(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 4 218 444 A1**

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

(43) Date of publication:
02.08.2023 Bulletin 2023/31

(21) Application number: **21870731.3**

(22) Date of filing: **23.03.2021**

(51) International Patent Classification (IPC):
A24F 40/46 *(2020.01)* ***A24F 47/00*** *(2020.01)*

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

(86) International application number:
PCT/CN2021/082418

(87) International publication number:
WO 2022/062342 (31.03.2022 Gazette 2022/13)

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

(30) Priority: **23.09.2020 CN 202011010204**

(71) Applicant: **Shenzhen Smoore Technology Limited**
Shenzhen, Guangdong 518102 (CN)

(72) Inventors:
- **WANG, Shouping**
  Shenzhen, Guangdong 518102 (CN)
- **ZHANG, Xingfu**
  Shenzhen, Guangdong 518102 (CN)
- **LIU, Juan**
  Shenzhen, Guangdong 518102 (CN)
- **ZHANG, Lin**
  Shenzhen, Guangdong 518102 (CN)
- **FANG, Riming**
  Shenzhen, Guangdong 518102 (CN)
- **ZHOU, Xiaoyong**
  Shenzhen, Guangdong 518102 (CN)

(74) Representative: **De Arpe Tejero, Manuel**
Arpe Patentes y Marcas
Alcalá, 26, 5ª Planta
28014 Madrid (ES)

(54) HEATING ASSEMBLY AND AEROSOL FORMING DEVICE

(57) The present application provides a heater assembly and an aerosol-forming device. The heater assembly includes a heating body. The heating body is configured to be inserted into and to heat an aerosol-forming substrate. The heating body includes a first segment portion and a second segment portion spaced apart from the first segment portion, the second segment portion is connected to an end of the first segment portion. At least a portion of the first segment portion and at least a portion of the second segment portion are configured to be inserted into the aerosol-forming substrate and to generate heat, when being supplied with power, to heat the aerosol-forming substrate. The heating body in the heater assembly can be directly inserted into the aerosol-forming substrate and is highly stable. Further, the heating body may heat the aerosol-forming substrate more uniformly.

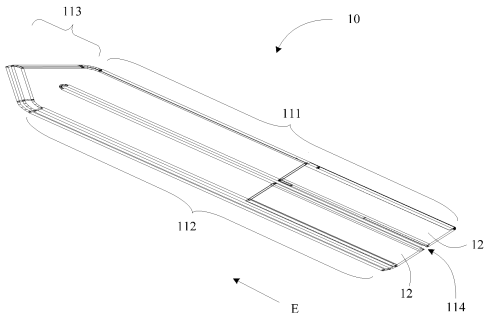

FIG. 1b

EP 4 218 444 A1

Description

TECHNICAL FIELD

[0001] The present disclosure relates to the field of heating-not-burning smoke-forming devices, and in particular to a heater assembly and an aerosol-forming device.

BACKGROUND

[0002] As an alternative to cigarettes, e-cigarettes are safe, can be conveniently used, healthy, and environmentally friendly. Therefore, the e-cigarettes, such as heating-not-burning e-cigarettes, also known as heating-not-burning aerosol-forming devices, are increasingly popular.

[0003] A heating-not-burning aerosol-forming device in the art may heat substrates in a tubular peripheral heating manner or in a central embedding heating manner. The tubular peripheral heating manner refers to a heating rod or a flat blade surrounding an outside of an aerosol-forming substrate (such as tobacco) to heat the aerosol-forming substrate. The central embedding heating manner refers to the heating rod or flat blade being inserted into the aerosol-forming substrate to heat the aerosol-forming substrate. The heater assembly may be easily manufactured and may be used easily, and therefore, the heater assembly is widely used. A heater assembly in the art may be manufactured by configuring a ceramic or an insulated metal as a substrate, printing or coating at least one resistor heating circuit on the substrate, and performing a high temperature treatment to fix the resistor heating circuit on the substrate.

[0004] However, the resistor heating circuit on the heater assembly in the art, heating line is a thin film that is printed or coated on a substrate at a later stage. In the process of inserting the heater assembly into the aerosol-forming substrate for a plurality of times, after being heated to a high temperature, the substrate may be curved, and the resistor heating circuit may fall off from the substrate easily, and the stability is poor. Further, in the process of heating, the resistor heating circuit contacts only the aerosol-forming substrate located on a side of the substrate arranged with the resistor heating circuit, but does not contact the aerosol-forming substrate located on an opposite side of the substrate. Therefore, the aerosol-forming substrate may not be heated uniformly.

SUMMARY OF THE DISCLOSURE

[0005] The present disclosure provides a heater assembly and an aerosol-forming device to solve the technical problems that the resistor heating circuit may fall off from the substrate easily when the heater assembly in the art being heated to a high temperature, the heater assembly has a poor stability, and the aerosol-forming substrate may not be heated by the resistor heating circuit uniformly.

[0006] According to an aspect, a heater assembly is provided and includes a heating body. The heating body is configured to be inserted into and to heat an aerosol-forming substrate. The heating body includes a first segment portion and a second segment portion spaced apart from the first segment portion, the second segment portion is connected to an end of the first segment portion. At least a portion of the first segment portion and at least a portion of the second segment portion are configured to be inserted into the aerosol-forming substrate and to generate heat, when being supplied with power, to heat the aerosol-forming substrate.

[0007] According to another aspect, an aerosol-forming device is provided and includes: a housing, the heater assembly according to the above aspect, and a power supply assembly. The heater assembly and the power supply assembly are arranged inside the housing; the power supply assembly is connected to the heater assembly and is configured to supply power to the heater assembly.

[0008] According to the present disclosure, a heater assembly and an aerosol-forming device are provided. The heater assembly includes the heating body configured to be inserted and heat the aerosol-forming substrate, the heating body includes a first extension and a second extension. The second extension is spaced apart from the first extension and is connected to an end of the first extension. Both the first extension and the second extension are configured to be at least partially insert into the aerosol forming substrate and generate heat to heat the aerosol forming substrate when being supplied with power. Compared to the heating body in the art, which is screen printed on a ceramic substrate, the heating body of the present disclosure can be directly and independently inserted into the aerosol-forming substrate. When the temperature is excessively high, the heating body may not fall off from the substrate, failure of the heater assembly may not be caused, the stability of the heater assembly may be improved significantly. Further, since the heating body is directly inserted and heats the aerosol-forming substrate, the uniformity that the aerosol-forming substrate is heated by the heating body is greatly improved.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009]

FIG. 1a is a structural schematic view of a heater assembly according to a first embodiment of the present disclosure.

FIG. 1b is a structural schematic view of a heater assembly according to a second embodiment of the present disclosure.

FIG. 1c is a schematic view of a heater assembly inserted in to an aerosol-forming substrate according to an embodiment of the present disclosure.

FIG. 2 is an exploded view of the structure shown in FIG. 1b.

FIG. 3a is a structural schematic view of a heater assembly according to a third embodiment of the present disclosure.

FIG. 3b is a schematic view of a heater assembly inserted in to an aerosol-forming substrate according to another embodiment of the present disclosure.

FIG. 4 is an exploded view of the structure shown in FIG. 3a.

FIG. 5 is a plane view of a heater assembly according to an implementation of the present disclosure.

FIG. 6 is a plane view of a heater assembly according to another implementation of the present disclosure.

FIG. 7 is a plane view of a heater assembly according to still another implementation of the present disclosure.

FIG. 8 is a schematic view showing a size of a heater plate according to an implementation of the present disclosure.

FIG. 9 is a schematic view showing a size of a heater stick according to an implementation of the present disclosure.

FIG. 10a is a schematic view showing electrodes arranged on two opposite surfaces of a heating body according to an embodiment of the present disclosure.

FIG. 10b is a schematic view of a heater stick according to an embodiment of the present disclosure.

FIG. 10c is a schematic view of a heater assembly, viewed from an E direction, according to an embodiment of the present disclosure.

FIG. 11 is a side view of a heater assembly according to an embodiment of the present disclosure.

FIG. 12 is a schematic view showing locations of a heater plate where a first heat region and a second heat region are located according to an embodiment of the present disclosure.

FIG. 13 is a schematic view showing locations of the heater stick where the first heat region and the second heat region are arranged according to an embodiment of the present disclosure.

FIG. 14 is a structural schematic view of the heating body being assembled with the mounting base according to an embodiment of the present disclosure.

FIG. 15 is a schematic view of a fixing sleeve according to an embodiment of the present disclosure.

FIG. 16 is a schematic view of a fixing sleeve according to another embodiment of the present disclosure.

FIG. 17 is a schematic view of a heater assembly including a fixing sleeve according to an embodiment of the present disclosure.

FIG. 18 is a schematic view of the structure shown in FIG. 17 before being assembled.

FIG. 19 is a schematic view of a heater assembly including a fixing sleeve according to another embodiment of the present disclosure.

FIG. 20 is a schematic view of the structure shown in FIG. 19 before being assembled.

FIG. 21 is a schematic view of a mounting base according to an embodiment of the present disclosure.

FIG. 22 is a schematic view of a mounting base being assembled with the heater plate according to an embodiment of the present disclosure.

FIG. 23 is a schematic view of a mounting base being assembled with the heater stick according to an embodiment of the present disclosure.

FIG. 24 is a schematic view of a mounting base being assembled with the heater stick according to another embodiment of the present disclosure.

FIG. 25 is a front view of a mounting base being assembled with a heater assembly according to an embodiment of the present disclosure.

FIG. 26 is a schematic view of an aerosol-forming device according to an embodiment of the present disclosure.

DETAILED DESCRIPTION

[0010] Technical solutions in the embodiments of the present disclosure will be clearly and completely described below by referring to the accompanying drawings of the embodiments. Obviously, the described embodiments are only some of but not all of the embodiments of the present disclosure. Based on the embodiments of the present disclosure, all other embodiments obtained by any ordinary skilled person in the art without creative work shall fall within the scope of the present disclosure.

[0011] Terms "first", "second", and "third" in the present disclosure are used for descriptive purposes only, and shall not be interpreted as indicating or implying relative importance or implicitly specifying the number of an indicated technical feature. Therefore, a feature defined by the terms "first", "second", and "third" may explicitly or implicitly include at least one such feature. In the description of the present disclosure, "a plurality of" means at least two, such as two, three, and so on, unless otherwise expressly and specifically limited. All directional indications (such as up, down, left, right, forward, backward .....) in the present disclosure are used only to explain relative positions and movements of components in a particular attitude (the attitude shown in the corresponding drawing). When the particular attitude is changed, the directional indications may be changed accordingly. Terms "include", "have", and any variation thereof, are intended to cover non-exclusive inclusion. For example, a process, a method, a system, a product or an apparatus including a series of operations or units is not limited to the listed operations or units, but may further include operations or units that are not listed, or may include other may or units that are inherently included in the process, the method, the product or the apparatus.

[0012] The term "embodiments" may indicate that a particular feature, a structure or a property described in

one embodiment may be included in at least one embodiment of the present disclosure. Presence of the term in various sections in the specification does not necessarily mean a same embodiment or a separate or an alternative embodiment that is mutually exclusive with other embodiments. It shall be understood, both explicitly and implicitly, by any ordinary skilled person in the art that the embodiments described herein may be combined with other embodiments.

[0013] The present disclosure will be described in detail below by referring to the accompanying drawings and embodiments.

[0014] As shown in FIGs. 1a to 4, FIG. 1a is a structural schematic view of a heater assembly according to a first embodiment of the present disclosure; FIG. 1b is a structural schematic view of the heater assembly according to a second embodiment of the present disclosure; FIG. 1c is a schematic view of the heater assembly inserted in to the aerosol-forming substrate according to an embodiment of the present disclosure; and FIG. 2 is an exploded view of the structure shown in FIG. 1b; FIG. 3a is a structural schematic view of the heater assembly according to a third embodiment of the present disclosure; FIG. 3b is a schematic view of the heater assembly inserted in to an aerosol-forming substrate according to another embodiment of the present disclosure; and FIG. 4 is an exploded view of the structure shown in FIG. 3a. In the present embodiment, a heater assembly 10 is provided and is configured to be inserted into and heat an aerosol forming substrate 102. For example, in a specific embodiment, the heater assembly 10 may be configured to be inserted into tobacco to heat tobacco, and the following embodiments will be described by taking the tobacco as an example of the aerosol-forming substrate 102. It is understood that in this embodiment, the aerosol forming substrate 102 may be tobacco.

[0015] In detail, the above-mentioned heater assembly 10 includes a heating body 11. In an embodiment, the heating body 11 may be a self-supporting structure. That is, the heating body 11 may be configured independently without any other carrier. Compared to the resistor heating circuit in the art, which is formed by being screen-printed or coated on the substrate, in the present disclosure, the self-supporting structure of the heating body 11 may be directly and independently inserted into the aerosol-forming substrate 102. Further, when the heating body 11 is heated to reach a high temperature, the resistor heating circuit may not fall off from the substrate, and the stability of the heater assembly 10 may be improved significantly. Since the heating body 11 is the self-supporting structure, the heating body is not required to engage with the substrate. Two opposite surfaces of the heating body 11 may directly contact the tobacco, such that a high energy utilization rate is achieved, the tobacco may be heated more uniformly, the pre-defined temperature field can be achieved, and especially, when the device is initiated at a low pressure, a power may be controlled and determined in real time.

[0016] The heating body 11 may be made of conductive ceramics. Compared to the heating body in the art made of metals, the heating body 11 made of conductive ceramics has a high conductive efficiency, and the heat generated by heating may be uniformly distributed on the heating body. Further, a power of the heating body 11 made of conductive ceramics may be adjusted between 3 watts and 4 watts, a conductive efficiency of the heating body 11 made of conductive ceramics may be in a range of $1*10^{-4}$ to $1*10^{-6}$ ohms. A strength of the heating body 11 made of conductive ceramics against bending may be greater than 40MPa. A fire-resistance of the heating body 11 made of conductive ceramics may be higher than 1200°C. In addition, the heating body 11 made of conductive ceramics may have a full starting voltage.

