 includes a battery 23, and a printed circuit board (PCB) 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. The battery 23 may be rechargeable by means of an external power supply.

**[0040]** The PCB 24 is implemented by, for example, a CPU and a memory. The PCB 24 controls operation of the flavor inhaler 100. For example, the PCB 24 may start heating of the smokable substance 16 in response to a user's operation on an input device such as a push button or a slide switch (not illustrated), and end heating of the smokable substance 16 upon elapse of a predetermined time. The PCB 24 may, when a puff action has been performed by the user a number of times exceeding a predetermined value, end the heating of the smokable substance 16 even before the predetermined time elapses after the start of heating of the smokable substance 16. For example, such a puff action is detected by a sensor (not illustrated).

**[0041]** Alternatively, the PCB 24 may start heating of the smokable substance 16 in response to the start of a puff action, and end heating of the smokable substance 16 in response to the end of the puff action. The PCB 24 may, when a predetermined time has elapsed since the start of a puff action, end heating of the smokable substance 16 even before the end of the puff action.

**[0042]** In the depicted example, the flavor inhaler 100 has an insertion end portion 101 through which the consumable 10 is to be inserted. The flavor inhaler 100 is thus configured to receive the consumable 10 that is in stick form. As depicted, the battery 23 and the PCB 24 may be arranged in a direction in which to insert the consumable 10 into the flavor inhaler 100. The direction of insertion of the consumable 10, or the longitudinal direction of the flavor inhaler 100 is herein sometimes referred to as axial direction. As used herein, the term circumferential direction means circumferential direction centered on an axis defining the axial direction, and the term radial direction refers to a direction perpendicular to the axial direction.

**[0043]** The flavor inhaler 100 includes a housing 30, an accommodation part 42, the heating part 60, and a cap part 80. The heating part 60 is configured to heat the

smokable substance 16. Specifically, for example, the heating part 60 is shaped to allow its insertion into the smokable substance 16, and configured to heat the smokable substance 16 from inside the smokable substance 16. More specifically, the heating part 60 includes the heater 62, which is to be inserted into the smokable substance 16, and a flange part 64 for fixing the heater 62 to a support 50. The heater 62 extends in the axial direction. The flange part 64 extends in a direction transverse to the axial direction, more specifically, in a direction perpendicular to the axial direction. For example, the heater 62 may include, on its surface or in its interior, heating tracks or other features capable of resistive heating.

**[0044]** The heater 62 is preferably a pin-type heater. If the heater 62 is a blade-type heater with a very small thickness relative to its width, the small width of the heater 62 makes it difficult for a gap described later to be formed between the major face of the heater 62 and the stopper element 18 upon insertion of the heater 62 into the smokable substance 16. If the heater 62 is a pin-type heater, this makes it possible to facilitate formation of the above-mentioned gap in comparison to a case where the heater 62 is a blade-type heater. A specific example of the shape of such a pin-type heater may be cylindrical. The shape of a cross-section perpendicular to the direction of insertion of the pin-type heater may be, for example, an ellipse rather than a perfect circle. Although the cross-section perpendicular to the direction of insertion of the pin-type heater may have a rectangular shape, this is not preferable because such a cross-sectional shape results in an excessive increase in the resistance encountered by the heater 62 as the heater 62 is inserted into the consumable 10.

**[0045]** The heater 62 receives supply of electric power from the battery 23. Specifically, the heater 62 is provided with a lead wire 66. The heater 62 may be electrically connected to the PCB 24 and/or the battery 23 via the lead wire 66. The flavor inhaler 100 may include an induction coil to inductively heat the heater 62. In this case, the heater 62 may be heated by the induction coil as a susceptor. Specifically, as the heater 62 is inserted into the smokable substance 16 and inductively heated with an induction coil (not illustrated), the smokable substance 16 is heated. If the flavor inhaler 100 includes an induction coil, at least one of the housing 30, the accommodation part 42, and the cap part 80 preferably has magnetic permeability and electrical non-conductivity (electrical insulating property). This makes at least one of the housing 30, the accommodation part 42, and the cap part 80 less susceptible to heat production. This in turn allows the heater 62 to efficiently produce heat. Examples of materials having magnetic permeability and electrical non-conductivity (electrical insulating property) include glass, plants, wood, paper, and resins such as PEEK. The induction coil may be, for example, a flat coil or a cylindrical coil. The induction coil may be disposed such that, with the consumable 10 positioned at a desired location within

the accommodation part 42, the induction coil is located opposite from the consumable 10 across a bottom wall 44 (described later) of the accommodation part 42, or the induction coil surrounds a side wall 43 (described later) of the accommodation part 42.

