



(11)

EP 4 740 763 A1

(12)

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

(43) Date of publication:
13.05.2026 Bulletin 2026/20

(51) International Patent Classification (IPC):
A24F 40/46^(2020.01) A24F 40/57^(2020.01)

(21) Application number: **24838806.8**

(52) Cooperative Patent Classification (CPC):
A24F 40/40; A24F 40/46; A24F 40/51; A24F 40/57

(22) Date of filing: **09.07.2024**

(86) International application number:
PCT/CN2024/104467

(87) International publication number:
WO 2025/011554 (16.01.2025 Gazette 2025/03)

(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 ME MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA
Designated Validation States:
GE KH MA MD TN

(72) Inventors:
• **GONG, Weifeng**
Shenzhen, Guangdong 518000 (CN)
• **XU, Zhongli**
Shenzhen, Guangdong 518000 (CN)
• **LI, Yonghai**
Shenzhen, Guangdong 518000 (CN)

(30) Priority: **11.07.2023 CN 202310842632**

(74) Representative: **Viering, Jentschura & Partner mbB**
Patent- und Rechtsanwälte
Am Brauhaus 8
01099 Dresden (DE)

(71) Applicant: **Shenzhen First Union Technology Co., Ltd.**
Shenzhen, Guangdong 518000 (CN)

(54) **HEATING ASSEMBLY AND AEROSOL GENERATING DEVICE**

(57) Embodiments of this application relate to a heating assembly and an aerosol generating device. The heating assembly includes: a heating tube in which a heating cavity accommodating at least a part of an aerosol generating article is provided; a temperature measurement element, including a probe and a conductive pin connected to the probe, where the probe is in contact with an outer surface of the heating tube; and a fixing tube, arranged on a periphery of at least a part of the heating tube, where the probe is located between the heating tube and the fixing tube, and the probe is elastic and elastically abuts against the heating tube or the fixing tube.

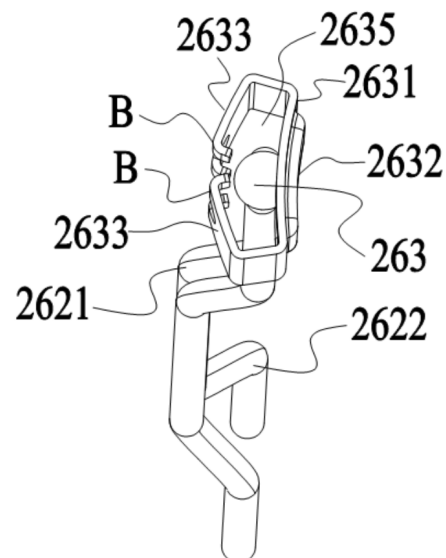


FIG. 13

Description

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority to Chinese Patent Application No. 202310842632.1, filed with the China National Intellectual Property Administration on July 11, 2023 and entitled "HEATING ASSEMBLY AND AEROSOL GENERATING DEVICE", which is incorporated herein by reference in its entirety.

TECHNICAL FIELD

[0002] Embodiments of this application relate to the technical field of aerosol generating devices, and specifically, to a heating assembly and an aerosol generating device.

BACKGROUND

[0003] An aerosol generating device includes a heating assembly, and the heating assembly is usually an electric heating assembly. The electric heating assembly releases heat when being electrically conducted, to heat an aerosol generating article, so that the aerosol generating article generates aerosols without being burnt.

[0004] In some existing aerosol generating devices, a temperature measurement element configured to detect a temperature of the heating assembly is usually further included, and the temperature measurement element is generally connected to the electric heating assembly in a welding manner. However, an insulating layer on a surface of the electric heating assembly may be damaged due to welding. In addition, when the electric heating assembly is a film layer formed on a base, the temperature measurement element welded to the electric heating assembly may pull the film layer. As a result, the film layer is cracked or separated from the base.

SUMMARY

[0005] Embodiments of this application provide a heating assembly and an aerosol generating device, ensuring that a temperature measurement element can be stably connected to a heating tube and does not damage the heating tube.

[0006] An embodiment of this application provides a heating assembly, including:

- a heating tube in which a heating cavity accommodating at least a part of an aerosol generating article is provided;
- a temperature measurement element, including a probe and a conductive pin connected to the probe, where the probe is in contact with an outer surface of the heating tube; and
- a fixing tube, arranged on a periphery of at least a part of the heating tube, where

the probe is located between the heating tube and the fixing tube, and the probe is elastic and elastically abuts against the heating tube or the fixing tube.

[0007] An embodiment of this application provides an aerosol generating device, including the heating assembly and further including a power supply assembly providing electric power to the heating assembly.

[0008] According to the heating assembly and the aerosol generating device, the probe of the temperature measurement element is elastic, and the probe can elastically abut against the heating tube or the fixing tube, so that the probe can be stably kept between the heating tube and the fixing tube and the probe can be tightly attached to the heating tube. In this way, compared with keeping a connection between the probe and the heating tube in a welding manner, a surface layer of the heating tube can be better protected from being damaged, and it can be easier to combine the temperature measurement element with the heating tube.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] One or more embodiments are exemplarily described with reference to the corresponding figures in the accompanying drawings, and the descriptions do not constitute a limitation to the embodiments. Elements in the accompanying drawings that have same reference numerals are represented as similar elements, and unless otherwise particularly stated, the figures in the accompanying drawings are not drawn to scale.

FIG. 1 is a schematic diagram of an aerosol generating device according to an embodiment of this application;

FIG. 2 is a schematic diagram of a heating assembly according to an embodiment of this application;

FIG. 3 is an exploded view of a heating assembly according to an embodiment of this application;

FIG. 4 is a schematic diagram of a first layered component according to an embodiment of this application;

FIG. 5 is a schematic diagram of an electrical connector according to an embodiment of this application;

FIG. 6 is a schematic diagram of a fixing tube according to an embodiment of this application;

FIG. 7 is a schematic diagram of an electric heating element according to an embodiment of this application;

FIG. 8 is another schematic diagram of an electric heating element according to an embodiment of this application;

FIG. 9 is a schematic diagram of a heating assembly with a fixing tube removed according to an embodiment of this application;

FIG. 10 is a schematic diagram of a heating assembly with an end cover according to an embodiment of

this application;

FIG. 11 is a schematic diagram of a temperature measurement element according to an embodiment of this application;

FIG. 12 is another schematic diagram of a temperature measurement element according to an embodiment of this application; and

FIG. 13 is still another schematic diagram of a temperature measurement element according to an embodiment of this application.

Reference numerals in the drawings:

[0010]

1. Aerosol generating article;
2. Heating assembly; 21. Heating tube; 211. Heating cavity; 212. Base body; 213. Electric heating element; 2131. Heat generating member; 2132. Electrode member;
22. Electrical connector; 221. Main body portion; 2211. Connecting portion; 2212. Elastic piece; 222. Abutting portion; 2221. First abutting member; 2222. Second abutting member; 223. Positioning portion;
23. Layered component; 231. First layered component; 2311. Second guiding groove; 2312. First guiding groove; 232. Fixing tube; 2321. Through hole; 24. Clamping space; 25. Wire;
26. Temperature measurement element; 261. Probe; 262. Conductive pin; 262a. Bending portion; 262b. Anti-retraction portion; 2621. Second bending portion; 2622. Third bending portion; 263. Thermal conductive element; 2631. Base body; 2632. Protrusion; 2633. Elastic arm; 2634. Window; 2635. Accommodating space;
A. First abutting surface; B. Second abutting surface;
27. End cover; 271. Second through hole;
3. Power supply assembly; 31. Control board; and
32. Battery.

DETAILED DESCRIPTION

[0011] Technical solutions in embodiments of this application are clearly and completely described below with reference to the accompanying drawings in the embodiments of this application. Apparently, the described embodiments are merely some rather than all of the embodiments of this application. All other embodiments obtained by a person of ordinary skill in the art based on the embodiments of this application without creative efforts shall fall within the protection scope of this application.

[0012] In this application, the terms "first", "second", and "third" are used merely for the purpose of description, and shall not be construed as indicating or implying relative importance or implying a quantity or a sequence of indicated technical features. All directional indications (for example, upper, lower, left, right, front, and rear) in

the embodiments of this application are merely used for explaining relative position relationships, movement situations, or the like between components in a specific posture (as shown in the accompanying drawings). If the specific posture changes, the directional indications accordingly change. In addition, the terms "comprise", "include", and any variations thereof are intended to cover non-exclusive inclusion. For example, a process, method, system, product, or device including a series of steps or units is not limited to the listed steps or units, but instead, optionally includes steps or units that are not listed, or optionally includes other steps or units inherent to the process, method, product, or device.

[0013] "Embodiment" mentioned in this specification means that particular features, structures, or characteristics described with reference to the embodiment may be included in at least one embodiment of this application. A phrase appearing at various positions in this specification may not necessarily indicate a same embodiment or an independent or optional embodiment that is mutually exclusive with another embodiment. A person skilled in the art explicitly or implicitly understands that the embodiments described in this specification may be combined with other embodiments.

[0014] It should be noted that, when an element is expressed as "being fixed to" another element, the element may be directly on the another element, or one or more intermediate elements may exist between the element and the another element. When an element is expressed as "being connected to" another element, the element may be directly connected to the another element, or one or more intermediate elements may exist between the element and the another element.

[0015] Unless otherwise defined, meanings of all technical and scientific terms used in this specification are the same as those usually understood by a person skilled in the technical field to which this application belongs. The terms used in this specification of this application are merely intended to describe objectives of specific embodiments, and are not intended to limit this application. The term "and/or" used in this specification includes any or all combinations of one or more related listed items.

[0016] In addition, the technical features that are described below and that are involved in different embodiments of this application may be combined provided that no conflict occurs.

[0017] Referring to FIG. 1, an embodiment of this application provides an aerosol generating device, where the device may be configured to heat an aerosol generating article 1 to produce aerosols from the aerosol generating article 1.

[0018] In an embodiment, the aerosol generating article 1 may be an article including an aerosol-forming substrate, and the aerosol-forming substrate is intended to release volatile compounds for forming aerosols through heating rather than burning. Compared with aerosols generated by burning or performing thermal degradation on the aerosol-forming substrate, the aero-

sols formed by heating the aerosol-forming substrate may include fewer known harmful components. In an example, the aerosol generating article is removably connected to the aerosol generating device. The aerosol generating article 1 may be disposable or reusable. In an example, the aerosol-forming substrate may include tobaccos, tobacco leaves, tobacco shreds, or tobacco pastes.

[0019] The aerosol generating device is a device connected to or interacting with the aerosol generating article 1 to form inhalable aerosols. For example, the aerosol generating device is an electric operating aerosol generating device and includes a power supply assembly 3 and a heating assembly 2, and the power supply assembly 3 supplies power to cause the heating assembly 2 to heat the aerosol generating article 1.

[0020] The heating assembly 2 includes an external heating assembly, an internal heating assembly, or an air heating assembly. The term "external heating assembly" used in this specification is a heating assembly located outside the aerosol generating article when the aerosol generating article and the aerosol generating device are combined. The term "internal heating assembly" used in this specification is a heating assembly at least partially located inside the aerosol generating article when the aerosol generating article and the aerosol generating device are combined. The term "air heating assembly" used in this specification is a heating assembly configured to heat air in an air inlet channel located upstream of the aerosol generating article to convert at least some air in an airflow channel into hot air and cause the hot air to enter the aerosol generating article to release heat so as to heat the aerosol generating article.

[0021] Referring to FIG. 2 and FIG. 3, the heating assembly 2 includes a heating tube 21, the heating tube 21 includes a heating cavity 211 that can accommodate at least a part of the aerosol generating article 1, and the aerosol-forming substrate in the aerosol generating article 1 is heated in the heating cavity 211 to generate aerosols. Referring to FIG. 2 and FIG. 3, an upper end of the heating cavity 211 is open, so that the upper end of the heating cavity 211 includes an entrance for insertion of the aerosol generating article 1 into the heating cavity 211, and the aerosol generating article 1 can be inserted into the heating cavity 211 from the upper end of the heating cavity 211.

[0022] When the heating assembly 2 is an internal heating assembly, the heating assembly 2 further includes an insertion member at least partially arranged in the heating cavity 211, and when the aerosol generating article 1 is inserted into the heating cavity 211, at least a part of the insertion member is inserted into the aerosol-forming substrate. In this embodiment, the insertion member may include a susceptor. The term "susceptor" used in this specification is a material that can convert electromagnetic energy into heat. When the susceptor is located in a varying electromagnetic field, an eddy current can be formed in the susceptor to cause the sus-

ceptor to generate heat.