[0017] In detail, an electromagnetic heating wavelength of the heating body 11 generated by the ceramic is a mid-infrared wavelength, allowing the tobacco oil to be atomized easily and providing an improved taste. In addition, the ceramic used to make the heating body 11 is oxide ceramic, and a microcrystalline structure of the ceramic is stable at high temperatures. Since the oxide ceramic is highly resistant to fatigue, has a high strength, and has a high density, harmful heavy metal volatilization and dust may be avoided, significantly increasing the service life of the heating body 11.

[0018] The heating body 11 may be an entire sheet of ceramics, such that an area of the highest temperature hot spot may be reduced, a risk of fatigue cracking and an increase in the resistance due to the fatigue may be eliminated, and the heating body 11 may have better consistency. Further, since the ceramic heating material has a high strength, and the microcrystalline structure of the ceramic heating material provides smoothness, the surface of the heating body 11 may be cleaned easily, and substrates may not be adhered to the surface of the heating body. In addition, the heating body 11 may be produced by performing a ceramic production process. The ceramic production process includes raw material mixing, forming and sintering, and a cutting process. The ceramic production process may be simple and may be controlled easily, and costs of the ceramic production process may be low. Therefore, the ceramic production process may be promoted for batch manufacturing, and economic benefits may be improved.

[0019] In detail, the heating body 11 made of the conductive ceramic includes a main component and a crystalline component. The main component is configured to conduct electricity and to allow the conductive ceramic of the heating body 11 to generate a certain resistance. The main component may specifically be one or more of manganese, strontium, lanthanum, tin, antimony, zinc, bismuth, silicon, and titanium. The crystalline component, i.e., the main material of the ceramic, is configured to form the shape and the structure of the conductive ceramic. The crystalline component may specifically be one or more of lanthanum manganate, lanthanum strontium manganate, tin oxide, zinc oxide, antimony oxide,

bismuth oxide, silicon oxide, and yttrium oxide. In other embodiments, the heating body 11 may be made of a ceramic alloy made of metal alloys, or a ceramic alloy made of iron-silicon alloys or iron-silicon-aluminum alloys.

[0020] In detail, as shown in FIG. 1a, in an embodiment, the heater assembly 10 specifically includes a first segment portion 111 and a second segment portion 112 connected to the first segment portion 111. In specific embodiments, each of at least a portion of the first segment portion 111 and at least a portion of the second segment portion 112 is inserted into the aerosol-forming substrate 102 for generating heat, when being conducted with power, to heat the aerosol-forming substrate 102. the first segment portion 111 and the second segment portion 112 may be independently and directly inserted into the aerosol-forming substrate 102. However, the resistor heating circuit in the art, which is screen-printed or coated to the substrate, may be inserted into the aerosol-forming substrate 102 via the substrate, and may not be independently inserted into the aerosol-forming device. Further, the first segment portion 111 and the second segment portion 112 of the present disclosure may not fall off from the substrate when being heated to high temperatures, and failure of the heater assembly may not be caused, such that stability of the heater assembly 10 may be improved significantly.

[0021] In detail, two opposite surfaces of the portion of the first segment portion 111 inserted into aerosol-forming substrate 102 and two opposite surfaces of the portion of the second segment portion 112 inserted into aerosol-forming substrate 102 and both contact the aerosol-forming substrate 102.

[0022] It is understood that, since the heating body 11 of the present disclosure is directly inserted into the aerosol-forming substrate 102, the substrate or other base plates may not be required. Therefore, at least two opposite surfaces of the first segment portion 111 and at least two opposite surfaces of the second segment portion 112 of the heating body 11 directly contact the aerosol-forming substrate 102, such that utilization of the generated heat may be improved significantly, and a heating efficiency is improved significantly

[0023] In another embodiment, as shown in FIG. 1b and FIG. 3a, the heater assembly 30 further includes a third segment portion 113 which may be entirely inserted into and heat the aerosol-forming substrate 102. Specifically, in the present embodiment, the first segment portion 111 and the second segment portion 112 are arranged side by side and are spaced apart from each other. An end of the first segment portion 111 near the second segment portion 112 and an end of the second segment portion 112 near the first segment portion 111 are connected with each other by the third segment portion 113. The end of the first segment portion 111 near the second segment portion 112 and the end of the second segment portion 112 near the first segment portion 111 refer to ends that firstly contact and are inserted into the aerosol-forming substrate 102. It is understood that the first segment portion 111, the second segment portion 112 and the third portion 113 cooperatively form a substantially U-shaped structure. In a specific embodiment, the first segment portion 111, the second segment portion 112 and the third segment portion 113 are conductive ceramics, and are sintered and configured as an integral one-piece structure. Specifically, a substrate plate for forming the heating body 11 may be cut by laser, and a cut-groove 114 is generated, such that the substrate having the first segment portion 111, the second segment portion 112 and the third segment portion 113 is obtained. It can be understood that the heating body 11 may also be configured by sintered directly.

[0024] In detail, shapes of the first segment portion 111, the second segment portion 112, and the third segment portion 113 are not limited herein and may be determined according to actual demands. In detail, the first segment portion 111 and the second segment portion 112 may be elongated, and a width of the third segment portion 113 decreases from an end near the first segment portion 111 to an end away from the first segment portion 111, such that a tip is formed, enabling the heating body 11 to be inserted into the tobacco easily. In the present embodiment, the first segment portion 111 and the second segment portion 112 are rectangular cubes, and the third segment portion 113 is substantially V-shaped. In other embodiments, the third segment portion 113 may be U-shaped or isosceles trapezoidal, or may be in another shape which has a width decreasing along the direction from the end near the first segment portion 111 and the second segment portion 112 to the end away from the first segment portion 111 and the second segment portion 112. In the present implementation, the cut-groove 114 is a rectangle having a uniform width, or a convex leading arc is formed at an end of the rectangle near the third segment portion 113. In detail, the cut-groove 114 is axial symmetric. A length direction of the cut-groove 114 is parallel to a direction of a central axis of the cut-groove 114. The first segment portion 111 and the second segment portion 112 are parallel to and spaced apart from each other, and are arranged side by side. Length directions of the first segment portion 111 and the second segment portion 112 are parallel to the direction of the central axis of the cut-groove 114. Each of a width direction of the first segment portion 111, a width direction of the second segment portion 112, and a width direction of the third segment portion 113 is perpendicular to the direction of the central axis of the cut-groove 114. The heating body 11 is symmetrical about the central axis of the cut-groove 114. That is, each of the first segment portion 111, the second segment portion 112, and the third segment portion 113 is symmetrical about the central axis of the cut-groove 114. In this way, corresponding positions of the first segment portion 111, the second segment portion 112, and the third segment portion 113, which are arranged on two opposite sides of the cut-groove 114, in the width direction may have a

same temperature, such that the smoke may have a better taste for the user.

[0025] In other embodiments, as shown in FIG. 5, FIG. 5 is a plane view of the heater assembly according to an implementation of the present disclosure.

[0026] The first segment portion 111 and the second segment portion 112 are arranged side by side. However, the cut-groove 114 may be centrosymmetric, and the width of the cut-groove 114 may decrease in a direction from the end away from the third segment portion 113 to the end near the third segment portion 113. Correspondingly, an outer edge of the first segment portion 111 and an outer edge of the second segment portion 112 are parallel to each other. A width of the first segment portion 111/the second segment portion 112 may increase in the direction from the end away from the third segment portion 113 to the end near the third segment portion 113. In this way, a resistance at the end away from the third segment portion 113 may be increased slightly to be balanced with a resistance of the third segment portion 113 (which has a relatively large resistance), such that the entire heater assembly may generate heat uniformly.

[0027] In other implementations, as shown in FIG. 6, FIG. 6 is a plane view of the heater assembly according to another implementation of the present disclosure. The cut-groove 114 may be centrosymmetric. The width of the cut-groove 114 may increase in the direction from the end away from the third segment portion 113 to the end near the third segment portion 113. Correspondingly, the outer edge of the first segment portion 111 and the outer edge of the second segment portion 112 are parallel to each other. The width of the first segment portion 111/the second segment portion 112 may decrease in the direction from the end away from the third segment portion 113 to the end near the third segment portion 113. In this way, a resistance near an upper end of the heating body 11 may be higher, meeting the requirements that high temperatures are more concentrated at a middle-upper portion of the heating body 11.

[0028] In other implementations, as shown in FIG. 7, FIG. 7 is a plane view of the heater assembly according to still another implementation of the present disclosure. The first segment portion 111 and the second segment portion 112 are rectangular, but are not arranged side by side. The first segment portion 111 and the second segment portion 112 are not parallel to each other, and there is a certain angle between the first segment portion 111 and the second segment portion 112, such as 3 degrees to 10 degrees. In this case, the cut-groove 114 may be centrosymmetric, and the width of the cut-groove 114 may decrease in the direction from the end away from the third segment portion 113 to the end near the third segment portion 113.

[0029] In an embodiment, as shown in FIG. 8, FIG. 8 is a schematic view showing a size of the heater plate according to an embodiment of the present disclosure. The heating body 11 may be configured as a plate as shown in FIG. 8 and may be a heater plate made of conductive ceramic. In the present embodiment, a spacing between the first segment portion 111 and the second segment portion 112 is less than one tenth of the width of the entire heating body 11. The spacing L1 between the first segment portionlll and second segment portion 112 may be in a range of 0.25 mm to 0.35 mm in order to ensure the strength of the heating body 11 while avoiding short circuits.

[0030] In detail, a resistivity of the ceramic used for making the heater plate may be $5*10^{-5}$ ohms, a design power of the ceramic may be 2 watts, and a resistance of the ceramic may be 0.71 ohms. Specifically, the heater plate may be formed by single-strip being connected in series (a cut-groove 114 defined in the middle). That is, the first segment portion 111, the third segment portion 113, and second segment portion 112 are arranged in sequence and are connected in series with each other. The thickness H1 of the heater plate may be 0.5 mm, and the total length L2 of the heater plate may be 18 mm. Each of the length L3 of the first segment portion 111 and the length L3 of the second segment portion 112 may be 16 mm. It shall be understood that the effective length of the single strip of the heating body 11 may be 32.0 mm. The length of the third segment portion 113 of the heating body 11 may be 2 mm. Specifically, the width W1 of the heater plate may be 4.0 mm; specifically, an error of each dimension of the heater plate is not greater than 0.05 mm. Each of two opposite surfaces of the plate-shaped heating body 11 may be configured to contact and heat the aerosol-forming substrate 102.

[0031] In another embodiment, as shown in FIG. 5 and FIG. 9, FIG. 9 is a schematic view showing a size of a heater stick according to an implementation of the present disclosure. The heating body 11 may alternatively be a stick and may be a heater stick made of conductive ceramic. In the present embodiment, the spacing L4 between the first segment portion 111 and the second segment portion 112 is less than one third of the diameter φ of the entire heater stick. The spacing L4 may specifically be in a range from 0 mm to 1 mm, and may preferably be 0.3mm or 0.4mm. Specifically, in the present embodiment, a support ceramic 14 is arranged between the first segment portion 111 and the second segment portion 112 to increase the strength of the heating body 11. In this way, while the heating body 11 is being inserted into the tobacco, the heating body 11 may be inserted more smoothly into the tobacco, and the probability of the heating body 11 being forced to be bent may be reduced. Specifically, the support ceramic 14 may be bonded to the first segment portion 111 and the second segment portion 112 by a glass ceramic 15, such that a bonding force there between may be improved. In the present embodiment, the support ceramic 14 may be made of ceramic materials such as zirconia, zirconia toughened, alumina material, and so on.

[0032] In detail, a resistivity of the ceramic materials for making the heater stick may be 3*10-5 ohms; a design power of the heater stick may be in a range of 3W to 4W,

such as 3.3W specifically; and a resistance of the heater stick may be in a range of 0.3ohms to 1ohm, such as 0.5ohms. In detail, the heater stick may be formed by single-strip being connection in series. That is, the first segment portion 111, the third segment portion 113, and the second segment portion 112 are arranged in sequence and are connected in series. The diameter φ of the heater stick may be in a range of 2 mm to 5 mm, specifically 3 mm. The length L5 of the heater stick may be in a range of 18 mm to 22 mm, specifically 19.7 mm. Each of the length L6 of the first segment portion111 and the length L6 of the second segment portion 112 may be in a range of 12 mm to 18 mm, specifically 16 mm. It shall be understood that the effective length of a single strip of the heating body 11 may be in a range of 30 mm to 35 mm, specifically 32.0 mm. The length of the third segment portion 113 may be in a range of 2 mm to 5 mm, specifically 3.7 mm. In detail, the length L7 of the support ceramic 14 disposed between the first segment portion 111 and the second segment portion 112 may be in a range of 12 mm to 18 mm, specifically 17 mm. The width W2 of the support ceramic 14 may be the same as the diameter φ of the heater stick and may be in a range of 2 mm to 5 mm, specifically 3 mm. The thickness H2 of the support ceramic 14 may be slightly less than the spacing between the first segment portion 111 and the second segment portion 112. Specifically, the thickness H2 may be in a range of 0.8 mm to 1.2 mm, such as 0.9 mm, allowing the glass ceramic 15 to be arranged easily.