**[0046]** The accommodation part 42 is generally tubular in form, and may be configured to accommodate the smokable substance 16. Specifically, the accommodation part 42 includes the side wall 43, which is tubular in form, and the bottom wall 44. The side wall 43 surrounds the smokable substance 16 and the stopper element 18 of the consumable 10 that has been positioned at a desired location within the accommodation part 42. As illustrated in Fig. 1, the heater 62 of the heating part 60 penetrates an opening 44a of the bottom wall 44, and a portion of the heater 62 is located inside the accommodation part 42.

**[0047]** As illustrated in Fig. 1, a gap S2 is preferably provided over the entire circumference of the area between the smokable substance 16 of the consumable 10 accommodated in the accommodation part 42, and the side wall 43 of the accommodation part 42. This may reduce transfer of heat from the heater 62 and the heated smokable substance 16 to the accommodation part 42 and the housing 30, in comparison to a case where the side face of the consumable 10 is in contact with the accommodation part 42. This makes it possible to reduce a rise in the temperature of the surface of the housing 30, and to reduce the risk of heat being taken away from the smokable substance 16 by the accommodation part 42.

**[0048]** The housing 30 surrounds at least the outer circumference of the accommodation part 42. Specifically, the housing 30 surrounds the outer circumference of the heating part 60, and the outer circumference of the accommodation part 42. As illustrated in Fig. 1, the housing 30 includes an air inlet 32, and an end portion 38. The air inlet 32 is an inlet through which to supply air to the heating part 60. The end portion 38 includes an opening through which the accommodation part 42 and the cap part 80 are to be inserted. Air entering from the air inlet 32 of the housing 30 flows into the accommodation part 42 through the opening 44a defined in the accommodation part 42.

**[0049]** The end portion 38 defines one end portion of the housing 30. The accommodation part 42 and the cap part 80 are inserted through the end portion 38 during assembly of the flavor inhaler 100. Specifically, the cap part 80 may be detachably attached to the housing 30. The cap part 80 may include an opening 81 through which to insert the consumable 10.

**[0050]** The heater 62 is now described in detail. Fig. 2A is a schematic side view of an example of the heating part 60 according to the embodiment. Fig. 2B is a cross-section of the heating part 60 taken along arrows 2B-2B in Fig. 2A. Fig. 2C is a schematic side view of the heating part 60 when inserted in the consumable 10. In Figs. 2A and 2C, a cover 67 and a wall part 70 are depicted in a

see-through manner. As illustrated in Fig. 2A, the heating part 60 may include the heater 62, and the wall part 70 that is attached to the heater 62.

**[0051]** The heater 62 preferably includes a heating resistor 68, and the cover 67 that covers the outer face of the heating resistor 68. As a result, the heating resistor 68 is not in direct contact with the smokable substance 16. This makes it possible to reduce, for example, contamination of the heating resistor 68 by the smokable substance 16, and potential physical damage to the heating resistor 68. Specifically, in the depicted example, the heater 62 may include a hollow tubular body 65. This makes it possible to reduce thermal capacity in comparison to a case where the heater 62 is solid inside. In the depicted example, the heater 62 may be formed by a process including forming the heating resistor 68 on the outer surface of the tubular body 65, placing the cover 67 over the outer face of the heating resistor 68, and then sintering the tubular body 65, the heating resistor 68, and the cover 67 into an integral body. The tubular body 65 and the cover 67 may be made of, for example, an insulator such as a ceramic material. The presence of the cover 67 disposed over the outer face of the heating resistor 68 allows for increased strength of the cover 67, and uniform heating.

**[0052]** According to the embodiment, as illustrated in Figs. 2A to 2C, the flavor inhaler 100 includes a gap S1. The gap S1 is formed between the heater 62 and the stopper element 18 upon insertion of the heater 62 into the smokable substance 16. As a result, the heater 62 is at least partially spaced apart from the stopper element 18. This makes it possible to reduce heat transfer to the stopper element 18 while allowing the smokable substance 16 to be heated by the heater 62. This in turn makes it possible to reduce melting of or damage to the stopper element 18, and reduce heat loss resulting from heat transfer to the stopper element 18. As illustrated in Fig. 2B, the gap S1 preferably exists over the entire circumference of the heater 62. This makes it possible to further reduce heat transfer to the stopper element 18.