[0023] Based on this, the heating tube 21 may be provided with or connected to a magnetic field generator. The magnetic field generator is configured to generate a varying magnetic field, to cause the insertion member in the heating tube 21 to generate heat. The magnetic field generator is electrically connected to the power supply assembly, and the power supply assembly provides a current for the magnetic field generator to generate the varying magnetic field. The magnetic field generator may include one or more induction coils for generating the varying magnetic field, and the one or more induction coils may be combined on the heating tube 21 to surround the susceptor. In an embodiment, the one or more induction coils may be formed on an outer surface of the heating tube 21 in a printing manner, or the one or more induction coils may be combined on the outer surface of the heating tube 21 in the form of a film layer.

[0024] The susceptor may include metal or carbon. In an embodiment, the susceptor may include a ferromagnetic material, for example, ferrite, ferromagnetic steel, or stainless steel. In an embodiment, the susceptor includes nickel-iron alloy. In an embodiment, the susceptor includes 400 series stainless steel, and the 400 series stainless steel includes 410, 420, or 430 stainless steel. When the susceptor is located in electromagnetic fields having similar frequencies and field strengths, different materials consume different amounts of energy. Therefore, parameters of the susceptor, for example, a material type, a length, a width, and a thickness may all be changed to provide required power consumption in existing electromagnetic fields.

[0025] When the heating assembly 2 is an external heating assembly, referring to FIG. 7 and FIG. 8, the heating tube 21 may include a tubular base body 212 and an electric heating element 213 combined on the base body 212.

[0026] The electric heating element 213 may include a resistive heating element, and a resistive material in the resistive heating element includes but is not limited to: a semiconductor like doped ceramic or conductive ceramic (for example, molybdenum disilicide), carbon, graphite, metal, metal alloy, and a composite material made of a ceramic material and a metal material. The composite material may include doped or non-doped ceramic. A suitable example of the doped ceramic includes doped silicon carbide. A suitable example of the metal includes titanium, zirconium, tantalum, and platinum group metal. A suitable example of the metal alloy includes stainless steel, constantan, nickel-containing alloy, cobalt-containing alloy, chromium-containing alloy, aluminum-containing alloy, titanium-containing alloy, zirconium-containing alloy, hafnium-containing alloy, niobium-containing alloy, molybdenum-containing alloy, tantalum-containing alloy, tungsten-containing alloy, stannum-containing alloy, gallium-containing alloy, manganese-containing alloy, and iron-containing alloy, nickel-based, iron-based, or cobalt-based superalloy, stainless steel, iron-aluminum-based

alloy, and iron-manganese-aluminum-based alloy. In the composite material, to make the resistive material visible, the resistive material needs to be buried in an insulating material and wrapped or coated by the insulating material, or vice versa.

[0027] The resistive heating element may be a resistive material coating or a resistive material printed layer formed on an outer surface of the base body 212; or the resistive heating element may be a heating film wrapped on the outer surface of the base body 212; or the resistive heating element may be a resistance wire or a resistance mesh arranged on the outer surface of the base body 212; or the resistive heating element may be conductive ceramic. It should be noted that, in another embodiment, the base body 212 of the heating tube may be made of conductive ceramic, so that there is no need to additionally arrange the resistive heating element.

[0028] The electric heating element 213 may include an infrared heating element, the infrared heating element may be an infrared electrothermal coating, the infrared heating element is formed on the outer surface of the base body 212, and the base body 212 is formed by a material like quartz that can transmit an infrared ray. The infrared heating element can generate heat when being powered on, to further generate an infrared with a specific wavelength, for example, an infrared ray whose wavelength ranges from 0.75 μm to 1000 μm . Optionally, the infrared electrothermal coating is obtained by fully stirring far-infrared electrothermal inks, ceramic powders, and an inorganic binding agent uniformly and printing the mixture on the outer surface of the base body, and drying and curing the mixture for specific time, where a thickness of the infrared electrothermal coating ranges from 30 μm to 50 μm . Certainly, the infrared electrothermal coating may alternatively be obtained by mixing and stirring tin tetrachloride, tin oxide, antimony trichloride, titanium tetrachloride, and anhydrous copper sulfate according to a specific proportion and printing the mixture on the outer surface of the base body; or may be one of a silicon carbide ceramic layer, a carbon fiber composite layer, a zirconium-titanium-based oxide ceramic layer, a zirconium-titanium-based nitride ceramic layer, a zirconium-titanium-based boride ceramic layer, a zirconium-titanium-based carbide ceramic layer, an iron-based oxide ceramic layer, an iron-based nitride ceramic layer, an iron-based boride ceramic layer, an iron-based carbide ceramic layer, a rare earth-based oxide ceramic layer, a rare earth-based nitride ceramic layer, a rare earth-based boride ceramic layer, a rare earth-based carbide ceramic layer, a nickel-cobalt-based oxide ceramic layer, a nickel-cobalt-based nitride ceramic layer, a nickel-cobalt-based boride ceramic layer, a nickel-cobalt-based carbide ceramic layer, or a high-silicon molecular sieve ceramic layer. Alternatively, the infrared electrothermal coating may be an existing coating made of another material.

[0029] In an embodiment, the electric heating element 213 includes a heat generating member 2131 generating

heat or an infrared ray when being powered on and an electrode member 2132 electrically connected to the heat generating member 2131. A resistance of the electrode member 2132 is lower than a resistance of the heat generating member 2131, and the electrode member 2132 is configured to electrically connect the heat generating member 2131 and an electrical connector 22. In an embodiment, the electric heating element 213 includes a heat generating member 2131 generating heat or an infrared ray when being powered on, and the heat generating member 2131 is directly electrically connected to the electrical connector 22.

[0030] The outer surface of the heating tube 21 includes a preset temperature measurement position, that is, a second position, the second position may be located in a heat centralized region of the heating tube 21, and the heat centralized region of the heating tube 21 has a higher temperature or a higher temperature rise speed than another region of the heating tube 21.

[0031] Referring to FIG. 2, FIG. 3, and FIG. 9, the heating assembly 2 includes a temperature measurement element 26, and the temperature measurement element 26 is tightly attached to the outer surface of the heating tube 21 to sense a temperature of the heating tube 21. Specifically, the temperature measurement element 26 includes a probe 261 and a conductive pin 262 connected to the probe 261, and the probe 261 is arranged in contact with or adjacent to the second position of the heating tube 21.

[0032] In an embodiment of this application, the temperature measurement element 26 is configured as including a thermistor temperature detector. A thermistor includes a thermistor chip and two conductive pins 262, the thermistor chip is arranged in the probe 261, and the two conductive pins 262 are respectively connected to two electrodes of the thermistor chip. At least a part of the thermistor chip and the two conductive pins 262 are encapsulated in an outer shell to form the thermistor temperature detector. The two conductive pins 262 are electrically connected to a control board 31 of the power supply assembly 3, to transmit temperature information to the control board 31 of the power supply assembly 3, and the control board 31 further controls, according to the timely temperature information of the heating tube 21 measured by the thermistor temperature detector, an amount of electric power provided by a battery 32 to the heating tube 21.

[0033] An outer shell of the probe 261 of the thermistor temperature detector may include a thermal conductive element 263. The thermal conductive element 263 is made of a thermal conductive material and has a high thermal conductivity. The thermal conductive material may be understood as a material whose thermal conductivity is at least 10 W/m·K, preferably at least 40 W/m·K, and more preferably at least 100 W/m·K at 23°C and relative humidity of 50%. Specifically, the thermal conductive material is formed by a material whose thermal conductivity is at least 40 W/m·K, preferably at

least 100 W/m·K, more preferably 150 W/m·K, and most preferably 200 W/m·K at 23°C and relative humidity of 50%. A suitable thermal conductive material includes but is not limited to graphite, graphene, aluminum, copper, zinc, steel, silver, a thermal conductive polymer, or any combination or alloy thereof. The thermal conductive element 263 is tightly attached to the heating tube 21, and since the thermal conductive element 263 has a good thermal conductivity, a temperature consistent with a temperature on the surface of the heating tube 21 can be quickly reached. To improve sensitivity of the thermal conductive element 263 for a temperature change of the heating tube 21 and reduce heat absorbed by the thermal conductive element 263 from the heating tube 21, a thickness of the thermal conductive material forming the thermal conductive element 263 may be reduced. For example, the thickness of the thermal conductive material may range from 0.03 mm to 1.5 mm, or the thickness of the thermal conductive material may be 0.1 mm.

[0034] In an embodiment of this application, referring to FIG. 11 to FIG. 13, the temperature measurement element 26 is configured as including a thermocouple, and the thermocouple may be a K-type thermocouple, a J-type thermocouple, an S-type thermocouple, an R-type thermocouple, a B-type thermocouple, a T-type thermocouple, an N-type thermocouple, or an E-type thermocouple. The conductive pin 262 includes two thermocouple wires made of different materials, which are respectively a first thermocouple wire and a second thermocouple wire.

[0035] The probe 261 includes a thermal conductive element 263.

[0036] In an example, referring to FIG. 13, the first thermocouple wire and the second thermocouple wire are electrically connected to form a thermocouple, and a hot junction of the thermocouple is welded to the thermal conductive element 263. In an example, the thermal conductive element 263 includes a conductor, a hot junction of the first thermocouple wire and a hot junction of the second thermocouple wire are both connected to the conductor, so that the first thermocouple wire and the second thermocouple wire are electrically connected through the conductor to form the thermocouple.

[0037] A cold junction of the thermocouple is configured to be electrically connected to the control board 31 of the power supply assembly 3, so that the control board 31 may obtain, according to a thermal electromotive force caused by a temperature difference between the hot junction and the cold junction of the thermocouple, a temperature at the hot junction of the thermocouple, that is, obtain a temperature of the thermal conductive element 263, to further obtain a temperature at the second position on the surface of the heating tube 21.

[0038] In an embodiment in which the temperature measurement element 26 includes the thermocouple, an insulating layer may exist on a surface of at least one of the heating tube 21 and the thermal conductive

element 263, to prevent the induction coil on the heating tube 21, the electric heating element 213, or the base body 212 prepared by using conductive ceramic from being electrically connected to the thermal conductive element 263, so that the thermal conductive element 263 can be prevented from causing electrical disturbance to the induction coil, the electric heating element 213, or the base body 212 prepared by using conductive ceramic, thereby ensuring that heat generation of the heating tube 21 is not affected by the thermal conductive element 263 and the thermocouple. In an example, an insulating layer exists on a surface of the induction coil, the electric heating element 213, or the base body 212 prepared by using conductive ceramic, and the insulating layer may be formed through printing, spray coating, physical deposition, chemical deposition, ion implantation, or particle sputtering, or the insulating layer may be a high-temperature tape wound on the surface of the heating tube 21 or adhered to the surface of the heating tube 21.

[0039] Referring to FIG. 2 and FIG. 3, the heating assembly 2 includes a layered component 23, and the layered component 23 is arranged surrounding at least a part of the heating tube 21. The layered component 23 includes a fixing tube 232, the probe 261 is located between the heating tube 21 and the fixing tube 232, and the fixing tube 232 provides an acting force causing the probe 261 to be tightly attached to the heating tube 21. In an example, the fixing tube 232 is elastic, so that the elastic fixing tube 232 extrudes the probe 261 to cause the probe 261 to be tightly attached to the heating tube 21. In an example, the probe 261 is elastic, and the probe 261 elastically abuts against the heating tube 21 or the fixing tube 232, so that the probe 261 can be tightly attached to the heating tube 21.

[0040] In an embodiment, the probe is elastic. In this embodiment, the probe includes a thermal conductive element and an elastic member, where the elastic member includes silicone, rubber, sponge, or spring, and the elastic member is elastic and elastically abuts against the heating tube or the fixing tube.

[0041] In an embodiment, the probe 261 is elastic, or the probe 261 includes a thermal conductive element 263, and the thermal conductive element 263 is elastic. In this embodiment, the probe 261 includes a first abutting portion abutting against the heating tube 21 and a second abutting portion abutting against the fixing tube 232, and at least one of the first abutting portion and the second abutting portion is elastic.

[0042] Specifically, referring to FIG. 12 and FIG. 13, the second abutting portion includes an elastic arm 2633, the elastic arm 2633 may include a cantilever with a free end, and the free end of the cantilever extends toward a direction in which the first abutting portion is located, so that an arc-shaped second abutting surface B is formed on a surface of the second abutting portion. A surface of the second abutting surface B formed in this way is smooth, helping prevent the fixing tube 232 from being damaged and prevent stress concentration on the

fixing tube 232 when the second abutting surface B abuts against the fixing tube 232. The elastic arm 2633 provides an acting force causing the second abutting surface B to elastically abut against the fixing tube 232.

[0043] The elastic arm 2633 may include a first elastic arm and a second elastic arm that are spaced apart from each other, and the first elastic arm and the second elastic arm may be arranged opposite to each other, so that a length of each elastic arm 2633 can be shortened, helping improve an elastic coefficient of the elastic arm 2633. Therefore, under an action of a same extrusion force, the elastic arm 2633 can have smaller elastic deformation, which is beneficial to reducing a volume of the probe 261. Certainly, in other examples, the first elastic arm and the second elastic arm may be arranged side by side.