[0033] In a specific embodiment, as shown in FIGs. 1b to 4, the heater assembly 10 further includes two electrodes 12, one of the two electrodes 12 is arranged on the first segment portion 111, and the other one of the two electrodes 12 is arranged on the second segment portion 112. While the device is in use, each of the two electrodes 12 is electrically connected to the power supply assembly through an electrode lead, allowing the heating body 11 to be electrically connected to the power supply assembly. In detail, as shown in FIG. 1b and FIG. 2, the two electrodes 12 are arranged on the end of the first segment portion 111 away from the third segment portion 113 and on the end of the second segment portion 112 away from the third segment portion 113, respectively; and sides of the ends where the two electrodes 12 are arranged face a same direction. The two electrodes 12 are formed by coating a conductive silver paste on an outer surface of a lower end of the conductive ceramic. In detail, each of the two electrodes 12 is substantially semi-cylindrical, and the two electrodes 12 extend from two ends of a cross section of the heating body 11 to the cut-groove 114. In this way, a contact area of the conductive ceramic may be increased as much as possible to reduce a contact resistance. Further, by having a larger contact area, the electrode lead may be soldered easily. Compared to the heating circuit in the art, which is in a small size and is formed by screen-printing or coating, for the heater assembly 10 of the present disclosure, a contact resistance between the electrodes and the heating circuit is high, the contact area between the heating body 11 of the present disclosure and the electrodes 12 may be increased significantly, such that the contact resistance may be reduced, and the heating body 11 may be sued more stably.

[0034] In a specific embodiment, as shown in FIG. 10a, FIG. 10a is a schematic view showing electrodes arranged on two opposite surfaces of the heating body according to an embodiment of the present disclosure. When the heating body 11 is configured as the heater plate, each of two opposite surfaces of the first segment portion 111 and each of two opposite surfaces of the second segment portion 112 is arranged with one electrode 12. That is, one of the two electrodes 12 is arranged on each of a first surface C at the end of the first segment portion 111 and a second surface D opposite to the first surface C of the first segment portion 111, and the other one of the two electrodes 12 is arranged on each of a first surface C at the end of the second segment portion 112 and a second surface D opposite to the first surface C of the second segment portion 112. When two electrode leads are connected, one of the two electrode leads is a Y-shaped electrode lead and may be connected to the one of the two electrodes 12 arranged on the two surfaces of the first segment portion 111, and the other one of the two electrode leads is a Y-shaped electrode lead and may be connected to the other one of the two electrodes 12 arranged on the two surfaces of the second segment portion 112. When the heating body 11 is the heater stick, as shown in FIG. 10b, FIG. 10b is a schematic view of a heater stick according to an embodiment of the present disclosure. Each of the two electrodes 12 may extend to the inner wall surface corresponding to the cut-groove 114. In detail, the first segment portion 111 of the heater stick has a first inner surface 111a and a first outer surface 111b. The second segment portion 112 has a second inner surface 112a and a second outer surface 112b. The electrode 12 arranged on the first segment portion 111 extends from the first outer surface 111a to the first inner surface 111b. The electrode 12 arranged on the second segment portion 112 extends from the second outer surface 112a to the second inner surface 112b. By arranging the electrodes 12 on two surfaces of the heating body 11, soldering may be performed easily, the heating body 11 may have a lower resistance and may generate relatively less heat when being conducted, such that the heating body 11 may be prevented from being damaged effectively. In addition, the two surfaces of the conductive ceramic may be conducted at the same time, a same electrical potential may be generated, conductive components of the two surfaces may generate a uniform electric field, and a better heating effect may be achieved.

[0035] In the present implementation, the cut-groove 114 extends through first surface C and second surface D. Further, as shown in FIG. 10c, FIG. 10c is a schematic view of the heater assembly, viewed from an E direction, according to an embodiment of the present disclosure.

Specifically, in the thickness direction of the heating body 11, each of an edge of the first segment portion 111, an edge of the second segment portion 112, and an edge of the third segment portion 113 extends from a surface parallel to the middle of the first surface C and the second surface D towards the first surface C and the second surface D to form a guiding surface 118. The guiding surface 118 may specifically be a guiding inclined surface (see FIG. 10c) or an arc. In this way, the heating body 11 may be inserted into the tobacco easily, a resistance while inserting may be reduced, and the heating body 11 may be protected better.

[0036] In a specific embodiment, the electrodes 12 may be formed on two ends of the first segment portion 111 and on two ends of the second segment portion 112 by coating, in order to improve bonding strength between the electrodes 12 and the heating body 11, such that stability of the connection between the electrode leads connected to the electrodes 12 and the heating body 11 may be improved. It is understood that the ceramic has a microporous structure. The microporous structure of the ceramic enables the bonding between the formed electrodes 12 and the heating body 11 to be strong when the thickness of the coating is large. In this way, the bonding between the electrodes 12 and the heating body 11 is improved significantly. Specifically, the above-mentioned coating material may be the silver paste. It can be understood that the electrodes 12 may be formed by depositing a metal film, such as depositing a metal material having a resistivity greater than $1*10^{-6}$ ohms, such as gold, platinum, copper, and so on.

[0037] In a specific embodiment, as shown in FIG. 11, FIG. 11 is a side view of the heater assembly according to an embodiment of the present disclosure. A surface of the heating body 11 may be coated with a protective layer 115. The protective layer 15 covers the two electrodes 12, preventing an oil, which is generated while the aerosol-forming substrate 102 is being heated, from damaging or contaminating the two electrodes 12 and the heating body 11. Specifically, the protective layer 115 may be a vitreous glaze layer.

[0038] In detail, as shown in FIG. 12 and FIG. 13, FIG. 12 is a schematic view showing locations of a heater plate where a first heat region and a second heat region are located according to an embodiment of the present disclosure; and FIG. 13 is a schematic view showing locations of the heater stick where the first heat region and the second heat region are arranged, according to an embodiment of the present disclosure. The heating body 11 includes a first heat region A and a second heat region B connected to the first heat region A. The first heat region A is a main atomization region and is inserted into the tobacco to heat the tobacco. An atomization temperature on the first heat region A is concentrated within a range of 280°C to 350°C, and the concentrated area occupies more than 75% of an area of the atomization region. The second heat region B is a main mating section of the heating body 11 and has a temperature below 150°C. In an embodiment, the length of the first heat region A of the heater stick may be 14.5 mm, and the length of the second heat region B of the heater stick may be 5.2 mm.

[0039] In a specific embodiment, for the first heat region A and the second heat region B of each of the first segment portion 111 and the second segment portion 112, only the majority of the first heat region A is inserted into the aerosol-forming substrate 102, and a small portion of the first heat region A and the entire second heat region B are disposed out of the aerosol-forming substrate 102. Alternatively, for the first heat region A and the second heat region B of each of the first segment portion 111 and the second segment portion 112, the entire first heat region A is inserted into the aerosol-forming substrate 102, and the second heat region B is disposed out of aerosol-forming substrate 102. Alternatively, for the first heat region A and the second heat region B of each of the first segment portion 111 and the second segment portion 112, the entire first heat region A and a small portion of the second heat region B are inserted into the aerosol-forming substrate 102, and only the majority of the second heat region B is disposed out of the aerosol-forming substrate 102.

[0040] In a specific embodiment, the two electrodes 12 are specifically disposed at the second heat region B of the heating body 11 to reduce the atomization temperature of the ceramic heating body 11 disposed at the second heat region B. In the present embodiment, a ratio of the heating temperature of the first heat region A to the heating temperature of the second heat region B of the heating body 11 is greater than 2.

[0041] In a specific embodiment, a resistivity of the material of the portion of the heating body 11 disposed at the second heat region B is less than a resistivity of the material of the portion of the heating body 11 disposed at the first heat region A, such that the temperature of the first heat region A is greater than the temperature of the second heat region B of the heating body 11. At the same time, since different heat regions are configured with materials of different resistivities, temperatures of the different heat regions may be regulated based on a difference in the resistivities. Specifically, a major component of the ceramic material of the portion of the heating body 11 disposed at the first heat region A may be the same as a major component of the ceramic material of the portion of the heating body 11 disposed at the second heat region B, and the first heat region A and the second heat region B may be configured as an integral one-piece structure. However, a proportion or other components of the ceramic materials of the portion of the heating body 11 disposed at the first heat region A may be different from a proportion or other components of the ceramic materials of the portion of the heating body 11 disposed at the second heat region B. In this way, the resistivity of the portion of the heating body 11 disposed at the first heat region A is different from the resistivity of the portion of the heating body 11 disposed at the second heat region B. Compared to technical solutions in the art

where the first heat region and the second heat region being made of different conductive materials, such as an aluminum film and a gold film, splicing two different conductive materials may prevent a conductive body made of the first heat region A and the second heat region B of the heating body 11 from being broken.

[0042] In another embodiment, as shown in FIG. 12, the width or/and the thickness of the portion of the first segment portion 111 of the heating body 11 disposed at the second heat region B is greater than the width or/and the thickness of the portion of the first segment portion 111 of the heating body 11 disposed at the first heat region A, and the width or/and the thickness of the portion of the second segment portion 112 of the heating body 11 disposed at the second heat region B is greater than the width or/and the thickness of the portion of the second segment portion 112 of the heating body 11 disposed at the first heat region A, such that the temperature of the first heat region A is greater than the temperature of the second heat region B of the heating body 11. In the present embodiment, the widened portion of the second heat region B of the heating body 11 is snapped within the mounting base 20, such that a position the mounting base 20 may be limited by the widened portion of the heating body 11. It this way, the mounting base 20 may be prevented from being displaced relative to the heating body 11 while being inserted and taken out, and the stability of the connection between the electrode leads and the electrodes 12 may not be affected.

[0043] Of course, in other embodiments, as shown in FIG. 14, FIG. 14 is a structural schematic view of the heating body being assembled with the mounting base according to an embodiment of the present disclosure. The material may be controlled to allow the temperature of the first heat region A to be greater than the temperature of the second heat region B of the heating body 11. For example, a conductive component may be added to a lower part of the heating body 11, such that the lower part has a lower resistance and reaches a lower temperature when being heated. Therefore, in the present embodiment, the width and/or the thickness of the first segment portion 111 disposed at the second heat region B is equal to the width and/or the thickness of the first segment portion 111 disposed at the first heat region A, and the width and/or the thickness of the second segment portion 112 disposed at the second heat region B is equal to the width and/or the thickness of the second segment portion 112 disposed at the first heat region A, such that the heating body 11 may be processed easily, and the problem that the widened portion is adhered with tobacco or tobacco oil may be avoided.

[0044] While the device is in use, the heater assembly 10 is inserted into the tobacco. After the power is supplied, the heater assembly 10 starts operating, the tobacco is heated, and smokes are generated.

[0045] According to the present embodiment, the heater assembly 10 includes the heating body 11. The heating body 11 includes the first segment portion 111 and the second segment portion 112 spaced apart from the first segment portion 111. At least a portion of the first segment portion 111 and at least a portion of the second segment portion 112 are configured to be inserted into the aerosol-forming substrate 102 and to generate heat, when being conducted, to heat the aerosol-forming substrate 102. Compared to the heating body in the art, which is screen-printed or coated on the substrate, the heating body 11 of the present disclosure may be directly and independently inserted into the aerosol-forming substrate 102, and when the heater assembly is heated to a high temperature, the heating body 11 may not fall of from the ceramic substrate, and failure of the heater assembly may not be caused, the stability of the heater assembly 10 may be improved. At the same time, since the heating body 11 is a self-supporting structure, the heating body 11 may not be engaged with the substrate, two opposite surfaces of the heating body 11 may directly contact the aerosol-forming substrate 102, such that the heater assembly 10 may heat the aerosol-forming substrate 102 more uniformly.

[0046] In an embodiment, as shown in FIGs. 15 to 20, FIG. 15 is a schematic view of a fixing sleeve according to an embodiment of the present disclosure; FIG. 16 is a schematic view of the fixing sleeve according to another embodiment of the present disclosure; FIG. 17 is a schematic view of the heater assembly including the fixing sleeve according to an embodiment of the present disclosure; FIG. 18 is a schematic view of the structure shown in FIG. 17 before being assembled; FIG. 19 is a schematic view of the heater assembly including the fixing sleeve according to another embodiment of the present disclosure; and FIG. 20 is a schematic view of the structure shown in FIG. 19 before being assembled.

[0047] That is, the heater assembly 10 further includes the fixing sleeve 13. The fixing sleeve 13 sleeves the outside of the heating body 11 to increase a resistance of the heating body 11 against fatigue, thereby increasing the service life of the heater assembly 10. Specifically, the fixing sleeve 13 may be made of metal, such as steel. A thickness of a wall the fixing sleeve 13 may be in a range of 0.1 mm to 0.5 mm.

[0048] Specifically, when the heating body 11 is the heater plate, a specific structure of the fixing sleeve 13 may be seen in FIG. 15. A structure of a product formed by the fixing sleeve 13 sleeving the plate-shaped heating body 11 can be seen in FIG. 17. An exploded view of the product can be seen in FIG. 18. Specifically, the fixing sleeve 13 is also plate-shaped. An end of the fixing sleeve 13 defines an opening, and the other end of the fixing sleeve 13 is closed. The closed end of the fixing sleeve 13 forms the tip, and each of two opposite side walls of the opening end of the fixing sleeve 13 has a notch 131. The two electrodes 12 are arranged on side surfaces of the first segment portion 111 and the second segment portion 112 respectively away from the cut-groove 114 and are exposed through two notches 131 to be connected to the electrode leads 23.

[0049] When the heating body 11 is the heater stick, a specific structure of the fixing sleeve 13 can be seen in FIG. 16. A structure of the product formed by the fixing sleeve 13 sleeving the stick-shaped heating body 11 can be seen in FIG. 19, and an exploded view of the product can be seen in FIG. 20. Specifically, the fixing sleeve 13 is stick-shaped. An end of the fixing sleeve 13 defines an opening, and the other end of the fixing sleeve 13 is closed. The closed end of the fixing sleeve 13 forms the tip, and each of two opposite side walls of the opening end of the fixing sleeve 13 has a notch 131. The two electrodes 12 are arranged on side surfaces of the first segment portion 111 and the second segment portion 112 respectively away from the cut-groove 114 and are exposed through two notches 131 to be connected to the electrode leads 23

[0050] Specifically, as shown in FIG. 20, an insulating medium layer 24 is disposed between the heating body 11 and the fixing sleeve 13 to strengthen bonding between the fixing sleeve 13 and the heating body 11 and to prevent short circuits. Specifically, the insulating medium layer 24 may be coated on the outer surface of the heating body 11 or the inner surface of the fixing sleeve 13, based on a coating processing. The thickness of the coating can be in a range from 0.05 mm to 0.1 mm. In a specific embodiment, the insulating medium layer 24 is coated on the surface of the heating body 11 and exposes the cut-groove 114 and the electrodes 12.