**[0053]** According to the embodiment, as illustrated in Fig. 2A, the heater 62 preferably includes a heat-producing part 69A and a non-heat-producing part 69B, each of which is located in the insertion direction of the heater 62 (axial direction or longitudinal direction of the heater 62). Specifically, for example, the heat-producing part 69A corresponds to a portion of the heater 62 where the heating resistor 68 is disposed, and the non-heat-producing part 69B corresponds to a portion of the heater 62 where a lead wire (an electric conductor portion with a resistance lower than that of the heating resistor 68) connected to the heating resistor 68 is disposed. As illustrated in Fig. 2C, the gap S1 is preferably located between the non-heat-producing part 69B of the heater 62, and the stopper element 18. As a result, the gap is provided between the non-heat-producing part 69B, which contributes relatively little to heating of the smokable substance 16, and the stopper element 18. This makes it

possible to further reduce heat transfer to the stopper element 18 while allowing a sufficient amount of aerosol to be generated through heating of the smokable substance 16 by the heat-producing part 69A.

**[0054]** As depicted, the heat-producing part 69A is preferably located closer to the tip of the heater 62 than is the non-heat-producing part 69B. As a result, with respect to the axial direction (the insertion direction of the heater 62), the non-heat-producing part 69B can be positioned to overlap the stopper element 18, and the heat-producing part 69A can be positioned to overlap the smokable substance 16. The tip of the heater 62 preferably includes a protrusion 69C with a diameter that decreases toward the tip. This makes it possible to facilitate insertion of the heater 62 into the consumable 10.

**[0055]** In the depicted example, the heating part 60 preferably includes the wall part 70 disposed between the heater 62 and the stopper element 18. The wall part 70 is in contact with the stopper element 18, and spaced apart from the heater 62. Since the gap S1 can be formed between the stopper element 18 and the heater 62 due to the presence of the wall part 70, the size (volume or thickness) of the gap S1 can be made constant. This results in the ability to reduce heat transfer to the stopper element 18 in a stable manner. According to the embodiment, the wall part 70 may be made of, for example, an easily workable metal such as stainless steel, or a material with low thermal conductivity (e.g., a resin material).

**[0056]** As depicted, it is preferable that the wall part 70 be positioned to overlap the non-heat-producing part 69B in the insertion direction, and spaced apart from the non-heat-producing part 69B. As a result, the gap S1 is provided between the non-heat-producing part 69B, which contributes relatively little to heating of the smokable substance 16, and the wall part 70. This makes it possible to reduce heat transfer to the wall part 70 while allowing a sufficient amount of aerosol to be generated through heating of the smokable substance 16 by the heat-producing part 69A. This results in the ability to reduce heat transfer to the stopper element 18 in contact with the wall part 70. If the consumable 10 does not include the stopper element 18, for example, the wall part 70 may be attached to the heater 62 with the wall part 70 positioned at a location corresponding to the upstream end of the smokable substance 16 that extends to the tip (upstream end) of the consumable 10. The wall part 70 is located near the root of the heater 62 in the longitudinal direction of the heater 62. The "root" of the heater 62 refers to a portion located at a position in the longitudinal direction that, when the heater 62 is inserted in the consumable 10, corresponds to the tip (upstream end) of the consumable 10.

**[0057]** As depicted, the wall part 70 preferably has a tapered face 71 such that the wall part 70 decreases in diameter in a direction from the rear end of the heater 62 toward the tip. As a result, as the heater 62 is inserted into the smokable substance 16 from the tip, the stopper element 18 in contact with the wall part 70 is pushed

apart, and the gap S1 is formed between the stopper element 18 and the heater 62 with the wall part 70 interposed therebetween. At this time, the stopper element 18 is smoothly pushed apart due to the tapered face 71 of the wall part 70. This makes it possible to facilitate insertion of the heater 62 into the smokable substance 16.

**[0058]** Specifically, the wall part 70 is generally tubular in form and, due to the presence of the tapered face 71, continuously increases in diameter in a direction from the tip toward the rear end. In the depicted example, the wall part 70 is cylindrical. One end portion of the wall part 70 near the tip may be fixed to the heater 62. As for the method for fixing the wall part 70 to the heater 62, any suitable method can be selected from the group consisting of: a chemical fixation method such as fixation with an adhesive; a mechanical fixation method such as fixation by fitting engagement or by crimping or swaging; and a combination of these methods. The wall part 70 thus constitutes a component integral with the heater 62. The other end portion of the wall part 70 near the rear end may be provided with a flange 72 that is greater in diameter than the tapered face 71. As illustrated in Fig. 2C, upon insertion of the heating part 60 into the consumable 10, an end portion (stopper element 18) of the consumable 10 makes contact with the flange 72. The flange 72 thus allows for positioning of the consumable 10. The flange 72 may be positioned to overlap the non-heat-producing part 69B in the axial direction.