[0044] Referring to FIG. 11, the first abutting portion may include a first abutting surface A abutting against the heating tube 21. To improve sensitivity of the probe 261 for a temperature change of the heating tube 21 and cause a temperature of the first abutting portion to be consistent with a temperature of the surface of the heating tube 21 as much as possible, at least a partial region of the first abutting surface A may be an arc-shaped surface attached to the outer surface of the heating tube 21, which is not only beneficial to attachment between the first abutting surface A and the heating tube 21, but also can increase a heat exchange area.

[0045] Specifically, at least a partial edge of the first abutting surface A extends toward a direction in which the second abutting portion is located, so that the at least a partial edge of the first abutting surface A has a rounded corner, to prevent a surface layer of the heating tube 21 from being damaged by the edge of the first abutting surface A during combination of the heating tube 21 and the probe 261.

[0046] In an embodiment shown in FIG. 11 and FIG. 13, the first abutting portion includes a base body 2631 and a protrusion 2632 formed on the base body 2631. The protrusion 2632 includes the foregoing first abutting surface A, the edge of the first abutting surface A is bent and extends to form a side edge of the protrusion 2632, and a transition from the first abutting surface A to the side edge is a smooth transition, so that there is no apparent boundary line between the first abutting surface A and the side edge. Therefore, no matter which direction the probe 261 moves along the surface of the heating tube 21, the edge of the first abutting surface A does not scratch or damage the surface layer of the heating tube 21. To ensure an area of the first abutting surface A, the protrusion 2632 may occupy at least 70% of an area of the base body 2631, for example, occupy 80% or 90% of the area of the base body 2631. Stamping is performed on an inner side of the base body 2631, so that the inner side of the base body 2631 is recessed and an outer side protrudes, to form the foregoing protrusion 2632.

[0047] Since a material like the thermal conductive element 263 forming the probe 261 has a small thickness,

the thickness may range from 0.03 mm to 1.5 mm, it is more effective to form a protrusion 2632 with a smooth corner at an edge through stamping compared with polishing an edge of the material like the thermal conductive element 263 into a rounded corner.

[0048] To ensure that an extension area of the first abutting portion is reduced while ensuring that the first abutting surface A has a large area, that is, to miniaturize the probe 261, hollows on the first abutting portion may be reduced, so that the first abutting portion has good integrity. When the first abutting portion has no hollow or has a small quantity of hollows, it is beneficial to preventing the first abutting portion from scratching or damaging the surface layer of the heating tube 21 when moving along the surface of the heating tube 21.

[0049] Referring to FIG. 12 and FIG. 13, the conductive pin 262 is connected to an inner side of the first abutting portion. More specifically, the hot junction of the thermocouple is connected to an inner side of the protrusion 2632, so that the hot junction of the thermocouple is closer to the heating tube 21, and a temperature of the hot junction of the thermocouple is closer to the temperature of the surface of the heating tube 21.

[0050] A window 2634 for welding laser or a welding head to pass through may be formed on the second abutting portion, and the window 2634 is provided corresponding to an end portion of the conductive pin 262 or the hot junction. The window 2634 can enable the welding laser or the welding head to pass through to perform welding on the conductive pin 262 and the temperature measurement element 26, and can also enable the welding to be performed in a visually inspectable state (including visually inspectable by naked eyes or visually inspectable by a machine). Therefore, welding quality can be improved, and welding process difficulty can be reduced. Specifically, the window 2634 is provided corresponding to a welding point on the first abutting portion, and the conductive pin 262 is welded to the welding point.

[0051] Referring to FIG. 11 to FIG. 13, the probe 261 includes a first abutting portion abutting against the heating tube 21 and a second abutting portion abutting against the fixing tube 232, an accommodating space exists between the first abutting portion and the second abutting portion, and the end portion of the conductive pin 262 is accommodated in the accommodating space 2635, so that the end portion of the conductive pin 262 or the hot junction can be prevented from being in contact with the heating tube 21 and the fixing tube 232, helping prevent the heating tube 21 and/or the fixing tube 232 from rubbing the end portion of the conductive pin 262 when the probe 261 moves along the heating tube 21, where the rubbing affects connection stability and good contact between the end portion of the conductive pin 262 or the hot junction and the probe 261.

[0052] In the embodiment shown in FIG. 11 and FIG. 12, a lower end of the accommodating space 2635 is open, for insertion of the end portion of the conductive pin 262 or the hot junction into the accommodating space

2635. An upper end of the accommodating space 2635 may also be open, which is not limited in this application.

[0053] In a process of arranging the probe 261 of the temperature measurement element 26 at the second position to cause the conductive pin 262 connected to the probe 261 to be electrically connected to the power supply assembly 3, the conductive pin 262 is generally pulled, and to prevent the probe 261 from deviating from the second position under pulling of the conductive pin 262, the heating assembly 2 may be constructed into a structure that can prevent the probe 261 from moving toward a pulling direction.

[0054] In an embodiment, the heating assembly 2 includes a fixing tube 232, the fixing tube 232 is wound on at least a part of a periphery of the heating tube 21, and at least a part of the probe 261 is kept between the fixing tube 232 and the heating tube 21. Specifically, the fixing tube 232 may extrude the probe 261, to cause the probe 261 to be tightly attached to the heating tube 21 and prevent the probe 261 from moving.

[0055] A first through hole 2321 for the conductive pin 262 to pass through is provided on the fixing tube 232, and the first through hole 2321 is configured to change an extending direction of the conductive pin 262, so that the conductive pin 262 is bent when passing through the first through hole 2321. In an example, a central axis of the first through hole 2321 inclines relative to an axial direction of the heating tube 21, for example, the central axis of the first through hole 2321 is perpendicular to the axial direction of the heating tube 21, so that the conductive pin 262 connected to the probe 261 needs to change the extending direction to pass through the first through hole 2321, or the conductive pin 262 located in the first through hole 2321 needs to have a different extending direction from that of the conductive pin 262 located between the probe 261 and the first through hole 2321, so that the conductive pin 262 is bent to pass through the first through hole 2321.

[0056] For clear description, the conductive pin 262 between the probe 261 and the first through hole 2321 is defined as a first part, the conductive pin 262 located in the first through hole 2321 is defined as a second part, and the conductive pin 262 located outside the first through hole 2321 is defined as a third part, where the first part and the second part have different extending directions, that is, bending occurs between the first part and the second part. When the third part is pulled, the first part and the third part can bear different acting forces due to the bending of the conductive pin 262, so that the acting force borne by the first part is less than the acting force borne by the third part. It should be noted that, the first part may have a specific length and can be located between the fixing tube 232 and the heating tube 21. However, this application is not limited thereto.

[0057] Specifically, when the third part is pulled, a hole wall of the first through hole 2321 may be in contact with and support the second part, or the hole wall of the first through hole 2321 may be in contact with and support the

conductive pin 262 due to the bending formed by the first through hole 2321, a support force provided by the hole wall of the first through hole 2321 to the conductive pin 262 can reduce the acting force borne by the first part.

[0058] Alternatively, when the third part is pulled, a bending degree of the bending formed due to the first through hole 2321 may be changed, for example, an angle between the first part and the second part may be increased, to cause the conductive pin 262 to extend by a suitable distance in a direction of a pulling force, thereby reducing a pulling force that should be borne by the first part.

[0059] Therefore, the bending formed due to the first through hole 2321 can reduce an acting force borne by the probe 261 along the conductive pin 262, helping prevent the probe 261 from moving.

[0060] In an embodiment, referring to FIG. 2 and FIG. 3, the conductive pin 262 includes a bending portion 262a formed through bending, where there may be one or more bending portions 262a, and the heating assembly 2 further includes an anti-retraction portion 262b, where there may be one or more anti-retraction portions 262b. Each anti-retraction portion 262b is at least arranged corresponding to one bending portion 262a, and the anti-retraction portion 262b and the corresponding bending portion 262a may be close to each other but are not in contact with each other in terms of positions, or the anti-retraction portion 262b and the corresponding bending portion 262a may be in contact with each other. Therefore, when the conductive pin 262 is pulled, the anti-retraction portion 262b can stop the bending portion 262a that comes into contact with the anti-retraction portion through deformation or stop the bending portion 262a that is in contact with the anti-retraction portion, to provide a stop force to resist the acting force pulling the conductive pin 262, and the stop force can reduce a pulling force of the conductive pin 262 to the probe 261, so that the anti-retraction portion 262b can prevent the probe 261 connected to the conductive pin 262 from deviating from the second position.

[0061] For example, in a process of arranging the probe 261 of the temperature measurement element 26 at the second position to cause the conductive pin 262 connected to the probe 261 to be electrically connected to the power supply assembly 3, the conductive pin 262 is generally pulled. In this case, through coordination between the anti-retraction portion 262b and the bending portion 262a, the pulling force of the conductive pin 262 to the probe 261 can be reduced when the conductive pin 262 is pulled, helping keep the probe 261 at the second position and helping prevent the probe 261 from moving. In addition, the anti-retraction portion 262b and the bending portion 262a can reduce the acting force causing the conductive pin 262 to pull the probe 261, helping prevent the pulling force from damaging the connection integrity between the probe 261 and the conductive pin 262 and helping protect the temperature measurement element 26.

[0062] In an embodiment, referring to FIG. 2 and FIG. 3, the outer surface of the heating tube 21 further includes a first position, the heating assembly 2 includes a layered component 23, and the layered component 23 is arranged surrounding at least a part of the heating tube 21. The layered component 23 includes a first layered component 231, the first layered component 231 includes a first guiding groove 2312, the first guiding groove 2312 communicates the first position with the second position, at least the second position in the first position and the second position may be exposed in the first guiding groove 2312, and the first guiding groove 2312 may provide a channel for guiding the probe 261 from the first position to the second position. The probe 261 may move from the first position to the second position along the surface of the heating tube 21. In an example, in the axial direction of the heating tube 21, a length of the first guiding groove 2312 is consistent with a length of the probe 261. In an example, in the axial direction of the heating tube 21, a length of the first guiding groove 2312 is greater than a length of the probe 261.

[0063] The conductive pin 262 includes the bending portion 262a at the first position or a position adjacent to the first position, and correspondingly, an anti-retraction portion 262b exists at the first position or the position adjacent to the first position. The anti-retraction portion 262b at this position stops the bending portion 262a at the position, to prevent the probe 261 from exiting the second position when the conductive pin 262 is pulled.

[0064] An extending direction of the first guiding groove 2312 may be approximately parallel to the axial direction of the heating tube 21. The second position may be arranged at an end of the first guiding groove 2312, that is, in a direction of the first guiding groove 2312 guiding to the second position, the first layered component 231 includes a first end wall defining an extension end point of the first guiding groove 2312, and the probe 261 is stopped by the first end wall at the second position, to ensure that the probe 261 can be accurately moved to the second position.

[0065] A width of the first guiding groove 2312 may be greater than a width of the probe 261, so that in a process of causing the probe 261 to move along the first guiding groove 2312 to the second position, resistance of the first guiding groove 2312 to the probe 261 can be reduced. A width of the first guiding groove 2312 may be equal to a width of the probe 261, so that the first guiding groove 2312 is provided on groove walls on two opposite sides of the temperature measurement element 26, thereby preventing unexpected movement of the probe 261 in a circumferential direction of the heating tube 21. Certainly, in another embodiment, the width of the first guiding groove 2312 may be slightly less than the width of the probe 261, so that the first guiding groove 2312 can clamp the probe 261, helping keep the probe 261 at the second position.

[0066] In an example, the first position may also be exposed in the first guiding groove 2312, and the first

guiding groove 2312 can provide a channel for moving the probe 261 from the first position to the second position. In addition, in the first guiding groove 2312, the first position is different from the second position, and the first position and the second position may be respectively located at two opposite ends of the first guiding groove 2312. However, this application is not limited thereto.

[0067] More specifically, the first position may be adjacent to an extension start point of the first guiding groove 2312, that is, in the direction of the first guiding groove 2312 guiding to the second position, the first layered component 231 includes a second end wall defining the extension start point of the first guiding groove 2312, when the probe 261 is at the second position, a part of the conductive pin 262 is accommodated in the first guiding groove 2312, and a part of the conductive pin 262 at the first position extends in a radial direction of the heating tube 21 and extends to the outside of the first guiding groove 2312. Therefore, one bending portion 262a on the conductive pin 262 may be formed in the first guiding groove 2312 and at a position corresponding to the first position, where the bending portion 262a is referred to as a first bending portion, the second end wall may become an anti-retraction portion 262b, where the anti-retraction portion 262b is referred to as a first anti-retraction portion. The first anti-retraction portion is in contact with or close to the first bending portion formed in the first guiding groove 2312, so that when the conductive pin 262 is pulled, the first anti-retraction portion can stop the first bending portion, thereby preventing the probe 21 from moving.