[0051] Specifically, the length of the fixing sleeve 13 is the same as or less than the length of the heating body 11. It shall be understood that since the fixing sleeve 13 has the tip, the third segment portion 113 may not have a tip, such that the heating body 11 may be machined easily. In other embodiments, the longitudinal length of the fixing sleeve 13 is less than the length of the heating body 11. That is, the portion arranged with the electrodes 12 is not sleeved by the fixing sleeve 13. In this way, two surfaces of the heating body 11 can be fixed directly to the mounting base 20, and the first segment portion 111 and the second segment portion 112, which are inserted into the tobacco, are reinforced and may not be deformed or broken.

[0052] As shown in FIGs. 21 to 24, FIG. 21 is a schematic view of the mounting base according to an embodiment of the present disclosure; FIG. 22 is a schematic view of the mounting base being assembled with the heater plate according to an embodiment of the present disclosure; FIG. 23 is a schematic view of the mounting base being assembled with the heater stick according to an embodiment of the present disclosure; and FIG. 24 is a schematic view of the mounting base being assembled with the heater stick according to another embodiment of the present disclosure. That is, in the present embodiment, the heater assembly 10 is arranged on the mounting base 20 when being in use to form a heater mechanism. Further, the mounting base 20 is fastened with the heater assembly 10, such that the heater assembly 10 is mounted in a body of the aerosol-forming device by the mounting base 20. In detail, when the heating body 11 is the heater plate, a structure of a product formed by the mounting base 20 being assembled with the heating body 11 can be seen in FIG. 22. When the heating body 11 is the heater stick, and when the fixing sleeve 13 does not sleeve the outside of the heating body 11, a structure of a product formed by the mounting base 20 being assembled with the heating body 11 can be seen in FIG. 23. When the fixing sleeve 13 is arranged at the outside of the heating body 11, the mounting base 20 may be arranged on the heating body 11 or on the fixing sleeve 13, according to actual situations. For example, when the length of the fixing sleeve 13 is the same as the length of the heating body 11, the mounting base 20 may sleeve the fixing sleeve 13, as shown in FIG. 24. When the length of the fixing sleeve 13 is less than the length of the heating body 11, the end of the heating body 11 coated with the electrodes 12 is exposed out of the fixing sleeve 13. The mounting base 20 is fixed to the end of the heating body 11 exposed out of the fixing sleeve 13, i.e., fixed to the second heat region B of the heating body 11. Further, the mounting base 20 abuts against the end of the fixing sleeve 13 near the mounting base 20. Preferably, when the end of the heating body 11 coated with electrodes 12 is exposed out of the fixing sleeve 13, the mounting base 20 is fixed to the opening end of the fixing sleeve 13, and that is, the mounting base20 is inserted into the opening end of the fixing sleeve 13, and the end of the body 11 coated with the electrodes 12 passes through the mounting base 20.

[0053] In detail, the mounting base 20 may be made of an organic or an inorganic material having a melting point of greater than 160°C, such as PEEK. The mounting base 20 may be adhered to the heater assembly 10 by an adhesive, and the adhesive may be a glue resistant to high temperatures.

[0054] In an embodiment, as shown in FIG. 21 and FIG. 22, the mounting base 20 includes a mounting body 21 with a through hole 22. The heating body 11 is inserted in the through hole 22 to be mounted on the mounting base 20. In a specific embodiment, the portion of the heating body 11 corresponding to the second heat region B is inserted in the through hole 22. Specifically, the side wall of the through hole 22 is provided with a reserved slot 211. The electrode lead 23 passes through the reserved slot 211 to be inserted to the inside of the mounting base 20 to be connect with the electrode 12 on the heating body 11. Further, the mounting body 21 is arranged with at least two fastening portions 24, and the mounting base 20 is fixed to the housing of the aerosol-forming device by the fastening portions 24.

[0055] In an embodiment, as shown in FIG. 25, FIG. 25 is a front view of the mounting base being assembled with the heater assembly according to an embodiment of the present disclosure. When the heater assembly 10 is fixed to the mounting base 20 (as shown in FIG. 25) through the heating body 11. A first fastening structure 116 is arranged on each of a partial surface of the first

segment portion 111 configured to be inserted into the mounting base 20 and a partial surface of the second segment portion 112 configured to be inserted into the mounting base 20 of the heating body 11. A second fastening structure 117 is arranged in the through hole 22 of the mounting base 20 at a position corresponding to the first fastening structure 116. The mounting base 20 is fixed to the heating body 11 by fastening the first fastening structure 116 with the second fastening structure 117, such that stability of the connection between the mounting base 20 and the heating body 11 is improved. When the fixing sleeve 13 of the heater assembly 10 is fixed to the mounting base 20, the first fastening structure 116 may be arranged on the surface of a part of the fixing sleeve 13 inserted into the mounting base 20 to be fastened with the second fastening structure 117 arranged in the mounting base 20, such that fixation between the fixing sleeve 13 and the mounting base 20 is achieved. The first fastening structure 116 may be a plurality of protrusions (or recesses), and the second fastening structure 117 may be a plurality of recesses (or protrusions) engaging with the first fastening structure 116.

[0056] The heater assembly 10 provided in the present embodiment may directly take the self-supporting ceramic heater plate (or heater stick) to generate heat. Further, the heating body 11 may be arranged as single-strip connected in series based on locations where the electrodes are arranged and requirements about resistance values. In addition, the heating body 11 is made of ceramic. Compared to the resistor heating circuit in the art, which is formed by coating a metal heating material on the substrate, two sides of the heating body made of ceramic may contact and heat the tobacco simultaneously, such that the tobacco may be heated more uniformly and stably.

[0057] As shown in FIG. 26, FIG. 26 is a schematic view of an aerosol-forming device according to an embodiment of the present disclosure. In the present embodiment, an aerosol-forming device 100 is provided and includes a housing 101, and the heater assembly 10 arranged inside the housing 101, a mounting base 20 arranged inside the housing, and a power supply assembly 30 arranged inside housing 101.

[0058] The heater assembly 10 is arranged on the mounting base 20 and is mounted on the inner wall of the housing 101 through the mounting base 20. Specific structures and functions of the heater assembly 10 and the mounting base 20 may be referred to the description of the heater assembly 10 in the above embodiments. The power supply assembly 30 is connected to the heater assembly 10 and is configured to supply power to the heater assembly 10. Further, in an embodiment, the power supply assembly 30 may be a rechargeable lithium-ion battery.

[0059] The aerosol-forming device 100 in the present embodiment is arranged with the heater assembly 10, and the heater assembly 10 is inserted into and heat the tobacco. The heater assembly 10 includes the heating body 11. The heating body 11 includes the first segment portions 111 and the second segment portion 112 spaced apart from the first segment portion 111. Both the first segment portion 111 and the second segment portion 112 are at least partially inserted into the aerosol forming medium 102 and may generate heat, when being supplied with power, to heat the aerosol forming medium 102. Compared to the heating body in the art, which is screen-printed on the substrate, the heating body 11 of the present disclosure can be directly and independently inserted into the aerosol-forming substrate 102. Further, when the temperature is excessively high, the heating body may not fall off from the substrate, failure of the heater assembly may not be caused, and the stability of the heater assembly 10 may be improved significantly. In addition, since the heating body 11 is the self-supporting structure and is not required to be engaged with the substrate, the entire surface of the heating body 11 directly contacts the aerosol-forming substrate 102, such that the heater assembly 10 may heat the substrate more uniformly.

[0060] The above description shows only embodiments of the present disclosure and does not limit the scope of the present disclosure. Any equivalent structure or equivalent process transformation performed based on the description and the accompanying drawings of the present disclosure, applied directly or indirectly in other related fields, shall be equally covered by the scope of the present disclosure.

Claims

1. A heater assembly, comprising a heating body, wherein,

   the heating body is configured to be inserted into and to heat an aerosol-forming substrate;
   the heating body comprises a first segment portion and a second segment portion spaced apart from the first segment portion, the second segment portion is connected to an end of the first segment portion; and
   at least a portion of the first segment portion and at least a portion of the second segment portion are configured to be inserted into the aerosol-forming substrate and to generate heat when being supplied with power, to heat the aerosol-forming substrate.

2. The heater assembly according to claim 1, wherein two opposite surfaces of the portion of the first segment portion inserted into the aerosol-forming substrate and two opposite surfaces of the portion of the second segment portion inserted into the aerosol-forming substrate are configured to contact the aerosol-forming substrate.

3. The heater assembly according to claim 1, wherein the first segment portion and the second segment portion are arranged side by side and are spaced apart from each other;

the heater connection further comprises a third segment portion, the entire third segment portion is configured to be inserted into and to heat the aerosol-forming substrate; and
an end of the first segment portion near the second segment portion and an end of the second segment portion near the first segment portion are connected with each other through the third segment portion.

4. The heater assembly according to claim 3, further comprising two electrodes, wherein one of the two electrodes is arranged on an end of the first segment portion away from the third segment portion; and the other one of the two electrodes is arranged on an end of the second segment portion away from the third segment portion.

5. The heater assembly according to claim 4, wherein the heating body is a heater plate made of conductive ceramic; and a spacing between the first segment portion and the second segment portion is in a range of 0.25 mm to 0.35 mm.

6. The heater assembly according to claim 4, wherein the heating body is a heater stick made of conductive ceramic; and a spacing between the first segment portion and the second segment portion of the heater stick is in a range from 0 to 1 mm.

7. The heater assembly according to claim 6, wherein a support ceramic is arranged between the first segment portion and the second segment portion; and the support ceramic is bonded to the first segment portion and the second segment portion by a glass ceramic.

8. The heater assembly according to claim 1, wherein the heating body comprises a main component and a crystalline component; the main component is one or more of manganese, strontium, lanthanum, tin, antimony, zinc, bismuth, silicon, and titanium; and the crystalline component is one or more of lanthanum manganate, lanthanum strontium manganate, tin oxide, zinc oxide, antimony oxide, bismuth oxide, silicon oxide, and yttrium oxide.

9. The heater assembly according to claim 1, further comprising a fixing sleeve, sleeving the outside of the heating body.

10. The heater assembly according to claim 9, wherein the fixing sleeve is made of metal; and an insulating medium layer is disposed between the heating body and the fixing sleeve.

11. The heater assembly according to claim 9, wherein a first fastening structure is arranged on each of a surface of a portion of the first segment portion configured to be inserted into a mounting base and a surface of a portion of the second segment portion configured to be inserted into the mounting base; or first fastening structure is arranged on a surface of a portion of the fixing sleeve configured to be inserted into the mounting base.

12. The heater assembly according to claim 4, further comprising a protective layer, which is coated on a surface of the heating body and covers the two electrodes.

13. The heater assembly according to claim 12, wherein the protective layer is a vitreous glaze layer.

14. The heater assembly according to claim 5, wherein one of the two electrodes is arranged on each of a first surface of the first segment portion and a second surface of the first segment portion opposite to the first surface; and the other one of the two electrodes is arranged on each of a first surface of the second segment portion and a second surface of the second segment portion opposite to the first surface.

15. The heater assembly according to claim 6, wherein the first segment portion has a first inner surface and a first outer surface, the second segment portion has a second inner surface and a second outer surface;

one of the two electrodes arranged on the first segment portion extends from the first outer surface to the first inner surface; and
the other one of the two electrodes arranged on the second segment portion extends from the second outer surface to the second inner surface.

16. The heater assembly according to claim 4, wherein the heating body comprises a first heat region and a second heat region connected to the first heat region; and

a ratio of a heating temperature of the first heat region to a heating temperature of the second heat region of the heating body is greater than 2; and
the two electrodes are disposed at the second heat region.

17. The heater assembly according to claim 16, wherein the width or/and the thickness of the portion of the first segment portion and the second segment por-

tion disposed at the second heat region is equal to the width or/and the thickness of the portion of the first segment portion and the second segment portion disposed at the first heat region.

18. The heater assembly according to claim 16, wherein the width or/and the thickness of the portion of the first segment portion and the second segment portion disposed at the second heat region is greater than the width or/and the thickness of the portion of the first segment portion and the second segment portion disposed at the first heat region, allowing a temperature of the first heat region of the hating body is greater than a temperature of the second heat region of the hating body.

19. The heater assembly according to claim 16, wherein the heating body is an integral one-piece structure, the resistivity of the material of portions of the first segment portion and the second segment portion disposed at the second heat region is different from the resistivity of the material of portions of the first segment portion and the second segment portion disposed at the first heat region, allowing temperature of the first heat region of the hating body is greater than a temperature of the second heat region of the hating body.

20. An aerosol-forming device, comprising: a housing, the heater assembly according to claim 1, and a power supply assembly, wherein the heater assembly and the power supply assembly are arranged inside the housing; the power supply assembly is connected to the heater assembly and is configured to supply power to the heater assembly.