**[0059]** According to the embodiment, a heat insulation member is preferably provided between the wall part 70 and the heater 62. Heat transfer from the heater 62 to the wall part 70 can be thus further reduced. This results in the ability to further reduce heat transfer to the stopper element 18 in contact with the wall part 70. The heat insulation member may be disposed to fill the entire gap S1 between the wall part 70 and the heater 62, or may be disposed between the wall part 70 and the heater 62 in such a way that a portion of the gap S1 is allowed to remain. The heat insulation member may be, for example, a known heat insulation member such as aerogel.

**[0060]** Reference is now made to another embodiment of the heating part 60. Fig. 3A is a schematic side view of an example of the heating part 60 according to another embodiment. Fig. 3B is a schematic side view of the heating part 60 when inserted in the consumable 10. Although the cover 67 is depicted in a non-see-through manner in Figs. 3A and 3B, the cover 67 includes the heating resistor 68 similar to that depicted in Figs. 2A to 2C.

**[0061]** Unlike the heating part 60 illustrated in Figs. 2A to 2C, the heating part 60 illustrated in Figs. 3A and 3B does not include the wall part 70. In this regard, the heater 62 of the heating part 60 illustrated in Figs. 3A and 3B includes a first portion 73A and a second portion 73B that are each located in the insertion direction of the heater 62. The second portion 73B has a cross-sectional area less than that of the first portion 73A. A cross-sectional area in this case refers to the area of a cross-section perpendicular to the direction of insertion of the heater

62. As depicted, the first portion 73A is located closer to the tip of the heater 62 than is the second portion 73B, and the gap S1 is located between the second portion 73B and the stopper element 18. Consequently, as the heater 62 is inserted into the consumable 10, a through-hole h1 corresponding to the cross-sectional shape of the first portion 73A is first formed in the stopper element 18 by the first portion 73A (see Fig. 3B), and the second portion 73B can be then positioned to overlap the stopper element 18 in the axial direction. As a result, the gap S1 is formed between the inner face of the through-hole h1, and the second portion 73B. This makes it possible to reduce melting of or damage to the stopper element 18, and reduce heat loss resulting from heat transfer to the stopper element 18. The through-hole h1 may be formed in the stopper element 18 in advance.

**[0062]** As depicted, the second portion 73B preferably includes the non-heat-producing part 69B. As a result, the gap S1 is provided between the second portion 73B, which contributes relatively little to heating of the smokable substance 16, and the stopper element 18. This makes it possible to further reduce heat transfer to the stopper element 18 while allowing a sufficient amount of aerosol to be generated through heating of the smokable substance 16 by the heat-producing part 69A.

**[0063]** The first portion 73A and the second portion 73B are preferably coaxial with each other. If the central axis of the second portion 73B is located outside the cross-section of the first portion 73A, this may result in the risk that the second portion 73B comes into contact with the inner face of the through-hole h1 that has been formed in the stopper element 18 by the first portion 73A. If the first portion 73A and the second portion 73B are coaxial with each other, adjusting the shape of the second portion 73B allows the entire second portion 73B to be positioned inside the outer circumferential face of the first portion 73A. As a result, the gap S1 can be provided between the stopper element 18 and the entire circumference of the second portion 73B. This makes it possible to further reduce heat transfer to the stopper element 18.

**[0064]** Further, it is preferable that when viewed in the insertion direction, the entire second portion 73B be positioned inside the outer circumferential face of the first portion 73A. As a result, the gap S1 can be provided between the stopper element 18 and the entire circumference of the second portion 73B. This makes it possible to further reduce heat transfer to the stopper element 18.

**[0065]** The foregoing description of embodiments of the invention is not intended to limit the invention to the embodiments described herein. Various modifications can be made within the scope of the technical idea described in the claims, the specification, and the drawings. Any shapes or materials not directly described in the specification and the drawings are also considered to fall within the scope of the technical idea of the invention insofar as such shapes or materials provide the effects/advantages of the invention.

## REFERENCE SIGNS LIST

### [0066]

5	10	consumable
	16	smokable substance
	18	stopper element
	42	accommodation part
	62	heater
10	67	cover
	68	heating resistor
	69A	heat-producing part
	69B	non-heat-producing part
	70	wall part
15	71	tapered face
	73A	first portion
	73B	second portion
	100	flavor inhaler
	S1	gap
20	S2	gap

## Claims

### 25 1. A flavor inhaler comprising

an accommodation part for accommodating a smokable substance of a consumable, the consumable including the smokable substance and a stopper element;  
a heater configured to be inserted into the smokable substance accommodated in the accommodation part, and heat the smokable substance from inside the smokable substance; and  
a gap between the heater and the stopper element, the gap being formed when the heater is inserted into the smokable substance.

### 40 2. The flavor inhaler according to claim 1,

wherein the heater includes a heat-producing part and a non-heat-producing part that are each located in an insertion direction of the heater, and  
wherein the gap is located between the non-heat-producing part of the heater, and the stopper element.