[0068] In an example, the first position is located outside the first guiding groove, the heating assembly further includes an end cover arranged at an upper end or a lower end of the heating tube, the first position is adjacent to one end cover, the end cover adjacent to the first position is referred to as a first end cover, and the first position is located between the fixing tube and the first end cover. In addition, a part of the conductive pin extends at the first position in the radial direction of the heating tube, so that at least a part of the conductive pin located outside the first guiding groove can be bent relative to the conductive pin located in the first guiding groove, and the conductive pin is provided with the bending portion at the position adjacent to the first position. The first end cover has an edge whose outer diameter is greater than an outer diameter of the heating tube, and the edge forms the anti-retraction portion that can support the bending portion described in this example, thereby preventing the probe from moving when the conductive pin is pulled.

[0069] In an embodiment, the heating assembly 2 includes a fixing tube 232 and a first layered component 231, and the anti-retraction portion is arranged on the fixing tube 232, where the anti-retraction portion arranged on the fixing tube 232 is referred to as a second anti-retraction portion.

[0070] Based on this, in this embodiment, the second

anti-retraction portion may include a first through hole 2321 provided on the fixing tube 232, the first through hole 2321 is in communication with the first position, the first through hole 2321 may allow the temperature measurement element 26 to pass through, the temperature measurement element 26 passes through the first through hole 2321 and enters the first guiding groove 2312, and the probe 261 may be moved along the first guiding groove 2312 to the second position. The first through hole 2321 may be provided directly facing the first position.

[0071] Referring to FIG. 2 and FIG. 10, one bending portion in the conductive pin 262 is a second bending portion 2621, and at least a part of the second bending portion 2621 may be located in the first through hole 2321. In this embodiment, the second bending portion 2621 may be formed since an orientation of the first through hole 2321 and the extending direction of the first guiding groove 2312 are not located on the same straight line in a process that the conductive pin 262 passes through the first through hole 2321, or the second bending portion 2621 may be formed before the conductive pin 262 passes through the first through hole 2321.

[0072] In an example, the second bending portion 2621 is suspended in the first through hole 2321 in an initial state, so that the second bending portion 2621 is not in contact with the hole wall of the first through hole 2321. When the conductive pin 262 is pulled, the second bending portion 2621 is deformed. For example, when the conductive pin 262 is pulled, the second bending portion 2621 is deformed with a reduced bending degree, so that the second bending portion 2621 extends. In this case, a pulling force of the conductive pin 262 to the probe 262 is less than a pulling force that the conductive pin 262 encounters, when the conductive pin 262 continues to be pulled to cause the second bending portion 2621 to extend to be in contact with the hole wall of the first through hole 2321, the hole wall of the first through hole 2321 can provide an acting force supporting the second bending portion 2621, and a component of the acting force in a reverse direction of the pulling force that the conductive pin 262 encounters and a component of the acting force in a direction perpendicular to the pulling force that the conductive pin 262 encounters are both less than the pulling force that the conductive pin 262 encounters, so that the pulling force of the conductive pin 262 to the probe 261 can be reduced, helping prevent the probe 261 from being removed from the second position.

[0073] In an example, the second bending portion 2621 is in contact with at least a part of the hole wall of the first through hole 2321 in an initial state, so that when the conductive pin 262 is pulled, the hole wall of the first through hole 2321 can provide an acting force supporting the second bending portion 2621, and the acting force can reduce a pulling force of the conductive pin 262 to the probe 261. Specifically, due to the second bending portion 2621, the conductive pin 262 includes a first step, and the first through hole 2321 supports the first step, so that

the first through hole 2321 can prevent the second bending portion 2621 from exiting the first through hole 2321, and further prevent the probe 261 from moving from the second position to the first position.

[0074] Referring to FIG. 2 and FIG. 3, in a process that the probe 261 of the temperature measurement element 26 moves along a second guiding groove 2312 to the second position, a part of the conductive pin 262 of the temperature measurement element 26 passes through the first through hole 2321 to enter the second guiding groove 2312, and a part of the conductive pin is located outside the fixing tube 232. The fixing tube 232 can block a periphery of the second position, so that the fixing tube 232 can block the probe 261 of the temperature measurement element 26, and the probe 261 can be hidden between the heating tube 21 and the fixing tube 232. Therefore, in a subsequent assembly or processing process of the heating assembly 2, the fixing tube 232 can insulate other components in addition to the heating assembly 2 from being in contact with the probe 261, thereby protecting the probe 261 and preventing displacement of the probe 261.

[0075] Therefore, after arrangement of the heating tube 21, the first layered component 231, and the fixing tube 232 is completed, the probe 261 may be caused to pass through the fixing tube 232 through the first through hole 2321 and move from the first position to the blocked second position through the first guiding groove 2312.

[0076] In an example, a thickness of the probe 261 in the radial direction of the heating tube 21 is greater than a thickness D of the first layered component 231, so that the probe 261 can protrude in the radial direction of the heating tube 21 out of the second guiding groove 2312, and the probe 261 can be in direct contact with the fixing tube 232 and be directly extruded inward by the fixing tube 232 in the radial direction of the heating tube 21, where a radius of the fixing tube 232 (for example, an inner radius of the fixing tube) may be greater than or equal to a sum of a radius of the heating tube 21 (for example, an outer radius of the heating tube 21) and the thickness of the probe 261 in the radial direction of the heating tube 21. For ease of moving the probe 261 from the first position to the second position, preferably, the inner radius of the fixing tube 232 is greater than the sum of the outer radius of the heating tube 21 and the thickness of the probe in the radial direction of the heating tube 21.

[0077] Referring to FIG. 2, FIG. 3, and FIG. 5, the heating assembly 2 further includes an electrical connector 22 electrically connected to the heating tube 21, and the electrical connector 22 is electrically connected to the heating tube 21, so that an induction coil arranged on the heating tube 21, the electric heating element 213, or the base body 212 prepared by using conductive ceramic is electrically connected to the electrical connector 22. The electrical connector 22 may be electrically connected to the power supply assembly 3 through a wire 25 or another conductive element, or the electrical con-

nector 22 may be directly electrically connected to the power supply assembly 3.

[0078] At least a part of the electrical connector 22 is arranged between the heating tube 21 and the fixing tube 232, the electrical connector 22 abuts against the fixing tube 232 to provide a tensioning force causing the fixing tube 232 to tension, and the fixing tube 232 is configured to extrude the probe 261 inward in the radial direction of the heating tube 21 under an action of the tensioning force, so that the probe 261 is tightly attached to the second position of the heating tube 21.

[0079] Based on this, for ease of moving the probe 261 along the first guiding groove 2312 to the second position, in a process of assembling the heating assembly 2, the temperature measurement element 26 may be assembled first, and when the probe 261 is pushed to the second position, at least a part of the electrical connector 22 is then inserted between the heating tube 21 and the fixing tube 232, so that the electrical connector 24 abuts against the heating tube 21 and the fixing tube 232 respectively toward two opposite sides. In this case, the fixing tube 232 tensions, and the tensioned fixing tube 232 is tightened to extrude the probe 261 inward, so that the probe 261 is tightly attached to the second position of the heating tube 21.

[0080] A thickness of the electrical connector 22 in the radial direction of the heating tube 21 is greater than the thickness of the probe 261 in the radial direction of the heating tube 21; or the electrical connector 22 includes a main body portion electrically abutting against the heating tube 21 and an abutting portion 222 extending from the main body portion 221 in the radial direction of the heating tube 21, where the abutting portion 222 abuts against the fixing tube 232, and an extension length L of the abutting portion 222 in the radial direction of the heating tube 21 is greater than the thickness of the probe 261. In this way, the electrical connector 22 can provide the tensioning force causing the fixing tube 232 to tension.

[0081] The abutting portion 222 may include a first abutting member 2221 and a second abutting member 2222 arranged on two opposite sides of the main body portion 221, that is, the first abutting member 2221 and the second abutting member 2222 are spaced apart from each other, and a plurality of abutting portions 222 respectively abut against different positions of the fixing tube 232, helping prevent stress concentration on the fixing tube 232, and helping prevent the fixing tube 232 from being pierced, punctured, or scratched by the abutting portion 222.

[0082] In an embodiment, referring to FIG. 3 and FIG. 4, to prevent the abutting portion 222 from scratching or piercing the fixing tube 232, the abutting portion 222 includes a rounded abutting surface, and the abutting portion 222 abuts against an inner wall of the fixing tube 232 through the rounded abutting surface. The rounded abutting surface refers to that the abutting surface is a smooth planar surface or a smooth arc surface, and the

rounded abutting surface is not provided with a spiked or sharp edge, where a connection angle between the abutting surface and an adjacent surface may be a rounded angle.

[0083] Referring to FIG. 3 and FIG. 4, the main body portion 221 abuts against the heating tube 21, and the abutting portion 222 and the main body portion 221 may be integrally formed. Specifically, the abutting portion 222 may be formed through extension from the main body portion 221 in the radial direction of the heating tube 21.

[0084] Referring to FIG. 4, the abutting portion 222 may be constructed to have a fold in the radial direction of the heating tube 21, a smooth arc-shaped curve surface is formed at the fold of the abutting portion, and the abutting surface is formed at the fold of the abutting portion 222, that is, at least a part of the arc-shaped curve surface forms the abutting surface of the abutting portion 222.

[0085] The abutting portion 222 may be folded to increase a strength of the abutting portion 222, to prevent the abutting portion 222 from being deformed when abutting against the fixing tube 232. The abutting portion 222 may be folded to increase an abutting area between the abutting portion 222 and the fixing tube 232, helping protect the fixing tube 232. In addition, a thickness of a metal sheet forming the electrical connector 22 does not exceed 5 mm. Therefore, the smooth abutting surface with a large area formed by folding the abutting portion 222 has lowest costs and a simplest process.

[0086] To ensure that the fixing tube 232 can extrude the probe 261 inward, projections of the electrical connector 22 and the probe 261 at the upper end or the lower end of the heating tube 21 do not overlap with each other, to prevent the electrical connector 22 from affecting an acting force of the fixing tube 232 extruding the temperature measurement element 26 or the probe.

[0087] Specifically, the heating assembly 2 further includes a clamping space 24 provided between the heating tube 21 and the fixing tube 232, at least a part of the electrical connector 22 is accommodated in the clamping space 24, and the electrical connector 22 abuts against the heating tube 21 in the clamping space 24 and is electrically connected to the heating tube through abutment. The clamping space 24 includes an entrance for the at least a part of the electrical connector 22 to enter. For example, an upper end and/or a lower end of the clamping space 24 are open, and the open part forms the entrance. Therefore, in a formation process of the heating assembly 2, the heating tube 21 may be first combined with the fixing tube 232, the clamping space 24 is formed between the fixing tube 232 and the heating tube 21, the at least a part of the electrical connector 22 is then inserted into the clamping space 24 from the entrance of the clamping space 24, so that the at least a part of the electrical connector 22 is kept in the clamping space 24. In addition, the fixing tube 232 can extrude the electrical connector 22, so that stable electrical abutment is kept between the electrical connector 22 and the heating tube 21. Compared with using a manner such as welding, this

process is simpler, which is beneficial to improving production efficiency and reducing production costs.

[0088] The first layered component 231 defines a part of a boundary of the clamping space 24, and the clamping space 24 may be formed in a region that is between the heating tube 21 and the fixing tube 232 and that is not covered by the first layered component 231.

[0089] In an embodiment, the electrical connector is constructed into annular and wound on the outer surface of the heating tube, or the electrical connector is constructed into tubular and sleeved on the outer surface of the heating tube. Based on this, an upper end edge and/or a lower end edge of the first layered component defines the part of the boundary of the clamping space.

[0090] In another embodiment, referring to FIG. 3 and FIG. 4, a second guiding groove 2311 in communication with the entrance from the first layered component 231 is provided on the first layered component 231. An extending direction of the second guiding groove 2311 may be approximately parallel to the axial direction of the heating tube 21. The second guiding groove 2311 may extend from an upper end of the first layered component 231 to a lower end of the first layered component 231, so that the upper end and the lower end of the first layered component 231 are in communication with each other, as shown in FIG. 3; or the second guiding groove 231 may extend from the upper end or the lower end of the first layered component 231, and an extension length of the second guiding groove in the axial direction of the heating tube 21 may be less than an extension length of the first layered component 231 in the axial direction of the heating tube 21, as shown in FIG. 4.

[0091] The second guiding groove 2311 includes a first guiding wall and a second guiding wall arranged opposite to each other, the electrical connector 22 located in the clamping space 24 is accommodated between the first guiding wall and the second guiding wall, and after entering the clamping space 24 through the entrance of the clamping space 24, the electrical connector goes deeper into the clamping space 24 in a direction defined by the first guiding wall and the second guiding wall.

[0092] In an example, the first guiding wall and the second guiding wall may clamp the electrical connector 22, which is conducive to keeping the electrical connector 22 in the clamping space 24.