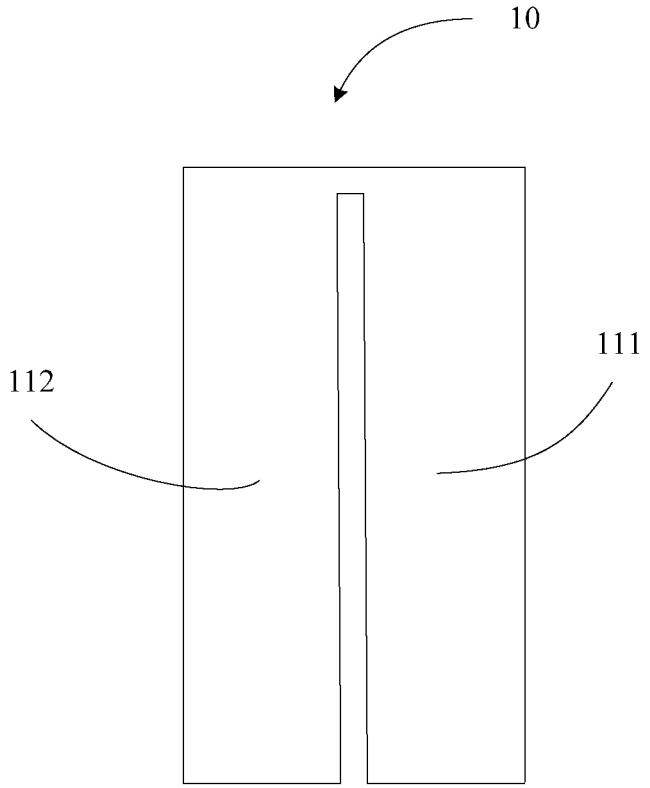

FIG. 1a

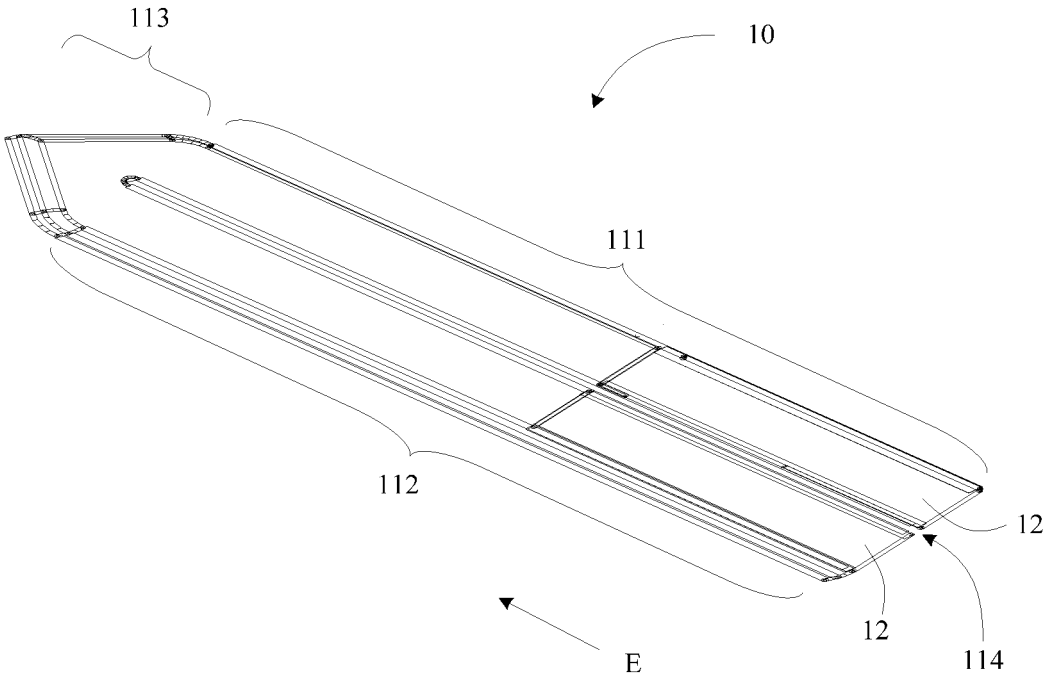

FIG. 1b

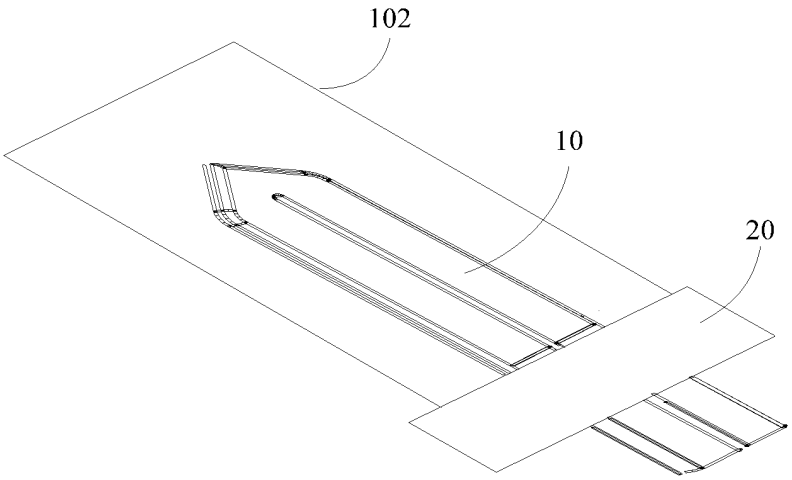

FIG. 1c

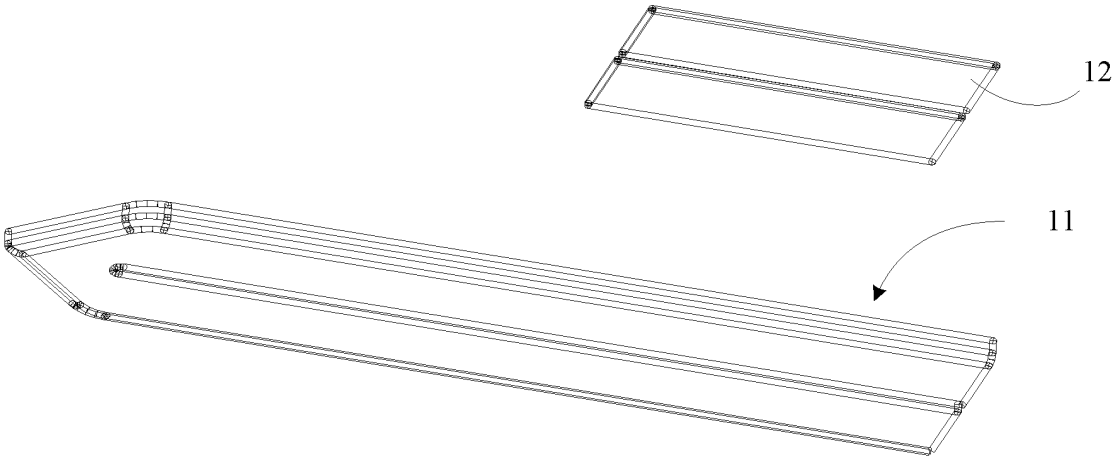

FIG. 2

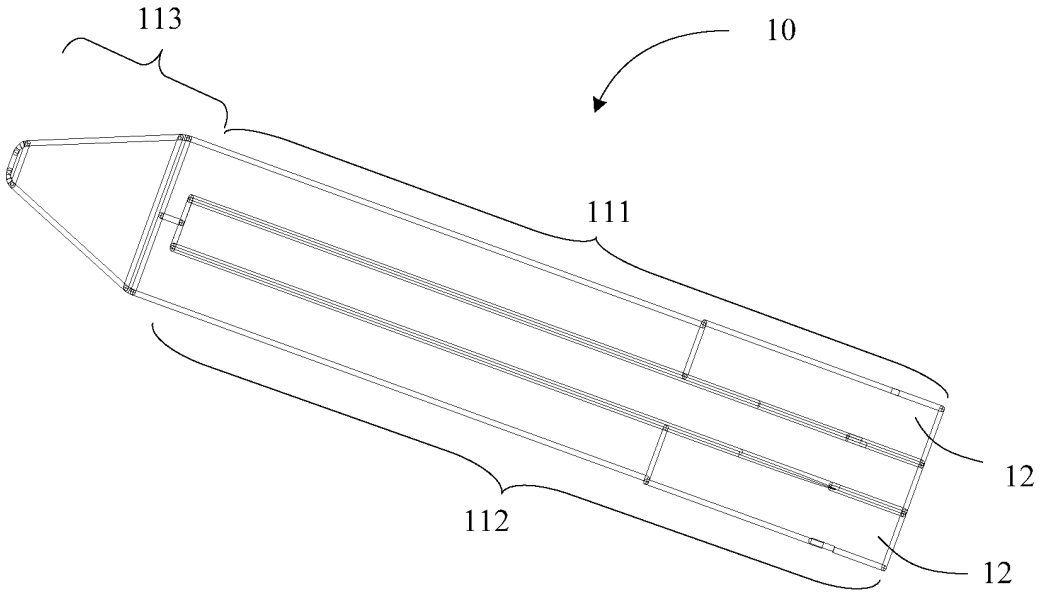

FIG. 3a

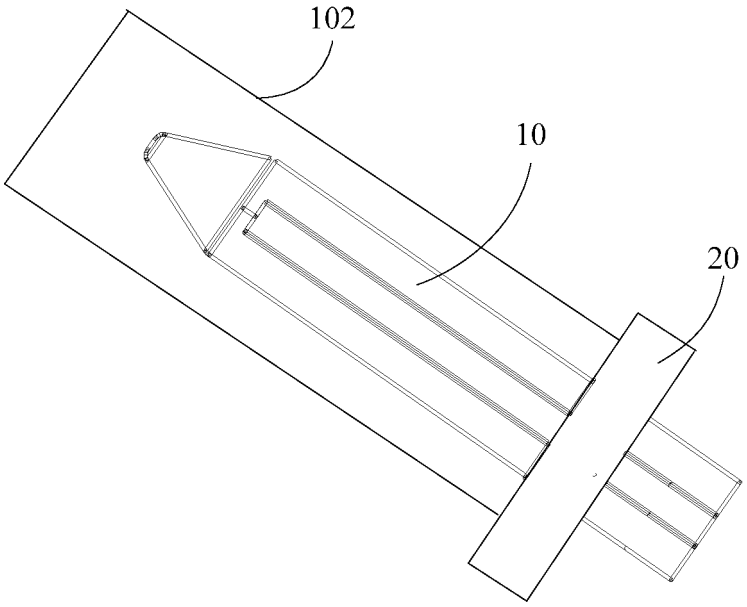

FIG. 3b

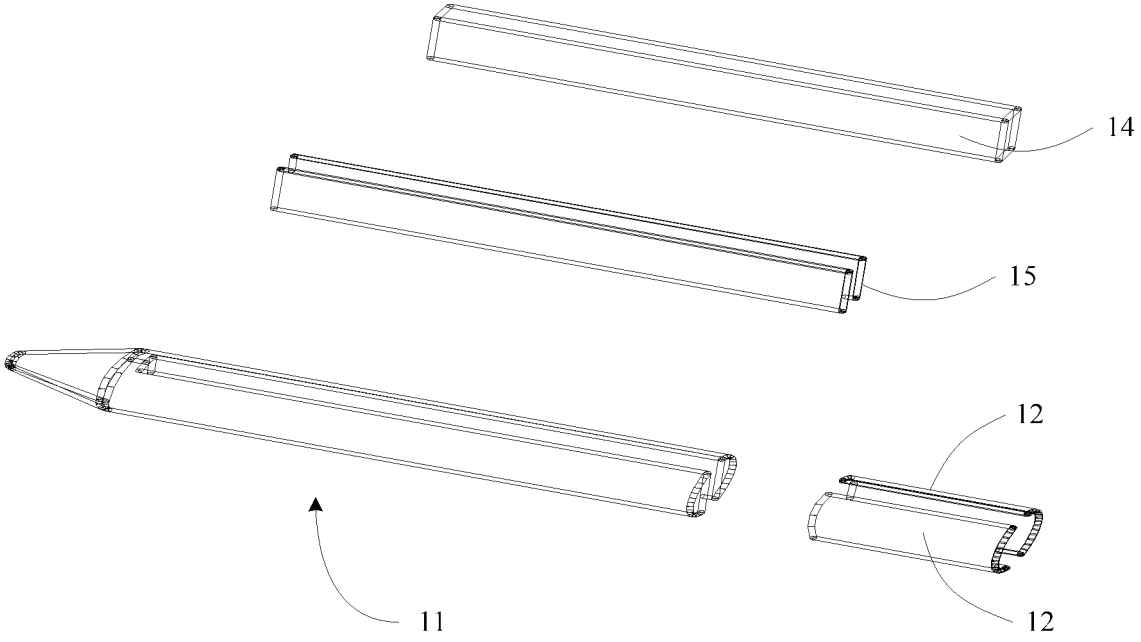

FIG. 4

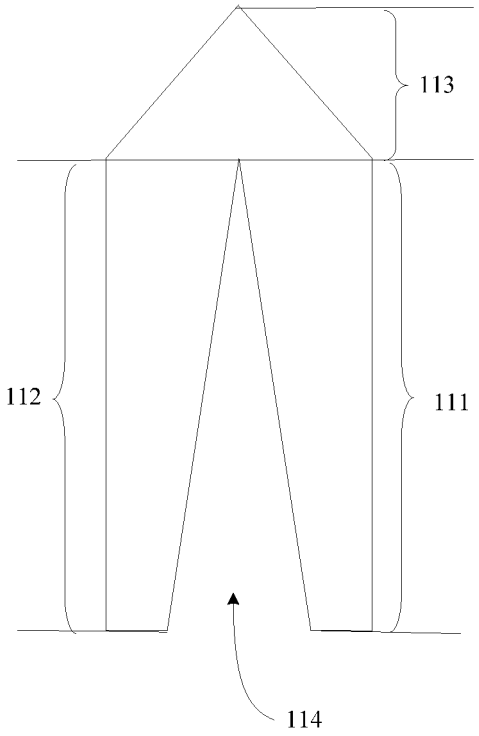

FIG. 5

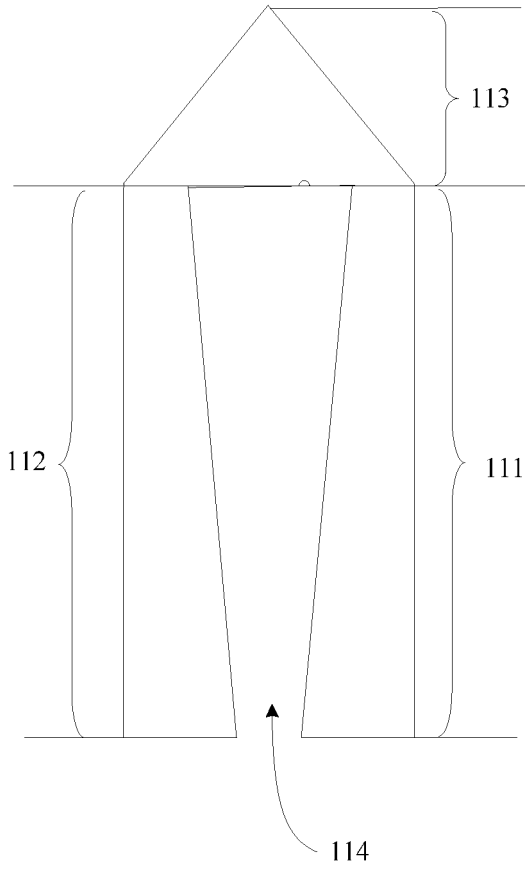

FIG. 6

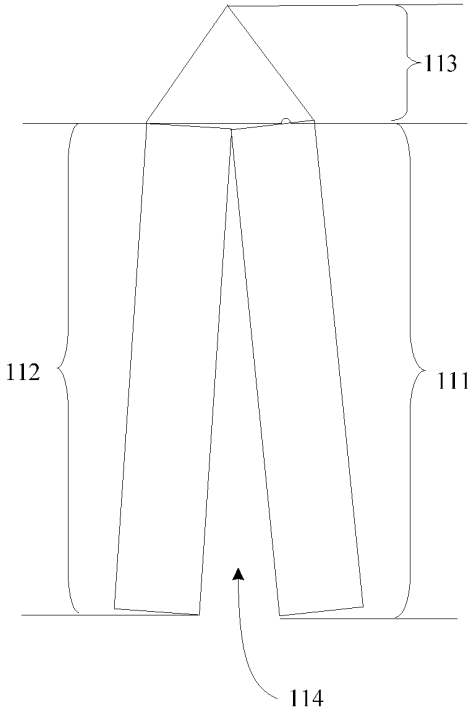

FIG. 7

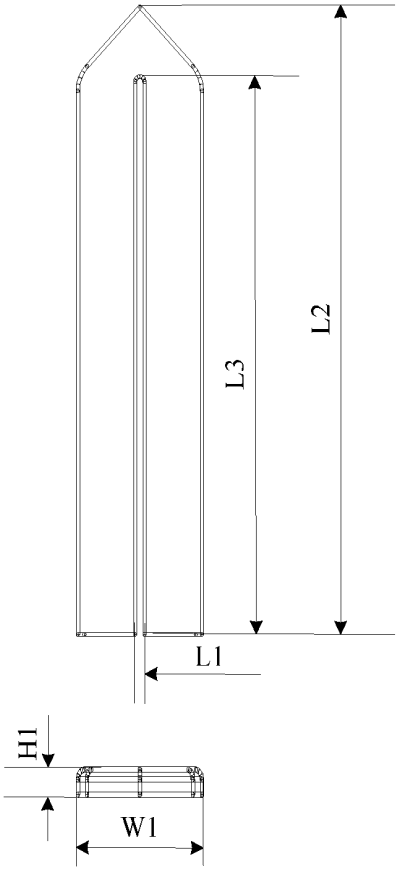

FIG. 8

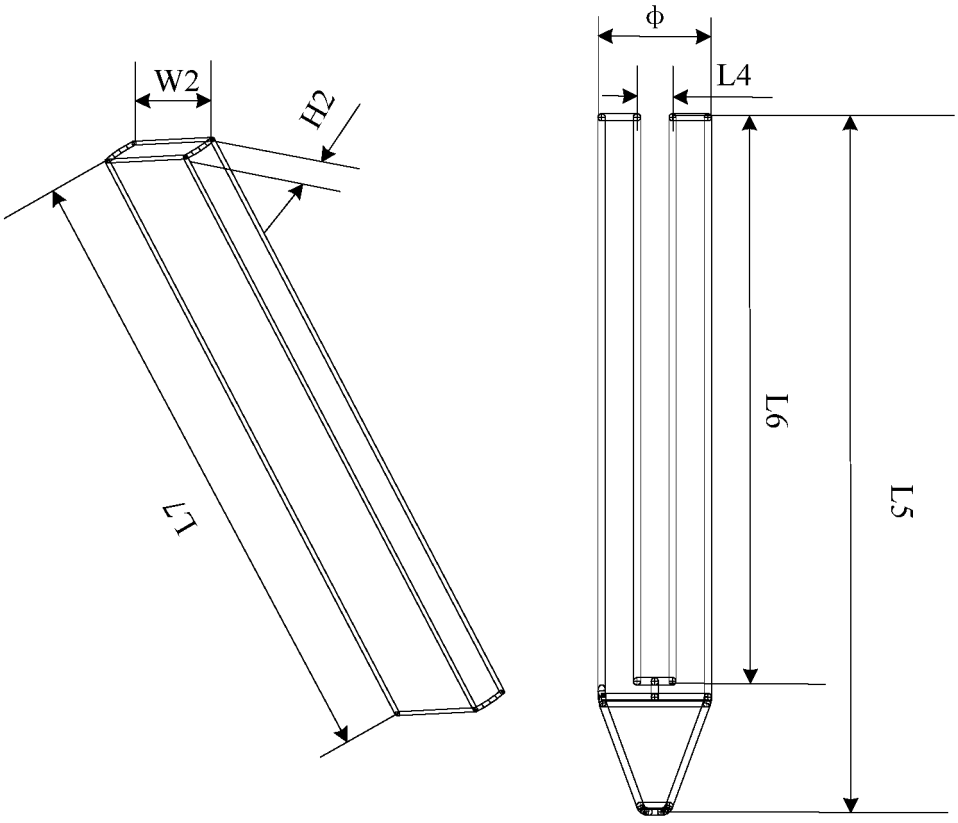

FIG. 9

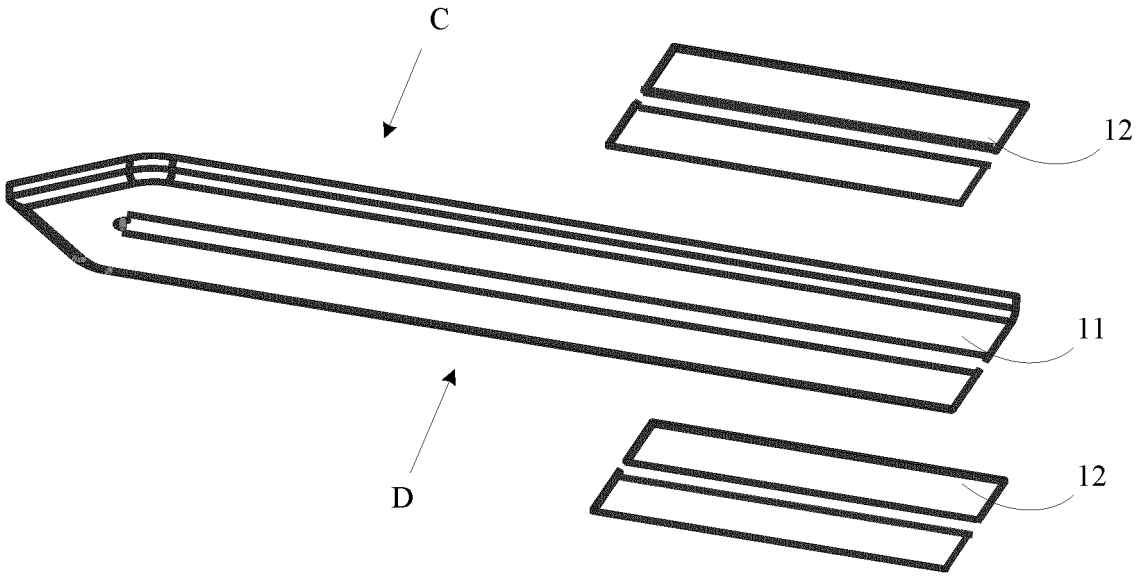

FIG. 10a

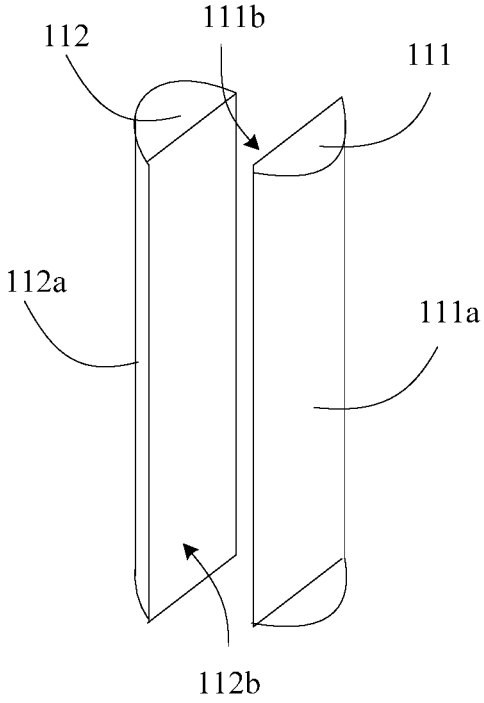

FIG. 10b

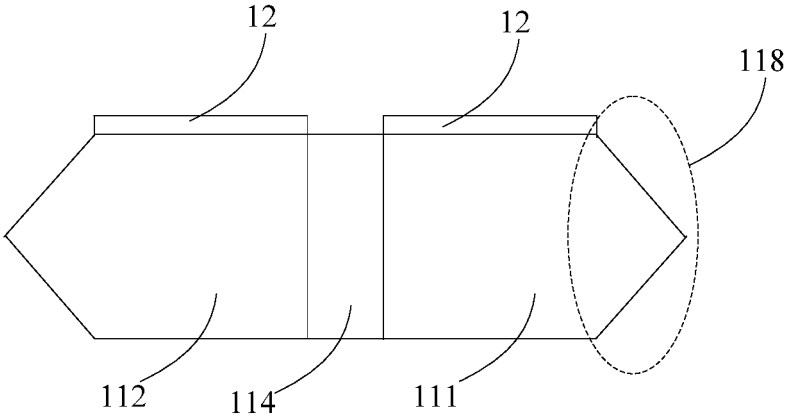

FIG. 10c

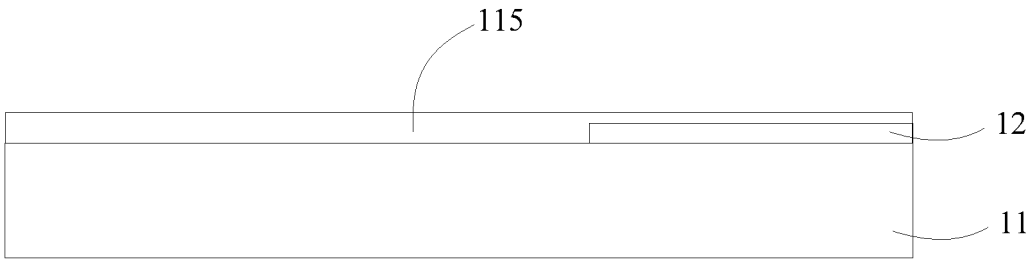

FIG. 11

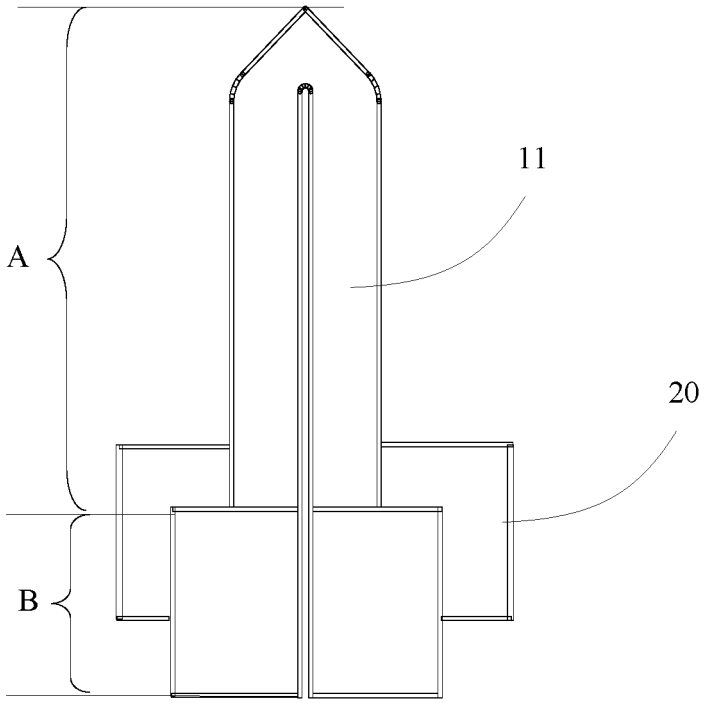

FIG. 12

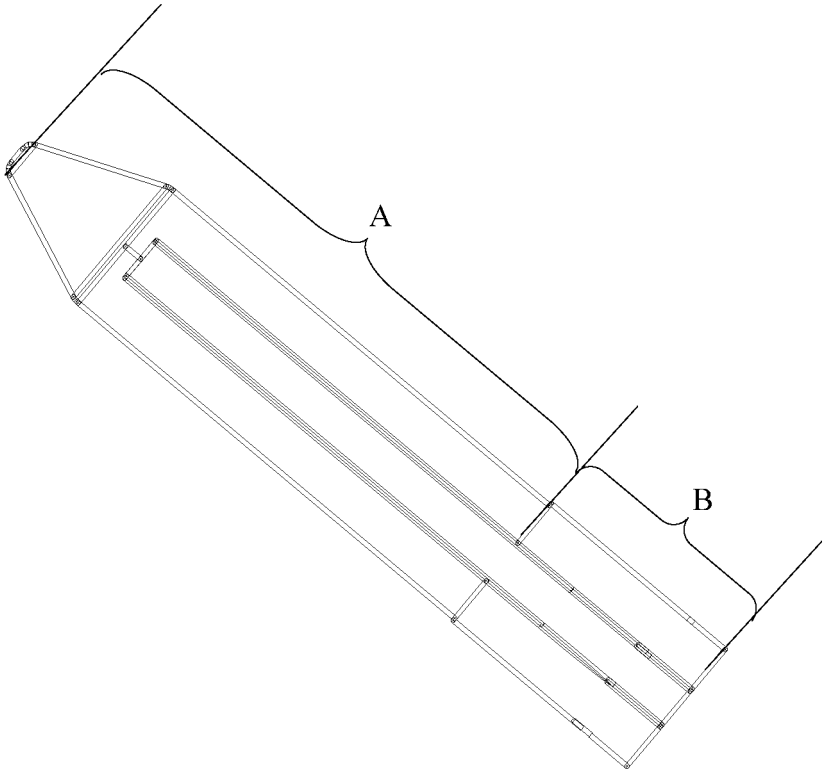

FIG. 13

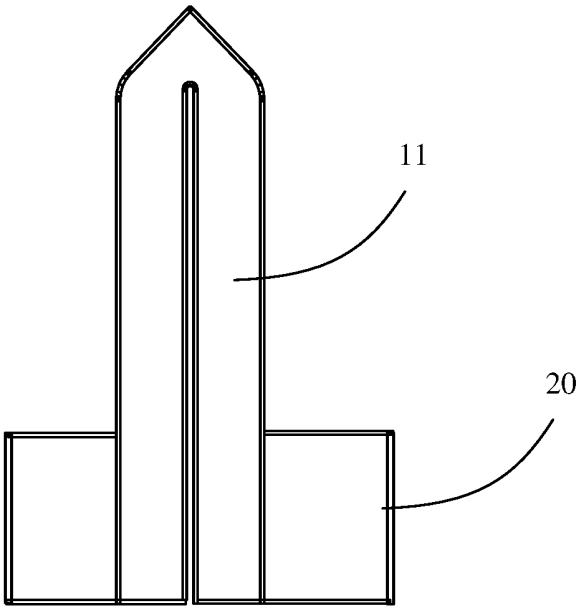

FIG. 14

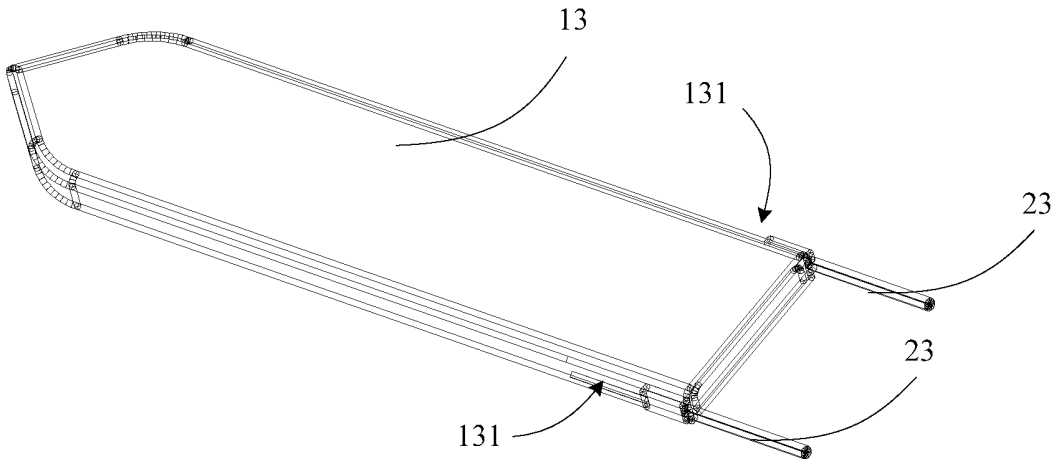

FIG. 15

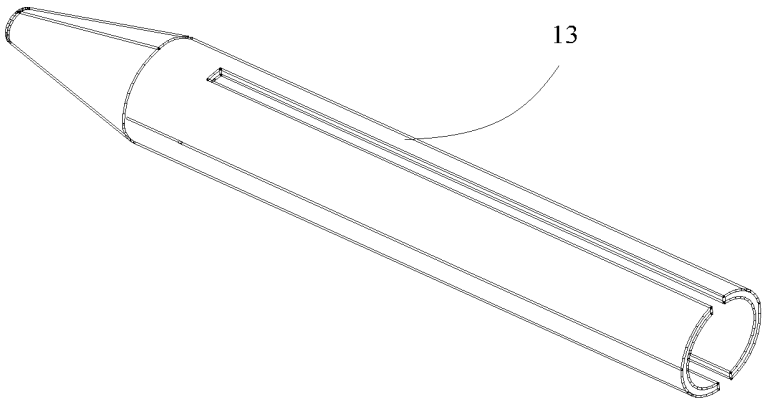

FIG. 16

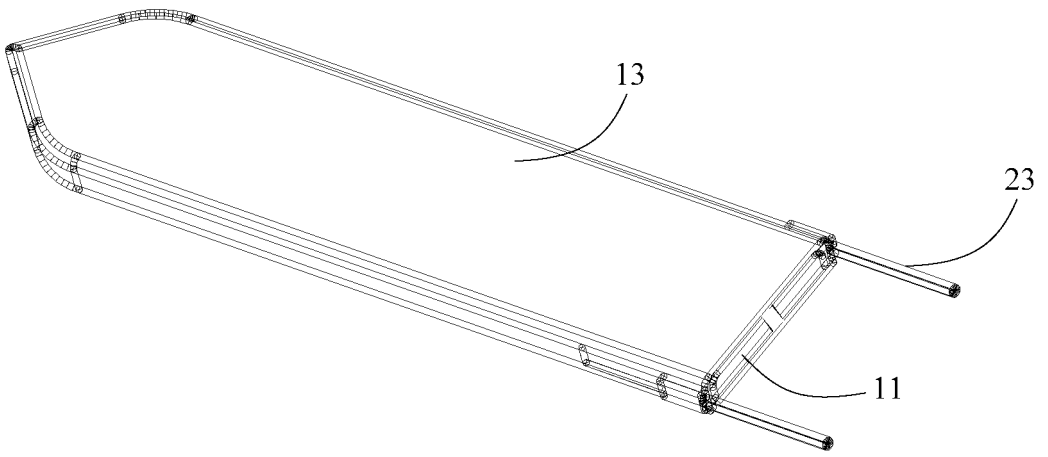

FIG. 17

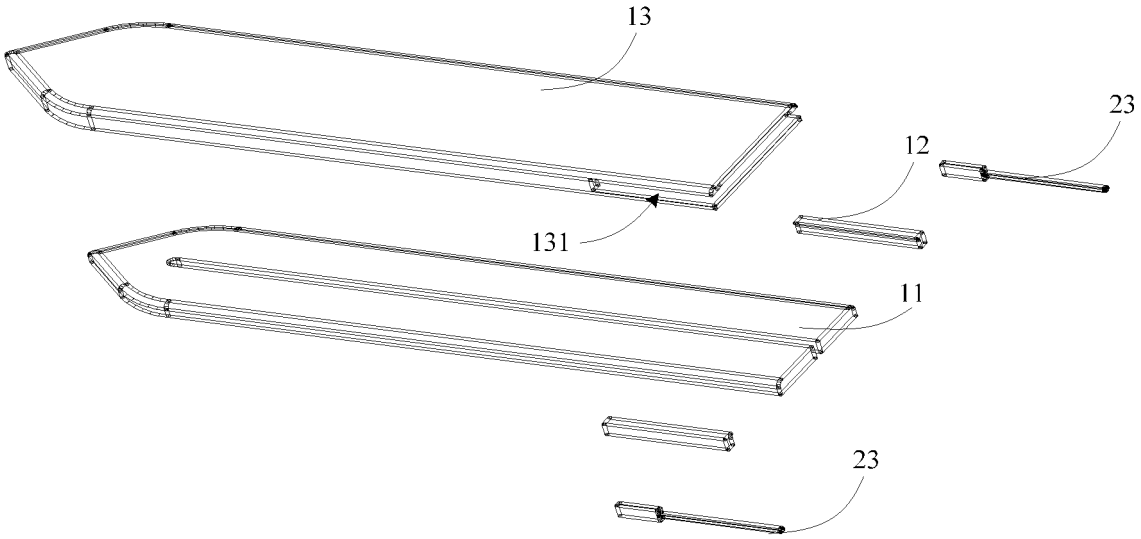

FIG. 18

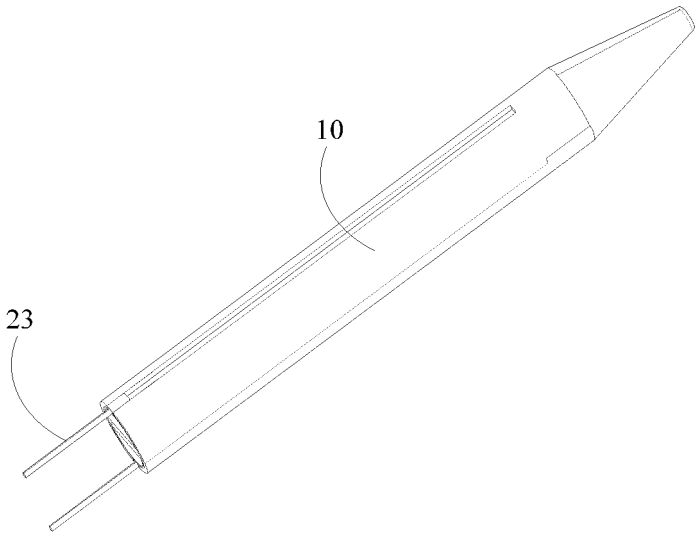

FIG. 19

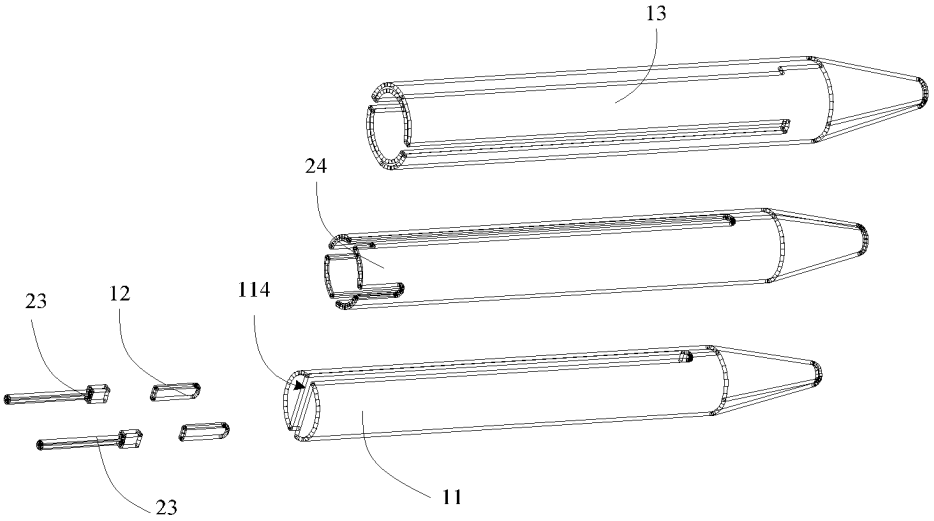

FIG. 20

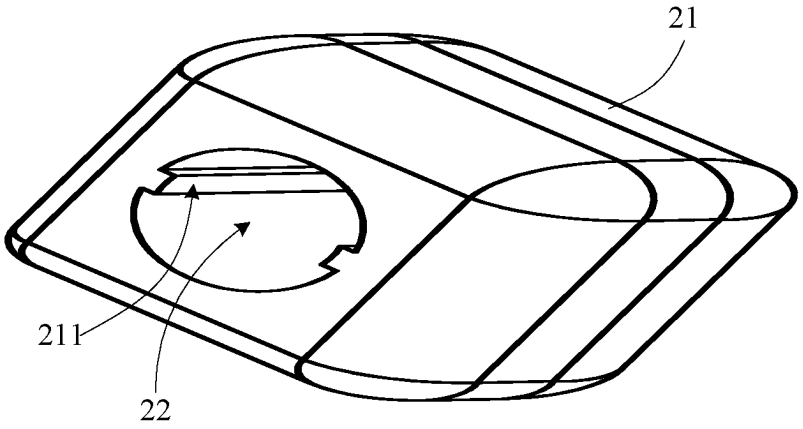

FIG. 21

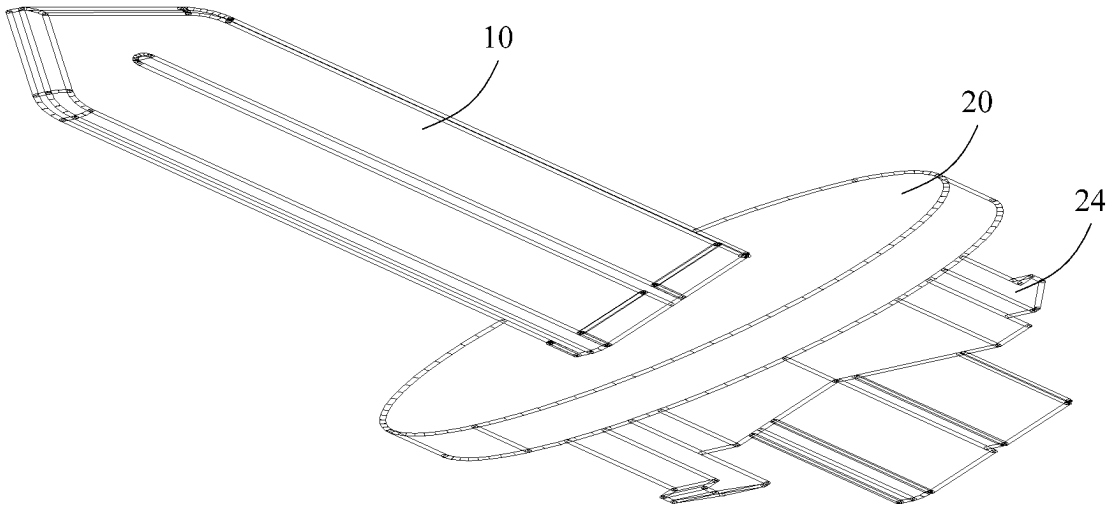

FIG. 22

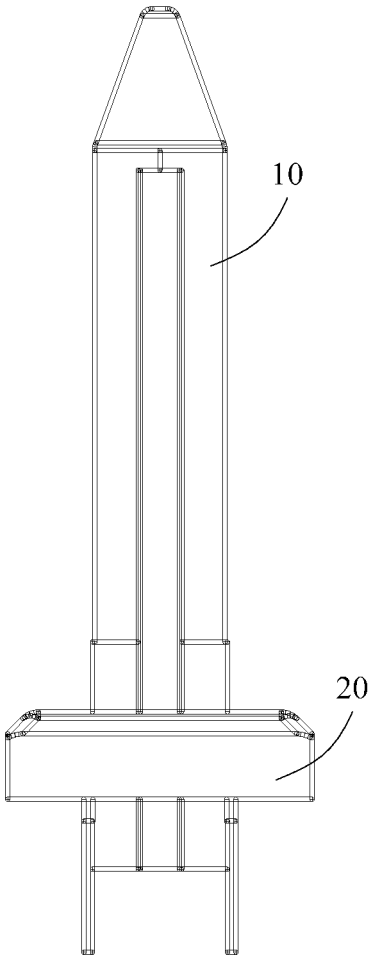

FIG. 23

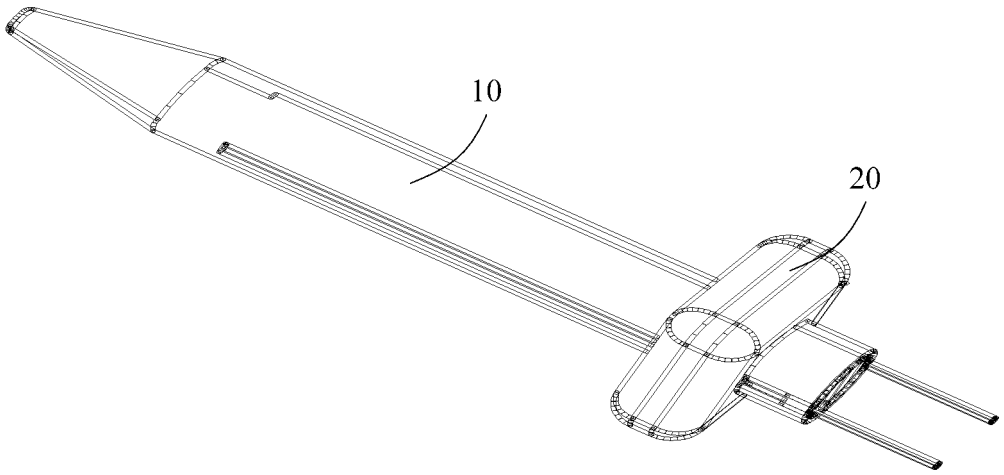