### 50 3. The flavor inhaler according to claim 2,

wherein the heat-producing part is located closer to a tip of the heater than is the non-heat-producing part.

### 55 4. The flavor inhaler according to claim 2 or 3,

wherein the heat-producing part includes a heating resistor, and a cover that covers an outer face of the heating resistor.



5. The flavor inhaler according to any one of claims 1 to 4, comprising  
a wall part disposed between the heater and the stopper element, the wall part being in contact with the stopper element and spaced apart from the heater. 5
6. The flavor inhaler according to claim 5 as recited in claim 2,  
wherein the wall part is positioned to overlap the non-heat-producing part in the insertion direction, and spaced apart from the non-heat-producing part. 10
7. The flavor inhaler according to claim 5 or 6,  
wherein the wall part has a tapered face such that the wall part decreases in diameter in a direction from a rear end of the heater toward a tip of the heater. 15
8. The flavor inhaler according to any one of claims 5 to 7, comprising  
a heat insulation member disposed between the wall part and the heater. 20
9. The flavor inhaler according to any one of claims 1 to 4, 25  
wherein the heater includes a first portion and a second portion that are each located in an insertion direction of the heater, the second portion having a cross-sectional area less than a cross-sectional area of the first portion, wherein the first portion is located closer to a tip of the heater than is the second portion, and wherein the gap is located between the second portion and the stopper element. 30 35
10. The flavor inhaler according to claim 9 as recited in claim 2,  
wherein the second portion includes the non-heat-producing part. 40
11. The flavor inhaler according to claim 9 or 10,  
wherein the first portion and the second portion are coaxial with each other. 45
12. The flavor inhaler according to any one of claims 9 to 11,  
wherein when viewed in the insertion direction, an entirety of the second portion is located inside an outer circumferential face of the first portion. 50
13. A flavor inhaler comprising:  
an accommodation part for accommodating a smokable substance of a consumable; 55  
a heater configured to be inserted into the smokable substance accommodated in the accommodation part, and heat the smokable sub-

stance from inside the smokable substance;  
a wall part disposed around the heater; and  
a gap between the heater and the wall part.

14. A flavor inhaler comprising:

an accommodation part for accommodating a smokable substance of a consumable; and  
a heater configured to be inserted into the smokable substance accommodated in the accommodation part, and heat the smokable substance from inside the smokable substance, wherein the heater includes a first portion and a second portion that are each located in an insertion direction of the heater, the second portion having a cross-sectional area less than a cross-sectional area of the first portion, and wherein the first portion is located closer to a tip of the heater than is the second portion.

15. A smoking system comprising:

the flavor inhaler according to any one of claims 1 to 14; and  
the consumable.