[0093] In an example, referring to FIG. 5, the electrical connector 22 includes a main body portion 221 and a first abutting member 2221 and a second abutting member 2222 extending in the radial direction of the heating tube 21. The main body portion 221 is configured to electrically abut against the heating tube 21, the first abutting member 2221 and the second abutting member 2222 are located on two opposite sides of the main body portion 221 and are arranged respectively toward the first guiding wall and the second guiding wall. In a process that the electrical connector 22 goes deep into the clamping space 24, the first abutting member 2221 and the second abutting member 2222 may be respectively in sliding

contact with the first guiding wall and the second guiding wall, and the cooperation between the first abutting member 2221 and the second abutting member 2222 with the first guiding wall and the second guiding wall helps more normalize a trajectory of the electrical connector 22 going deep into the clamping space 24, which helps prevent the electrical connector 22 from being partially embedded between the first layered component 231 and the heating tube 21 due to an unexpected trajectory deviation in the process that the electrical connector 22 goes deep into the clamping space 24 and affecting a stable connection between the first layered component 231 and the heating tube 21, and also helps improve the efficiency of assembling the electrical connector 22 into the clamping space 24.

[0094] In an example, the electrical connector 22 is in clearance fit with the first guiding wall and/or the second guiding wall in the clamping space 24, to reduce resistance that the electrical connector 22 encounters in a process of going deeper into the clamping space 24 in the direction defined by the first guiding wall and the second guiding wall.

[0095] Referring to FIG. 5, the electrical connector 22 may further include a hooking portion 223. The hooking portion 223 can prevent the electrical connector 22 from moving along the clamping space 24 or limit an offset of the electrical connector 22 along the clamping space 24. For example, when the electrical connector 22 is partially accommodated in the clamping space 24, in a process of causing the electrical connector 22 to be electrically connected to the power supply assembly 3, the electrical connector 22 is generally pulled or the wire 25 or another conductive element electrically connected to the electrical connector 22 is generally pulled. In this case, the hooking portion 223 is blocked or hooked by another component or member in addition to the hooking portion 223 on the heating assembly 2. In this way, the electrical connector 22 cannot move along the clamping space 24 in a pulling direction, and the hooking portion 223 helps keep the electrical connector 22 at a preset position or limit an offset of the electrical connector 22 along the clamping space 24, which is conducive to preventing a short circuit of the heating assembly 2 or ensuring normal operation of the heating assembly 2.

[0096] In an embodiment, the hooking portion 223 can help locate the electrical connector 22, which is conducive to combination of the electrical connector 22 on the heating tube 21 according to the preset position or accommodation of the electrical connector in the clamping space 24. Referring to FIG. 4, since at least a part of the clamping space 24 is blocked by the fixing tube 232, for ease of locating the electrical connector 22, the hooking portion 223 is stopped outside the clamping space 24, so that through the hooking portion 223, an inappropriate position of the electrical connector 22 in the clamping space 24 may be avoided or the electrical connector 22 may be prevented from excessively entering the clamping space 24.

[0097] In an embodiment, the hooking portion 223 is hooked on the heating tube 21 or the fixing tube 232, and the hooking portion 223 is hooked through the heating tube 21 or the fixing tube 232, to block the hooking portion 223 from moving along the clamping space 24 in an unexpected case.

[0098] Referring to FIG. 2 and FIG. 5, the hooking portion 223 may be integrally formed with the main body portion 221, and the hooking portion 223 may extend from the main body portion 221. The hooking portion 223 may include a first component 2231 extending in the radial direction of the heating tube 21, and the first component 2231 may be perpendicular to the axial direction of the heating tube 21 to form a right-angle hook or incline relative to the axial direction of the heating tube 21 to form an acute-angle hook. The heating tube 21 or the fixing tube 232 abuts against the first component 2231, the first component 2231 is hooked on the heating tube 21 or the fixing tube 232, and the heating tube 21 or the fixing tube 232 can support the first component 2231 in a reverse direction of a direction in which the electrical connector 22 enters the clamping space 24, to stop the electrical connector 22 from moving along the clamping space 24, so that the electrical connector 22 cannot go deeper into the clamping space 24 after reaching a specific depth in the clamping space 24.

[0099] In the embodiments shown in FIG. 2 and FIG. 5, the hooking portion 223 further includes a second component 2232 that is bent relative to the first component 2231, the heating tube 21 or the fixing tube 232 is located between the second component 2232 and the main body portion 221, the second component 2232 extends in the axial direction of the heating tube 21, and the second component 2232 can be buckled on the heating tube 21 or the fixing tube 232. The second component 2232 can prevent the first component 2231 from moving toward the heating tube 21 in the radial direction of the heating tube 21, so that it can be ensured that the first component 2231 is abutted and stopped by the heating tube 21 or the fixing tube 232. It should be noted that, the second component 2232 is optional rather than mandatory.

[0100] Referring to FIG. 2, the hooking portion 223 may be arranged adjacent to the entrance of the clamping space 24, or the hooking portion 223 may be stopped at the entrance of the clamping space 24. That is, the first component 2231 may be stopped and supported by at least a part of a boundary of the entrance of the clamping space 24.

[0101] In an embodiment, the entrance of the clamping space is completely defined by the fixing tube, that is, a run-through hole may be provided on a tube wall of the fixing tube, and a part of the electrical connector may pass through the run-through hole. That is, the run-through hole may form the entrance of the clamping space.

[0102] In an embodiment, referring to FIG. 2, the entrance of the clamping space 24 is formed at an end portion of the fixing tube 232, so that the end portion of the

fixing tube 232 and the heating tube 21 respectively define a part of the entrance of the clamping space 24. The heating assembly 2 may include one or more electrical connectors 22. Based on this, the heating assembly 2 may include one or more clamping spaces 24, and when the entrance of one of the clamping spaces 24 is provided at an upper end of the fixing tube 232, the upper end of the fixing tube 232 or the upper end of the heating tube 21 can support the hooking portion 223 upward, and the wire 25 electrically connected to the electrical connector 22 may pass through a lower end of the clamping space 24. Therefore, when the wire 25 is pulled downward, since the hooking portion 223 is blocked, the electrical connector 22 may be prevented from being pulled to move downward, thereby ensuring that the electrical connector 22 can be stably kept at an original position when the wire 25 is pulled downward.

[0103] Alternatively, in another embodiment, referring to FIG. 9, the heating assembly 2 further includes an end cover 27. The end cover 27 is connected to the heating tube 21, and may be connected to the upper end of the heating tube 21 or may be connected to the lower end of the heating tube 21. There may be two end covers 27, and the two end covers 27 are respectively connected to the upper end and the lower end of the heating tube 21. The hooking portion 223 is hooked on the end cover 27, and the end cover 27 blocks and supports the hooking portion 223 in the reverse direction of the direction in which the electrical connector 22 enters the clamping space 24.

[0104] Alternatively, in another embodiment, a bracket different from the end cover and the fixing tube may be arranged on the heating assembly, and the hooking portion is hooked on the bracket to be stopped and supported, so as to prevent the electrical connector from moving along the clamping space.

[0105] The first layered component 231 may be first arranged together with the fixing tube 232 at the periphery of the heating tube 21, to help expose the first position and the second position on the outer surface of the heating tube 21 in the first guiding groove 2312, and ensure that the first layered component 231 forms blocking at a position adjacent to the second position, thereby ensuring that the probe 261 moving along the first guiding groove 2312 can accurately reach the second position.

[0106] For ease of sleeving the fixing tube 232 on a periphery of the first layered component 231, an inner diameter of the fixing tube 232 may be greater than or equal to an outer diameter of the first layered component 231, or the fixing tube 232 may be elastic.

[0107] When the fixing tube 232 tensions under abutment of the electrical connector 22, at least a part of the first layered component 231 may be tightly attached to the heating tube 21, and the fixing tube 232 can prevent the first layered component 231 from rotating relative to the heating tube 21.

[0108] The first layered component 231 may include a heat preservation layer made of a heat preservation material. The heat preservation material may include a

thermal insulating material, and the thermal insulating material is a material whose thermal conductivity is less than $100 \text{ W/m}\cdot\text{K}$ and preferably less than $40 \text{ W/m}\cdot\text{K}$ or $10 \text{ W/m}\cdot\text{K}$ at 23°C and relative humidity of 50%. For example, the thermal insulating material may be made of at least one of a PAEK-based material, a PI material, or a PBI material, where the PAEK-based material includes a PEEK material, a PEKK material, a PEKEKK material, or a PEK material.

[0109] For ease of arrangement of the heat preservation material surrounding the surface of the heating tube 21, the heat preservation material may include a flexible heat preservation material. For example, the heat preservation material may include at least one of thermal insulating silicone, ceramic fiber cloth, or aerogel. In an embodiment of this application, a main component of the heat preservation material is SiO_2 aerogel particles. The SiO_2 aerogel particle is a type of silicon dioxide material of a three-dimensional mesh nanostructure, a porosity of the material is up to 80% to 99.8%, a pore size ranges from 10 nm to 50 nm, air can hardly perform heat conduction in pores of the material, and a thermal conductivity coefficient at normal temperature is down to $0.01 \text{ W/(m}\cdot\text{K)}$. Therefore, the material has an extremely low thermal conductivity, and a flexible heat preservation layer prepared by using the SiO_2 aerogel particles has an excellent thermal insulating and heat preservation effect.

[0110] The heat preservation layer prepared by using the SiO_2 aerogel particles is combined with a polymer material through a special process to form the flexible heat preservation layer, where mass percentage content of the SiO_2 aerogel particles is greater than mass percentage content of the polymer material. The polymer material includes at least one of PU (polyurethane), PTEE (polytetrafluoroethylene), melamine foam, or polymer resin. In an example of this application, the heat preservation material includes PU and SiO_2 aerogel particles, where in terms of mass percentage, mass percentage content of the PU is 10%, mass percentage content of the SiO_2 aerogel particles is 90%, and a thermal conductivity of a heat preservation layer prepared by using the foregoing heat preservation material ranges from $0.01 \text{ W/m}\cdot\text{K}$ to $0.02 \text{ W/m}\cdot\text{K}$. In another example of this application, the heat preservation material includes polymer resin and SiO_2 aerogel particles, where in terms of mass percentage, mass percentage content of the polymer resin ranges from 1% to 30%, mass percentage content of the SiO_2 aerogel particles ranges from 1% to 99%, and a thermal conductivity of a heat preservation layer prepared by using the foregoing heat preservation material ranges from $0.02 \text{ W/m}\cdot\text{K}$ to $0.026 \text{ W/m}\cdot\text{K}$.

[0111] The foregoing heat preservation material is drawn into shape and die-cut into a sheet body with a suitable size. In the embodiments of this application, the sheet body is flexible, so that the sheet body can be wrapped and wound on the periphery of the heating tube

21 to form a heat preservation layer with a heat preservation and thermal insulating effect, which has simple and convenient operations. In another optional implementation, the heat preservation material may be drawn into a curved or tubular heat preservation layer, and the heat preservation layer has specific stretching performance, so that the heat preservation layer can be directly sleeved on the periphery of the heating tube 21.

[0112] One or more layers of heat preservation layers may be arranged according to a requirement on a heat preservation effect. In an implementation, a single layer of heat preservation layer is arranged, to prevent formation of a gap between layers and loss of heat. A thickness of the heat preservation layer arranged on the outer surface of the heating tube 21 approximately ranges from 0.5 mm to 2 mm. It may be understood that, a larger thickness of the arranged heat preservation layer indicates a better heat preservation effect formed by the heat preservation layer. The thickness of the heat preservation layer arranged on the outer surface of the heating tube 21 may be any value selected from 0.5 mm to 2 mm according to the requirement on the heat preservation effect.

[0113] The heat preservation layer surrounds in the circumferential direction of the heating tube 21, and in an implementation, the heat preservation layer is wrapped and wound on most of the outer surface of the heating tube 21. Since the heat preservation layer is configured into a sheet body, after the single layer of heat preservation layer is wound on the outer surface of the heating tube 21, the heat preservation layer needs to be fixed, so that the heat preservation layer can be kept on the outer surface of the heating tube 21. For ease of operations, a back adhesive may be arranged on a surface of the heat preservation layer facing the heating tube 21, and the heat preservation layer is adhered to the outer surface of the heating tube 21 through the back adhesive. When a plurality of layers of heat preservation layers are configured, the heat preservation layer and the outer surface of the heating tube 21 and heat preservation layers on two adjacent sides may all be adhered by using the back adhesive. It should be noted that, the heat preservation layer may alternatively be fixed to the heating tube 21 in another manner, which is not listed one by one in this application.

[0114] The fixing tube 232 in any one of the foregoing embodiments may be prepared by using a high-temperature-resistant PEEK (polyetheretherketone) material, and in a preferred implementation of this application, the fixing tube 232 may be a PI (polyimide) tube, which is a thin-wall tube formed by stretching a pyromellitic polyimide thin film, has a thin thickness and a light weight, and is conducive to miniaturization and lightweighting designs of the entire heating assembly.