FIG. 24

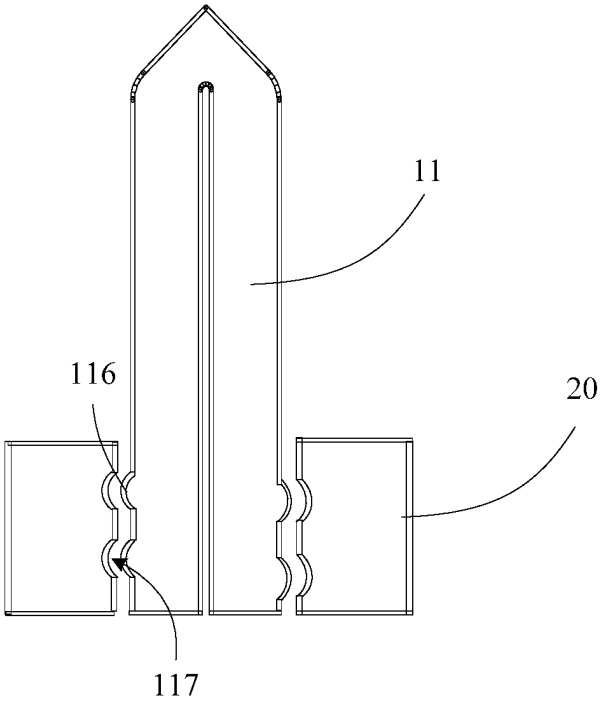

FIG. 25

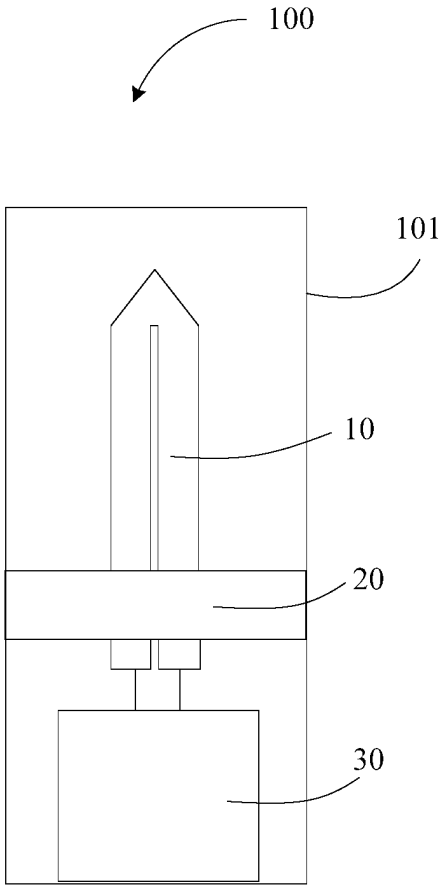

FIG. 26

国际检索报告

国际申请号
PCT/CN2021/082418

A. 主题的分类

A24F 40/46(2020.01)i; A24F 47/00(2020.01)i

按照国际专利分类(IPC)或者同时按照国家分类和IPC两种分类

B. 检索领域

检索的最低限度文献(标明分类系统和分类号)

A24F47; A24F40; H05B3

包含在检索领域中的除最低限度文献以外的检索文献

在国际检索时查阅的电子数据库(数据库的名称，和使用的检索词（如使用））

CNABS,CNTXT,VEN,电子烟，电子香烟，无烟香烟，加热，片，板，棒，导电陶瓷，外套，护套，套筒，双面加热，稀土，U形，U型，electronic,smokeless,cigarette,tobacco,conduct,ceramic,heat,plate,board,piece,sheet,rod,heater,jacket,sleeve,sheath,rare earth,U-shaped

C. 相关文件

类 型*	引用文件，必要时，指明相关段落	相关的权利要求
PX	CN 212488479 U (深圳市卓力能技术股份有限公司) 2021年 2月 9日 (2021-02-09) 说明书第36-57段及附图3-5	1-8，14，20
X	CN 209643859 U (惠州市吉瑞科技有限公司深圳分公司) 2019年 11月 19日 (2019-11-19) 说明书第20-31段及附图1-2、5	1-8，14-15
Y	CN 209643859 U (惠州市吉瑞科技有限公司深圳分公司) 2019年 11月 19日 (2019-11-19) 说明书第20-31段及附图1-2、5	9-13，16-20
Y	CN 208490847 U (深圳市华诚达精密工业有限公司) 2019年 2月 15日 (2019-02-15) 说明书第29-41段及附图1-4	9-11
Y	CN 107404948 A (菲利普莫里斯生产公司) 2017年 11月 28日 (2017-11-28) 说明书第30、66-92段及附图1-5）	12-13，16-20
X	WO 2019002330 A1 (PHILIP MORRIS PRODUCTS SA) 2019年 1月 3日 (2019-01-03) 说明书第19页第5行至第26页第26行及附图1、4、8-11	1-7，20
X	WO 2019002329 A1 (PHILIP MORRIS PRODUCTS SA) 2019年 1月 3日 (2019-01-03) 说明书第19页第20行至第27页第10行及附图1、4、8-11	1-7，20

☑ 其余文件在C栏的续页中列出。　☑ 见同族专利附件。

* 引用文件的具体类型：
“A” 认为不特别相关的表示了现有技术一般状态的文件
“E” 在国际申请日的当天或之后公布的在先申请或专利
“L” 可能对优先权要求构成怀疑的文件，或为确定另一篇引用文件的公布日而引用的或者因其他特殊理由而引用的文件（如具体说明的）
“O” 涉及口头公开、使用、展览或其他方式公开的文件