Fig. 1

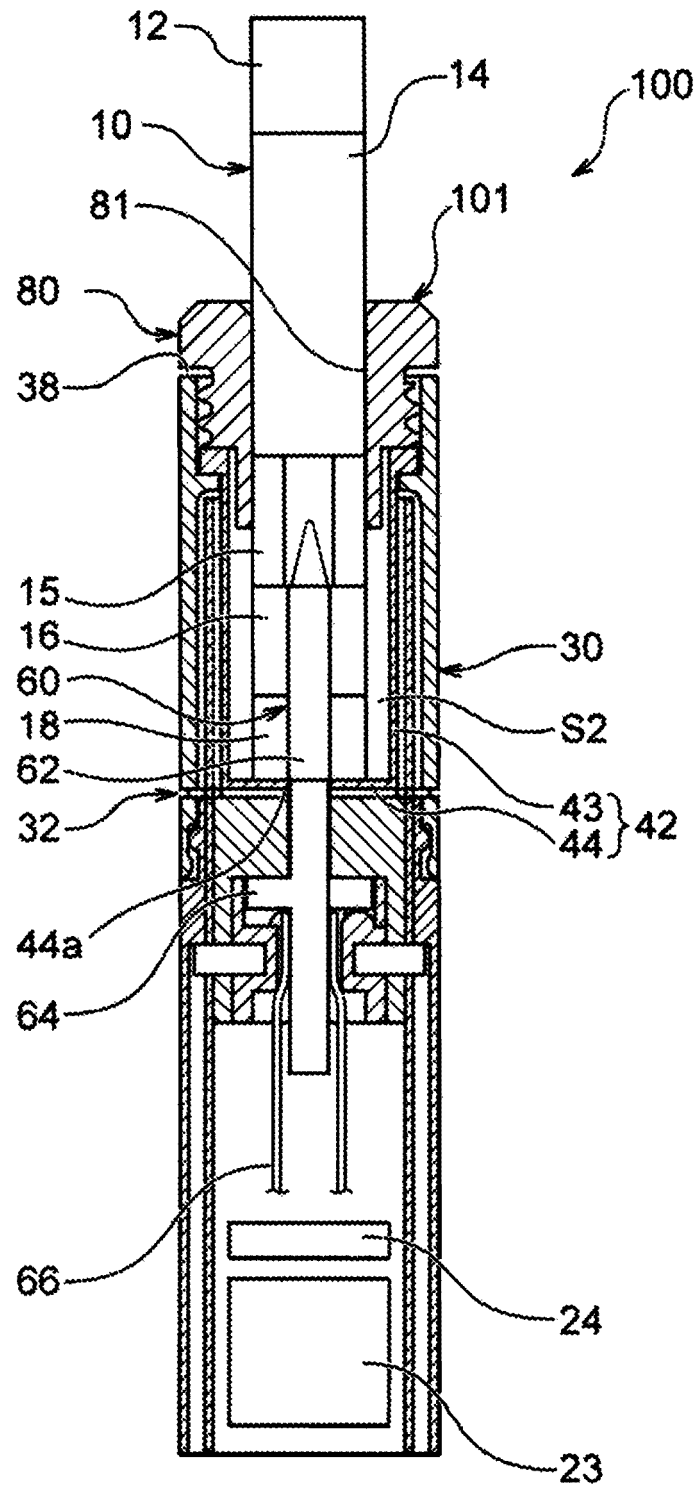


Fig. 2A

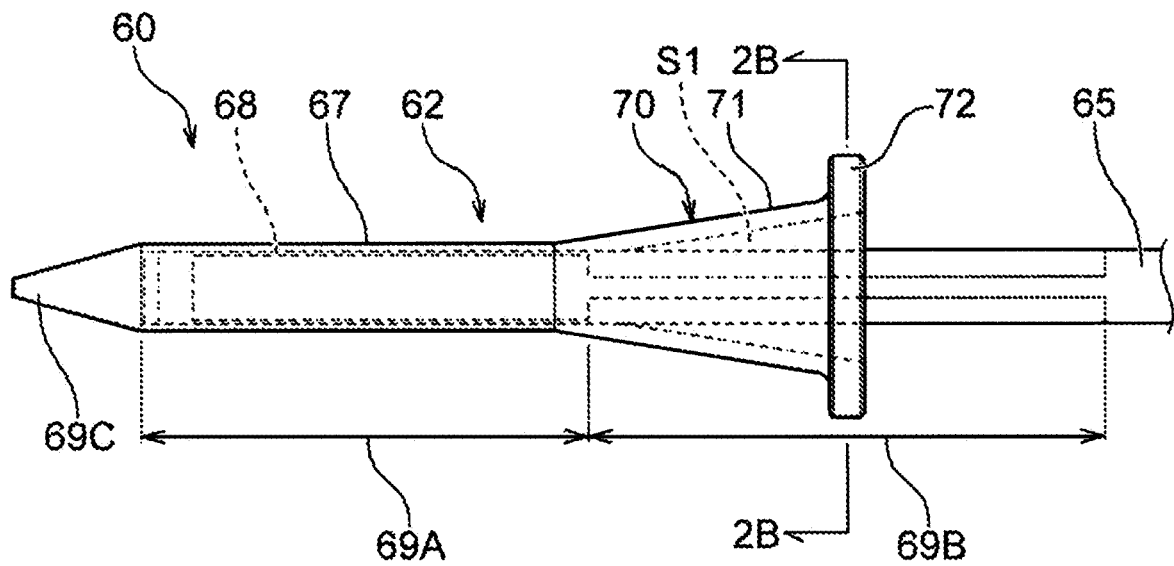


Fig. 2B

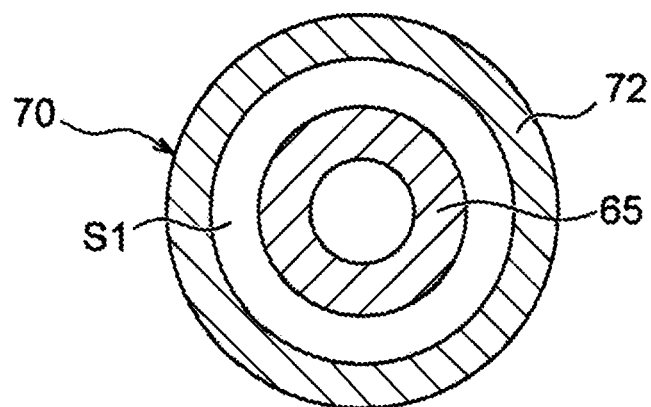


Fig. 2C

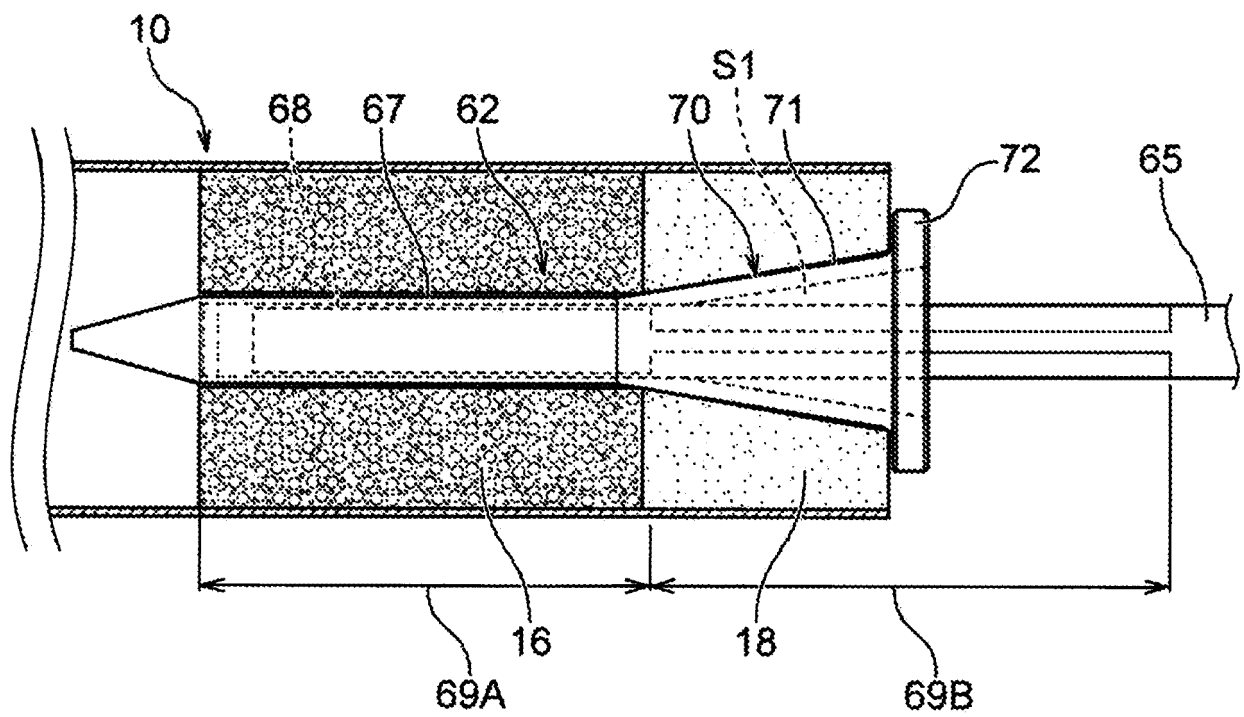


Fig. 3A

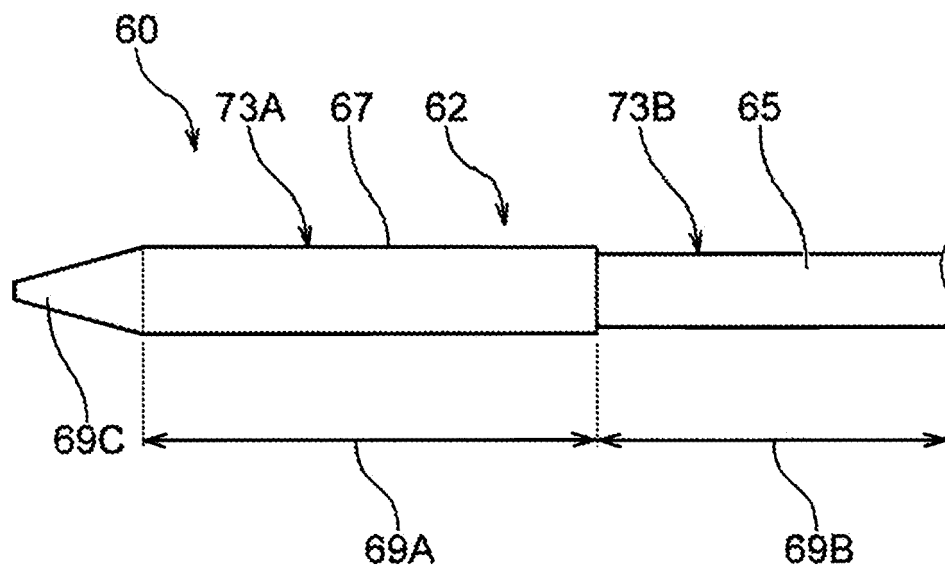
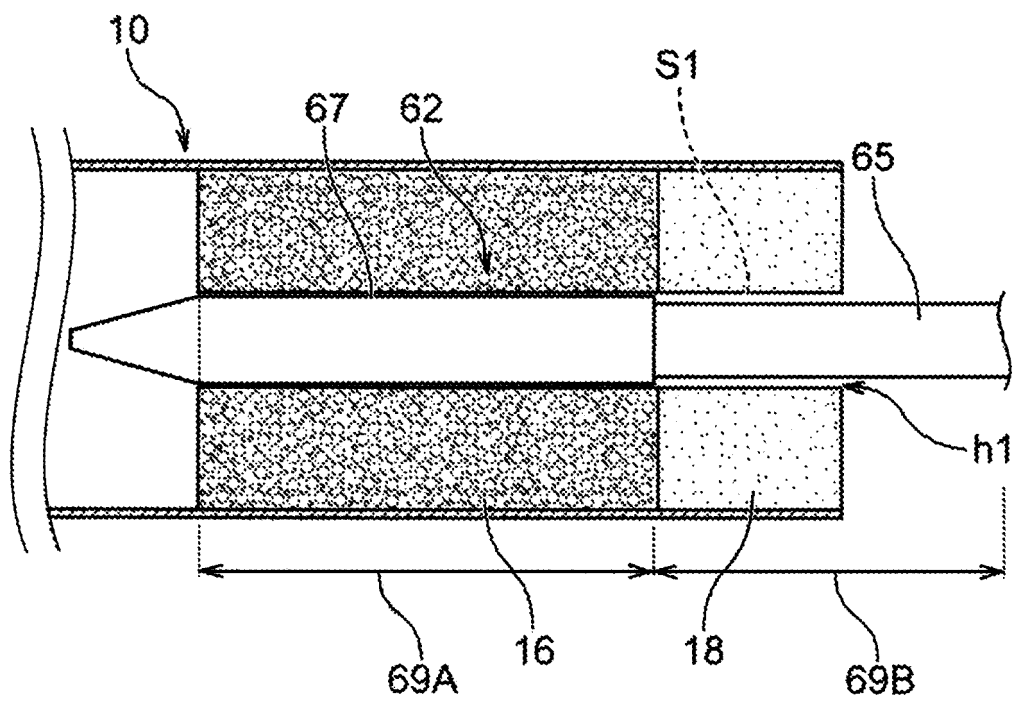


Fig. 3B



## INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2021/042899

## A. CLASSIFICATION OF SUBJECT MATTER

A24F 40/46(2020.01)i

FI: A24F40/46

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

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A24F40/46

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.
Y	JP 3227591 U (TOA INDUSTRY CO., LTD.) 03 September 2020 (2020-09-03) paragraph [0114], fig. 1, 9C	1, 5, 9, 11-15
A		2-4, 6-8, 10
Y	WO 2020/057045 A1 (SHENZHEN BUDDY TECHNOLOGY DEVELOPMENT CO., LTD.) 26 March 2020 (2020-03-26) paragraphs [0029]-[0034], fig. 2	1, 5, 13, 15