[0115] In an embodiment, referring to FIG. 10, the heating assembly further includes an end cover 27 connected to an end portion of the heating tube 21, an anti-retraction portion is arranged on the end cover 27, and

the anti-retraction portion herein is referred to as a third anti-retraction portion.

[0116] Specifically, the anti-retraction portion may include a second through hole 271 provided on the end cover 27, the conductive pin 262 passes through the second through hole 271, and the conductive pin 262 includes a bending at a position adjacent to the second through hole 271, where the bending may be referred to as a third bending portion 2622. The third bending portion 2622 is located between the second through hole 271 and the probe 261, and the second through hole 271 is configured to prevent the third bending portion 2622 from passing through, to prevent displacement of the probe 261 when the conductive pin 262 is pulled.

[0117] The third bending portion 2622 is arranged adjacent to the end cover 27, and the "adjacent to" includes being in contact with or being close to but not in contact with.

[0118] In an example, due to the third bending portion 2622, the conductive pin 262 includes a second step, and the end cover 27 defining the second through hole 271 supports the second step. Since the second step is in contact with and supported by the end cover 27 defining the second through hole 271, when the conductive pin 262 is pulled on one side of the second through hole 271, the conductive pin 262 located on another side of the second through hole 271 may almost not move. That is, the second through hole 271 can prevent the conductive pin 262 from retreating and prevent the probe 261 from being moved from the second position.

[0119] In an example, the third bending portion 2622 is arranged adjacent to the second through hole 271 but a specific gap exists between the third bending portion and the second through hole 271. When the conductive pin 262 is pulled, the third bending portion 2622 may be deformed to reduce a bending degree of the third bending portion, so that the conductive pin 262 can provide a retreat margin to enable a part of conductive pin 262 away from the probe 261 to retreat, and a part of the conductive pin adjacent to the probe 261 can basically remain static. Therefore, when the conductive pin 262 is pulled, a position of the probe 261 may remain unchanged.

[0120] Therefore, when the conductive pin 262 is pulled in a process of connecting the conductive pin 262 to the control board 31, the third bending portion 2622 may prevent the probe 261 of the temperature measurement element 26 from deviating from the second position.

[0121] In an embodiment, the conductive pin 262 may include at least one of the first bending portion, the second bending portion 2621, and the third bending portion 2622. In an embodiment, the first bending portion and the second bending portion 2621 may be combined into one bending portion. In an embodiment, the conductive pin 262 may further include another bending portion different from the first bending portion, the second bending portion 2621, and the third bending portion 2622,

and the another bending portion is also configured to prevent the temperature measurement element 26 from moving along the second guiding groove 2311.

[0122] In an embodiment, the anti-retraction portion includes a first anti-retraction portion and a second anti-retraction portion, the conductive pin 262 connects the first anti-retraction portion to the second anti-retraction portion, and a geometric connection line between the first anti-retraction portion and the second anti-retraction portion inclines relative to the axial direction of the heating tube 21. For example, the first through hole 2321 and the second through hole 271 are respectively the first anti-retraction portion and the second anti-retraction portion, and a geometric connection line between the first through hole 2321 and the second through hole 271 inclines relative to the axial direction of the heating tube 21, to further prevent the probe 261 from deviating from the second position when the conductive pin 262 is pulled.

[0123] In an embodiment, a part of the conductive pin 262 is wound into a helical structure similar to a spring, so that when the conductive pin 262 is pulled, the helical structure can provide an extension margin to reduce a pulling force to the probe 261.

[0124] In an embodiment, referring to FIG. 3 and FIG. 5, the electrical connector 22 includes a main body portion 221 and an abutting portion 222 extending from the main body portion 221 in the radial direction of the heating tube 21, and further includes a wire 25, where the main body portion 221 electrically abuts against the heating tube 21, and the abutting portion 222 abuts against the fixing tube 232. Under an action of the abutting portion 222, a gap exists between the main body portion 221 and the fixing tube 232, the wire 25 is electrically connected to the main body portion 221, at least a part of the wire 25 is accommodated in the gap between the fixing tube 232 and the main body portion 221, and the main body portion 221 is electrically connected to the power supply assembly 3 through the wire 25.

[0125] More specifically, referring to FIG. 5, the main body portion 221 may include an elastic piece 2212 and a connecting portion 2211 electrically connected to the wire 25. The wire 25 may be electrically connected to the connecting portion 2211 through welding. The main body portion 221 elastically abuts against the heating tube 21 through the elastic piece 2212, to ensure a stable electrical connection between the main body portion 221 and the heating tube 21. In the example shown in FIG. 5, the elastic piece 2212 includes an elastic arm A constructed into V-shaped and an electrical contact B arranged at a V-shaped corner of the elastic arm A, where the electrical contact B protrudes out toward the heating tube 21, so that the elastic arm A provides an elastic force causing the electrical contact B to electrically abut against the heating tube 21.

[0126] In an embodiment, there is only one induction coil or electric heating element 213 on the heating tube 21, so that there may be at least two electrical connectors

22, where one is a positive electrical connector, and the other is a negative electrical connector. The positive electrical connector and the negative electrical connector are respectively electrically connected to two opposite ends of the induction coil or the electric heating element 213. Based on this, in an example, there are two second guiding grooves 2311 that are independent of each other and not in communication with each other on the first layered component 231, and the positive electrical connector and the negative electrical connector are respectively arranged in different second guiding grooves 2311. In another example, there is a second guiding groove 2311 running through the upper end and the lower end of the first layered component 231 on the first layered component 231, and the positive electrical connector and the negative electrical connector are respectively inserted into the second guiding groove 2311 from top to bottom and from bottom to top and are respectively located on an upper side and a lower side of the second guiding groove 2311.

[0127] In an embodiment, referring to FIG. 3, FIG. 7, and FIG. 8, there are a plurality of induction coils or electric heating elements 213 on the heating tube 21, so that there may be at least three electrical connectors 22, where one electrical connector 22 may be a public electrical connector and can be electrically connected to the plurality of induction coils or electric heating elements 213 simultaneously, the rest electrical connectors 22 are electrically connected to the plurality of induction coils or electric heating elements 213 in a one-to-one correspondence manner, and a quantity of second guiding grooves 2311 on the first layered component 231 is not greater than a quantity of the electrical connectors 22. For example, as shown in FIG. 3, FIG. 7, and FIG. 8, there are two induction coils or electric heating elements 213 on the heating tube 21, there may be three electrical connectors 22, and there may be two second guiding grooves 2311 on the first layered component 231, where one second guiding groove is a long second guiding groove running through the upper end and the lower end of the first layered component 231, and the other second guiding groove may be a short second guiding groove. The short second guiding groove and the long second guiding groove are independent of each other, the two electrical connectors 22 are respectively arranged on an upper side and a lower side of the long second guiding groove, a public electrical connector is arranged in the short second guiding groove, and an extension length of the short second guiding groove in the axial direction of the heating tube 21 is less than an extension length of the long second guiding groove in the axial direction of the heating tube 21.

[0128] When a first electrical connector and a second electrical connector are arranged in the same second guiding groove 2311 simultaneously and the first electrical connector is arranged above the second electrical connector, arrangement of the fixing tube 232 on the first electrical connector can prevent, when the wire 25 con-

nected to the first electrical connector is pulled downward, the first electrical connector from further going deep into the clamping space 24, leading to a short circuit caused by contact between the first electrical connector and the second electrical connector.

[0129] When the electric heating element 213 includes a first electric heating element and a second electric heating element arranged on upper and lower sides, the first electric heating element is electrically connected to the first electrical connector, the second electric heating element is electrically connected to the second electrical connector, the first electric heating element is located above the second electric heating element, and at least a part of the first electric heating element and at least a part of the second electric heating element are exposed in the same second guiding groove 2311 simultaneously, arrangement of the fixing tube 232 on the first electrical connector can prevent, when the wire 25 connected to the first electrical connector is pulled downward, the first electrical connector from further going deep into the clamping space 24, leading to abnormal operation of the heating assembly 2 since the first electrical connector is electrically connected to the first electric heating element and the second electric heating element simultaneously.

[0130] According to the heating assembly and the aerosol generating device, the probe 261 of the temperature measurement element 26 is elastic, and the probe 261 can elastically abut against the heating tube 21 or the fixing tube 232, so that the probe 261 can be stably kept between the heating tube 21 and the fixing tube 232 and the probe 261 can be tightly attached to the heating tube 21. In this way, compared with keeping a connection between the probe 261 and the heating tube 21 in a welding manner, a surface layer of the heating tube 21 can be better protected from being damaged, and it can be easier to combine the temperature measurement element 26 with the heating tube 21.

[0131] The foregoing descriptions are merely the embodiments of this application, and are not intended to limit the patent scope of this application. All equivalent structure or process changes made according to the content of the specification and the accompanying drawings of this application or direct or indirect application in other related technical fields shall fall within the patent protection scope of this application.

Claims

1. A heating assembly, comprising:

a heating tube in which a heating cavity accommodating at least a part of an aerosol generating article is provided;
a temperature measurement element, comprising a probe and a conductive pin connected to the probe, wherein the probe is in contact with an

- outer surface of the heating tube; and
a fixing tube, arranged on a periphery of at least
a part of the heating tube, wherein
the probe is located between the heating tube
and the fixing tube, and the probe is elastic and
elastically abuts against the heating tube or the
fixing tube.
2. The heating assembly according to claim 1, wherein
the probe comprises a thermal conductive element
and an elastic member combined on the thermal
conductive element, the thermal conductive element
is tightly attached to the heating tube, and the elastic
member elastically abuts against the heating tube or
the fixing tube.
 3. The heating assembly according to claim 1, wherein
the probe comprises a thermal conductive element,
an elastic arm is arranged on the thermal conductive
element, and the elastic arm elastically abuts against
the heating tube or the fixing tube.
 4. The heating assembly according to claim 1, wherein
the probe comprises a thermal conductive element,
the thermal conductive element is tightly attached to
the heating tube, and the conductive pin comprises a
first thermocouple wire and a second thermocouple
wire; and

the first thermocouple wire and the second ther-
mocouple wire are electrically connected to form
a thermocouple, and a hot junction of the ther-
mocouple is connected to the thermal conduc-
tive element; or
the thermal conductive element comprises a
conductor, and the first thermocouple wire and
the second thermocouple wire are electrically
connected through the conductor and form a
thermocouple.
 5. The heating assembly according to claim 4, wherein
an insulating layer exists on a surface of at least one
of the heating tube and the thermal conductive ele-
ment.
 6. The heating assembly according to claim 1, wherein
the probe comprises a first abutting portion and a
second abutting portion, the first abutting portion
abuts against the heating tube, the second abutting
portion comprises an elastic arm, and the elastic arm
abuts against the fixing tube.
 7. The heating assembly according to claim 6, wherein
an accommodating space exists between the first
abutting portion and the second abutting portion, and
an end portion of the conductive pin is accommo-
dated in the accommodating space.
 8. The heating assembly according to claim 7, wherein
a window for welding laser or a welding head to pass
through is formed on the second abutting portion,
and the window is in communication with the accom-
modating space and provided directly facing the end
portion of the conductive pin.
 9. The heating assembly according to claim 6, wherein
the first abutting portion comprises a first abutting
surface with at least a partial region abutting against
the heating tube, and at least a partial edge of the first
abutting surface extends toward a direction in which
the second abutting portion is located.
 10. The heating assembly according to claim 9, wherein
the at least a partial region of the first abutting surface
is an arc-shaped surface attached to the outer sur-
face of the heating tube.
 11. The heating assembly according to claim 6, wherein
the elastic arm comprises a cantilever with a free
end, the free end of the cantilever extends toward a
direction in which the first abutting portion is located
to form an arc-shaped second abutting surface on a
surface of the second abutting portion, and the sec-
ond abutting surface abuts against the fixing tube.
 12. The heating assembly according to claim 1, wherein
the conductive pin comprises a bending portion, the
heating assembly further comprises an anti-retraction
portion, and the anti-retraction portion is config-
ured to have a capability of stopping the bending
portion.
 13. The heating assembly according to claim 12, where-
in the anti-retraction portion comprises a first through
hole that is provided on the fixing tube and that is for
the probe to pass through, and at least a part of the
bending portion is formed in the first through hole.
 14. The heating assembly according to claim 12, where-
in the heating assembly further comprises a first
layered component arranged between the heating
tube and the fixing tube, and a first guiding groove is
provided on the first layered component; and
a surface of the heating tube comprises a first posi-
tion and a second position that is in contact with the
probe, the first guiding groove communicates the
first position with the second position, and the con-
ductive pin comprises the bending portion at the first
position or a position close to the first position.
 15. The heating assembly according to claim 14, where-
in the second position is exposed in the first guiding
groove, and the probe is stopped by an extension
end point of the first guiding groove at the second
position.