“P” 公布日先于国际申请日但迟于所要求的优先权日的文件
“T” 在申请日或优先权日之后公布，与申请不相抵触，但为了理解发明之理论或原理的在后文件
“X” 特别相关的文件，单独考虑该文件，认定要求保护的发明不是新颖的或不具有创造性
“Y” 特别相关的文件，当该文件与另一篇或者多篇该类文件结合并且这种结合对于本领域技术人员为显而易见时，要求保护的发明不具有创造性
“&” 同族专利的文件

国际检索实际完成的日期	国际检索报告邮寄日期
2021年 6月 16日	2021年 6月 23日
ISA/CN的名称和邮寄地址 中国国家知识产权局(ISA/CN) 中国北京市海淀区蓟门桥西土城路6号 100088 传真号 (86-10)62019451	受权官员 刘文颖 电话号码 (86-10)62085536

PCT/ISA/210 表(第2页) (2015年1月)

国际检索报告

国际申请号
PCT/CN2021/082418

C. 相关文件

类 型*	引用文件，必要时，指明相关段落	相关的权利要求
A	CN 210248380 U（广东国研新材料有限公司）2020年 4月 7日（2020 - 04 - 07） 全文	1-20
A	CN 204579889 U（东莞市国研电热材料有限公司）2015年 8月 26日（2015 - 08 - 26） 全文	1-20

PCT/ISA/210 表(第2页)（2015年1月）

国际检索报告
关于同族专利的信息

国际申请号
PCT/CN2021/082418

检索报告引用的专利文件			公布日（年/月/日）	同族专利			公布日（年/月/日）
CN	212488479	U	2021年 2月 9日	无			
CN	209643859	U	2019年 11月 19日	无			
CN	107404948	A	2017年 11月 28日	HK	1246109	A1	2018年 9月 7日
				US	10638794	B2	2020年 5月 5日
				RU	2017134602	A	2019年 4月 5日
				SG	11201708054T	A	2017年 10月 30日
				JP	2018511316	A	2018年 4月 26日
				SG	11201705399P	A	2017年 10月 30日
				KR	20170133333	A	2017年 12月 5日
				US	2018235278	A1	2018年 8月 23日
				JP	2018511314	A	2018年 4月 26日
				RU	2017134602	A3	2019年 8月 28日
				EP	3277109	B1	2020年 5月 6日
				AU	2016239643	A1	2017年 8月 17日
				BR	112017018626	A2	2018年 4月 17日
				JP	6771478	B2	2020年 10月 21日
				RU	2720608	C2	2020年 5月 12日
				WO	2016156121	A1	2016年 10月 6日
				WO	2016156103	A1	2016年 10月 6日
				ZA	201704916	B	2019年 7月 31日
				BR	112017018675	A2	2018年 4月 17日
				RU	2705507	C2	2019年 11月 7日