Y	JP 2021-153586 A (KT & G CORP.) 07 October 2021 (2021-10-07) fig. 2	9, 11-12, 14-15

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

\* Special categories of cited documents:

“A” document defining the general state of the art which is not considered to be of particular relevance

“E” earlier application or patent but published on or after the international filing date

“L” document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

“O” document referring to an oral disclosure, use, exhibition or other means

“P” document published prior to the international filing date but later than the priority date claimed

“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

“X” document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

“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

“&amp;” document member of the same patent family

Date of the actual completion of the international search

07 January 2022

Date of mailing of the international search report

25 January 2022

Name and mailing address of the ISA/JP

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

Authorized officer

Telephone No.

INTERNATIONAL SEARCH REPORT  
Information on patent family members

International application No.  
**PCT/JP2021/042899**

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
JP 3227591 U	03 September 2020	(Family: none)	
WO 2020/057045 A1	26 March 2020	US 2021/307397 A1 paragraphs [0024]-[0029], fig. 2	
		CN 109077361 A	
		EP 3854241 A1	
JP 2021-153586 A	07 October 2021	US 2020/0093177 A1 fig. 2	
		WO 2018/110834 A2	
		EP 3556230 A2	
		KR 10-2018-0070436 A	
		CN 207604513 U	

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

**REFERENCES CITED IN THE DESCRIPTION**

*This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.*

**Patent documents cited in the description**

- JP 5963375 B [0003]