16. The heating assembly according to claim 14, wherein the first position is exposed in the first guiding groove, the anti-retraction portion comprises an extension start point of the first guiding groove, and the extension start point is adjacent to the first position. 5
17. The heating assembly according to claim 14, wherein a width of the first guiding groove is greater than or equal to a width of the temperature measurement element. 10
18. The heating assembly according to claim 14, wherein the first layered component comprises a heat preservation layer. 15
19. The heating assembly according to claim 12, wherein the heating assembly further comprises an end cover connected to an end portion of the heating tube, the anti-retraction portion comprises a second through hole that is provided on the end cover and that is through which the conductive pin passes, and the bending portion is arranged adjacent to the end cover and located between the end cover and the probe. 20
25
20. The heating assembly according to claim 1, wherein the heating assembly further comprises an electrical connector electrically connected to the heating tube, at least a part of the electrical connector is arranged between the heating tube and the fixing tube, the electrical connector abuts against the fixing tube to provide a tensioning force causing the fixing tube to tension, and the fixing tube is configured to extrude the probe inward in a radial direction of the heating tube under an action of the tensioning force. 30
35
21. An aerosol generating device, comprising the heating assembly according to any one of claims 1 to 20, and further comprising a power supply assembly providing electric power to the heating assembly. 40

45

50

55

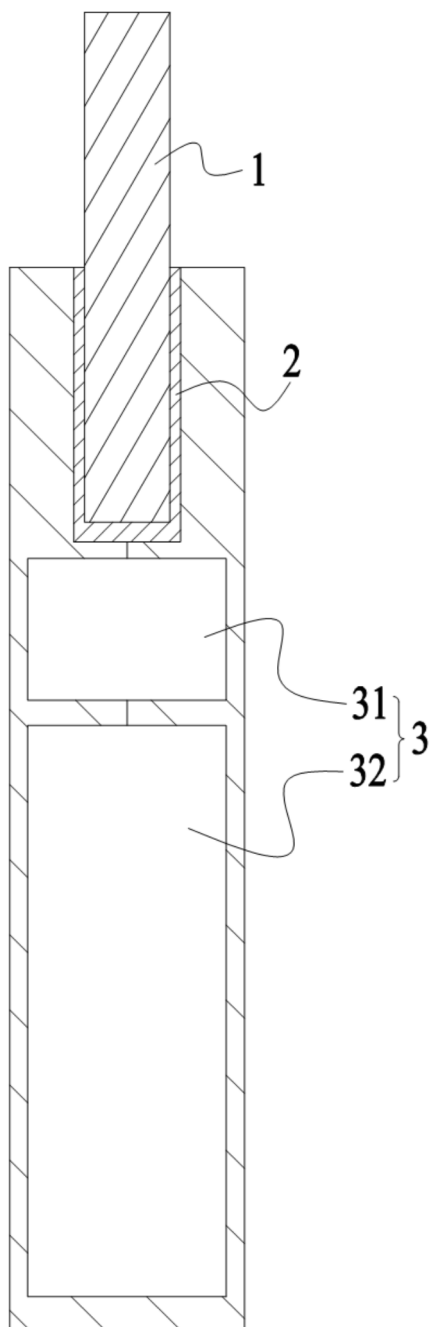


FIG. 1

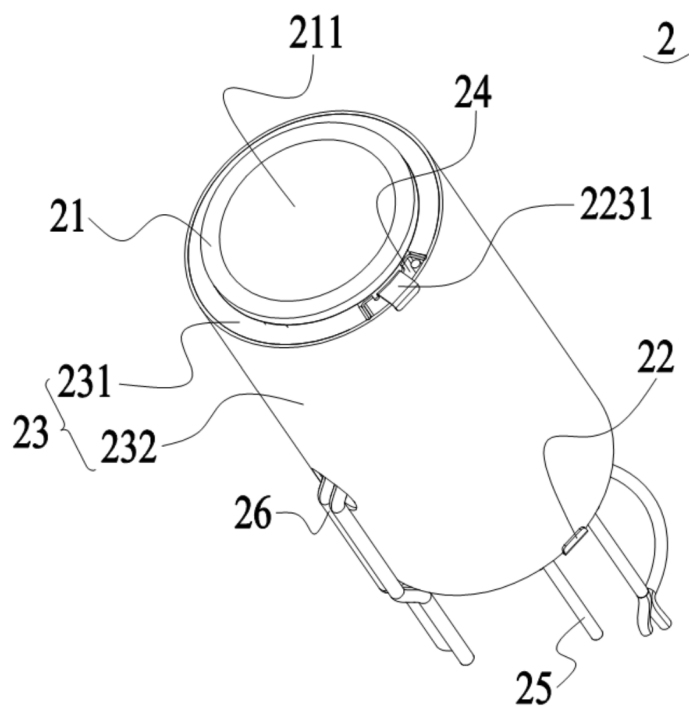


FIG. 2

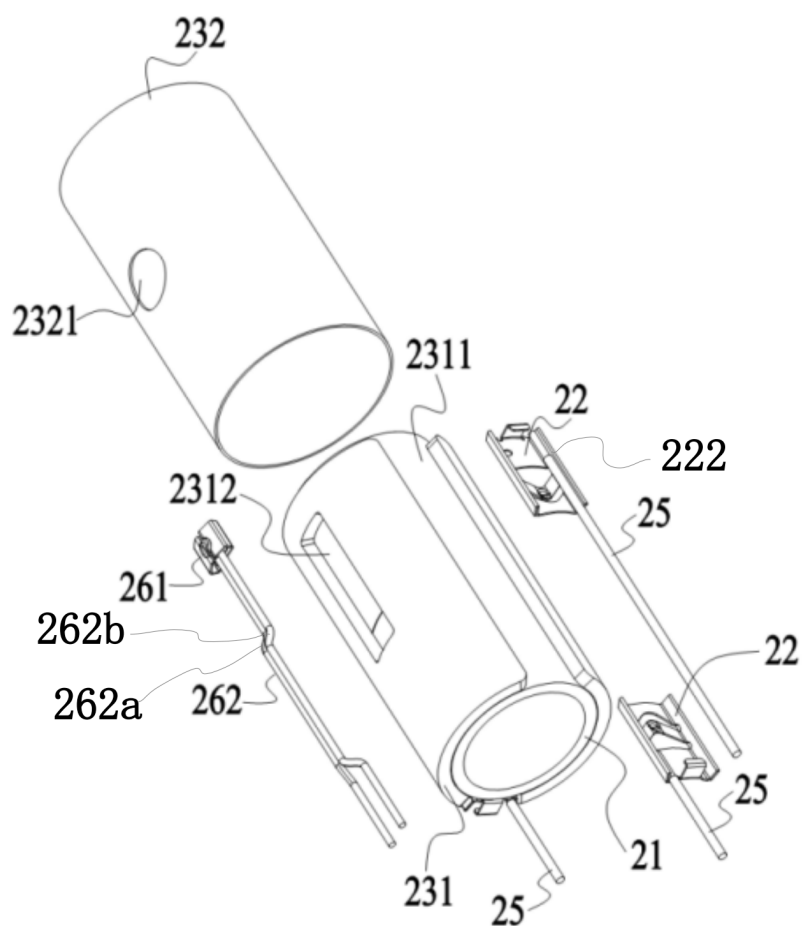


FIG. 3

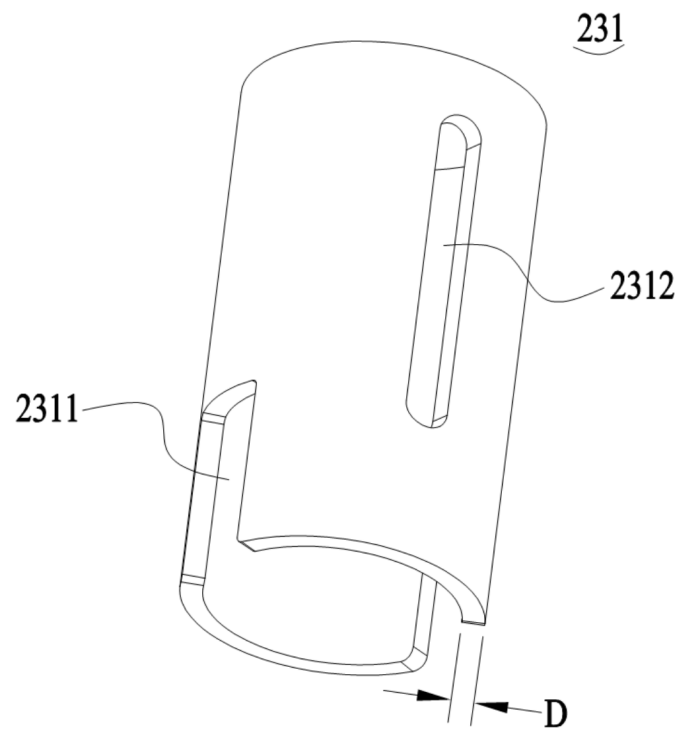


FIG. 4

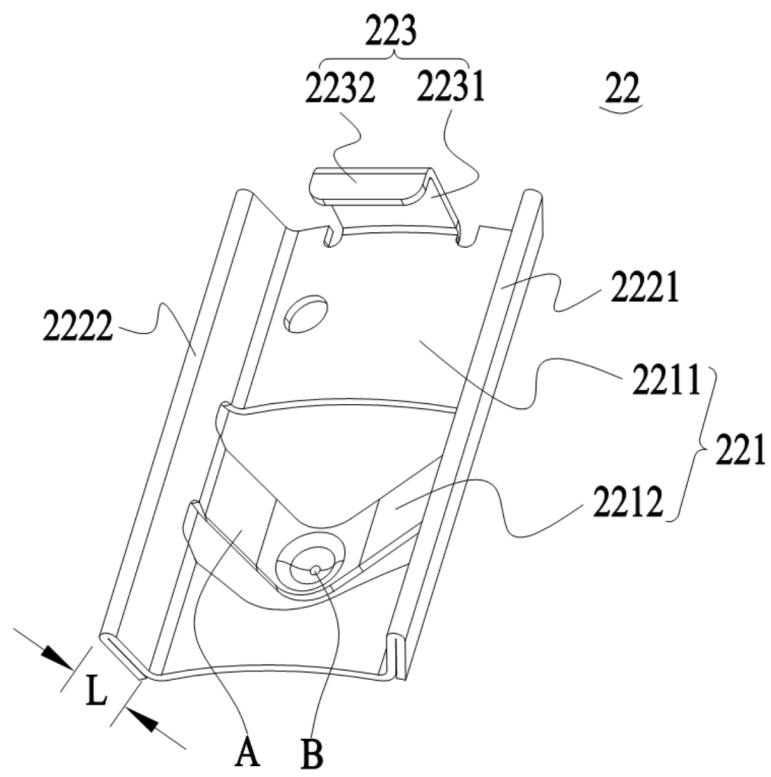


FIG. 5

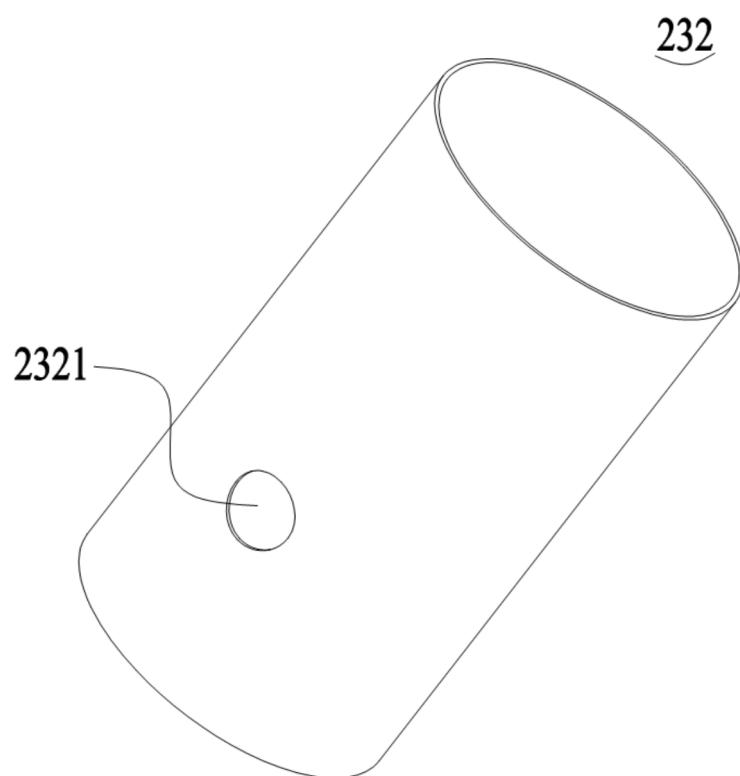


FIG. 6

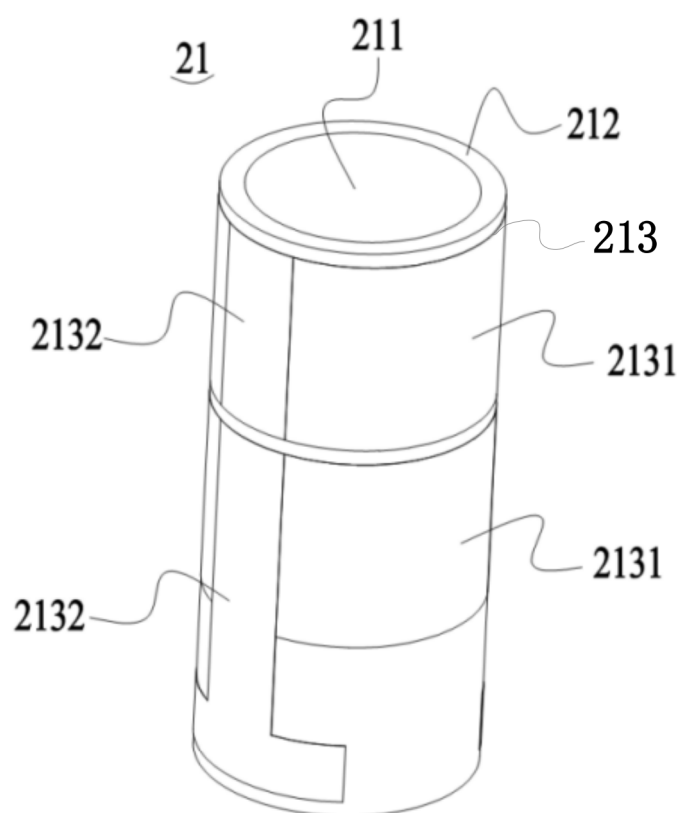


FIG. 7

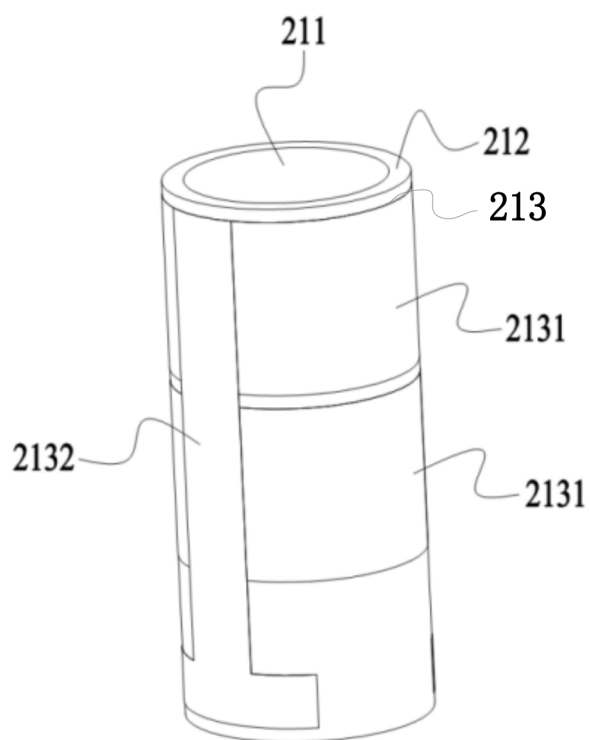


FIG. 8

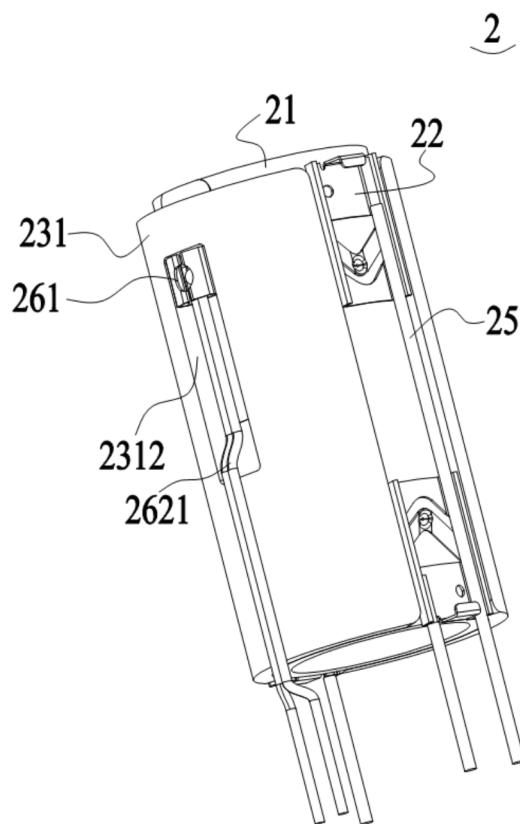


FIG. 9

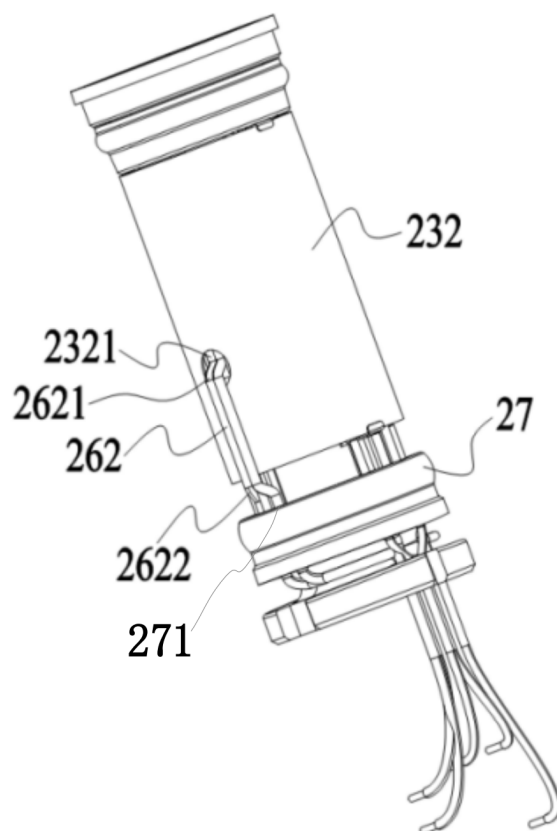


FIG. 10

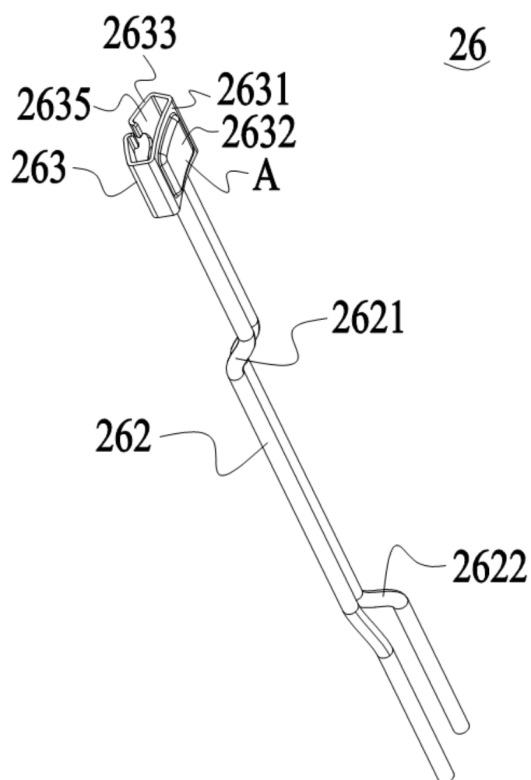


FIG. 11

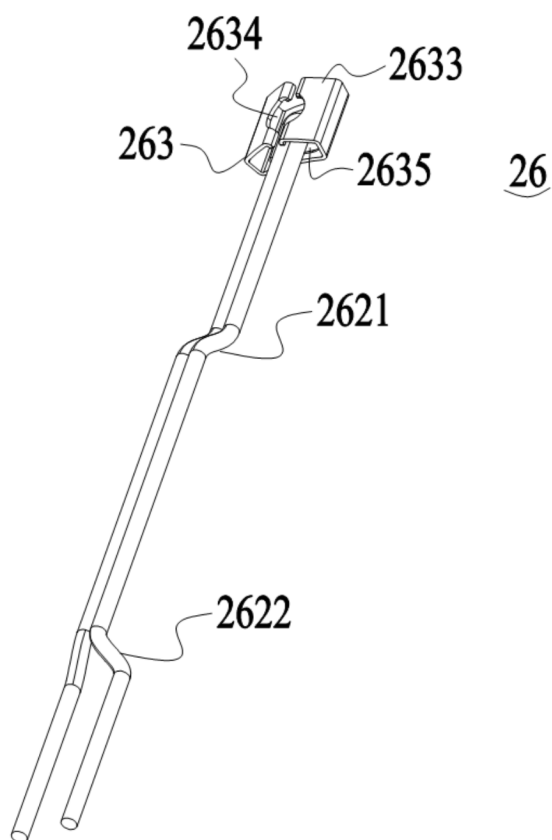


FIG. 12

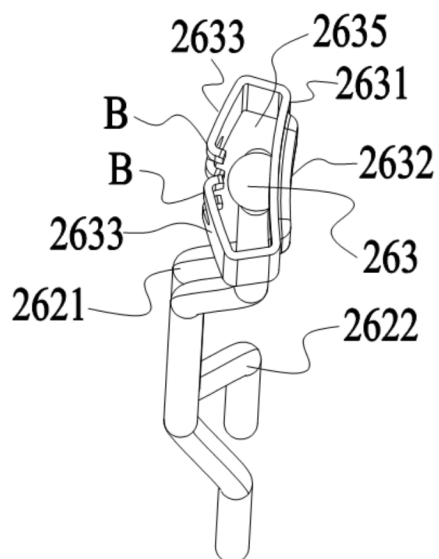


FIG. 13

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2024/104467

A. CLASSIFICATION OF SUBJECT MATTER

A24F40/46(2020.01)i; A24F40/57(2020.01)i

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC:A24F40/-

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

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

WPABSC; CNTXT; ENTXTC; CNKI; ENTXT: 弹性, 弹片, 簧, 抵接, 固定, 温度, 弯折, 弯曲, 压; elastic, spring, contact, press, fix, temperature, bent

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 112890303 A (CHINA TOBACCO HUBEI INDUSTRIAL CO., LTD.) 04 June 2021 (2021-06-04) description, paragraphs 24, 27, 29, 31, 35 and 45, and figure 10	1-5, 21
PX	CN 220712930 U (SHENZHEN FIRST UNION TECHNOLOGY CO., LTD.) 05 April 2024 (2024-04-05) claims 1-21	1-21
A	CN 219270178 U (BEIJING WONZ TECHNOLOGY CO., LTD.) 30 June 2023 (2023-06-30) entire document	1-21
A	US 2017042228 A1 (LIU TUANFANG) 16 February 2017 (2017-02-16) entire document	1-21
A	CN 217592041 U (BYD PRECISION MANUFACTURING CO., LTD.) 18 October 2022 (2022-10-18) entire document	1-21
A	WO 2022048568 A1 (SHENZHEN FIRST UNION TECHNOLOGY CO., LTD.) 10 March 2022 (2022-03-10) entire document	1-21

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

* Special categories of cited documents:	"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
"A" document defining the general state of the art which is not considered to be of particular relevance	"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
"D" document cited by the applicant in the international application	"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
"E" earlier application or patent but published on or after the international filing date	"&" document member of the same patent family
"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	

Date of the actual completion of the international search

24 September 2024

Date of mailing of the international search report

27 September 2024

Name and mailing address of the ISA/CN

China National Intellectual Property Administration (ISA/
CN)
China No. 6, Xitucheng Road, Jimenqiao, Haidian District,
Beijing 100088

Authorized officer

Telephone No.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2024/104467

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN 114173591 A (PHILIP MORRIS PRODUCTS S.A.) 11 March 2022 (2022-03-11) entire document	1-21

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CN2024/104467

5

10

15

20

25

30

35

40

45

50

55

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
CN 112890303 A	04 June 2021	None	
CN 220712930 U	05 April 2024	None	
CN 219270178 U	30 June 2023	None	
US 2017042228 A1	16 February 2017	US 10039324 B2	07 August 2018
		EP 3141136 A1	15 March 2017
CN 217592041 U	18 October 2022	None	
WO 2022048568 A1	10 March 2022	CN 114098167 A	01 March 2022
CN 114173591 A	11 March 2022	US 2022395024 A1	15 December 2022
		WO 2021001511 A1	07 January 2021
		JP 2022539547 A	12 September 2022
		EP 3993654 A1	11 May 2022
		KR 20220027158 A	07 March 2022

Form PCT/ISA/210 (patent family annex) (July 2022)

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

- CN 202310842632 [0001]