				IL	253568	D0	2017年 9月 28日
				EP	2921065	A1	2015年 9月 23日
				IL	252530	D0	2017年 7月 31日
				EP	2921066	A1	2015年 9月 23日
				EP	3277108	A1	2018年 2月 7日
				PH	12017501316	A1	2018年 1月 29日
				CA	2978506	A1	2016年 10月 6日
				CA	2981196	A1	2016年 10月 6日
				AU	2016239746	A1	2017年 7月 6日
				HK	1246105	A1	2018年 9月 7日
				RU	2017134811	A	2019年 4月 5日
				EP	3277109	A1	2018年 2月 7日
				MX	2017012421	A	2018年 1月 11日
				PH	12017500987	A1	2017年 12月 18日
				US	2018007971	A1	2018年 1月 11日
				IL	252530	A	2020年 4月 30日
				MX	2017011801	A	2017年 12月 7日
				RU	2020114169	A	2020年 5月 21日
				KR	20170133330	A	2017年 12月 5日
				RU	2017134811	A3	2019年 8月 27日
				CN	107427079	A	2017年 12月 1日
WO	2019002330	A1	2019年 1月 3日	CN	110799051	A	2020年 2月 14日
				IL	269588	D0	2019年 11月 28日
				BR	112019021893	A2	2020年 5月 26日
				PH	12019502097	A1	2020年 3月 9日
				EP	3646668	A1	2020年 5月 6日
				JP	2020524981	A	2020年 8月 27日
				KR	20200019858	A	2020年 2月 25日

PCT/ISA/210 表(同族专利附件) (2015年1月)

国际检索报告
关于同族专利的信息

国际申请号
PCT/CN2021/082418

检索报告引用的专利文件			公布日（年/月/日）	同族专利			公布日（年/月/日）
				US	2020107579	A1	2020年 4月 9日
WO	2019002329	A1	2019年 1月 3日	JP	2020524982	A	2020年 8月 27日
				BR	112019021706	A2	2020年 5月 12日
				CN	110800372	A	2020年 2月 14日
				US	2020163386	A1	2020年 5月 28日
				KR	20200019856	A	2020年 2月 25日
				PH	12019502098	A1	2020年 3月 9日
				EP	3646667	A1	2020年 5月 6日
				IL	269282	D0	2019年 11月 28日
CN	210248380	U	2020年 4月 7日		无		
CN	204579889	U	2015年 8月 26日		无		

PCT/ISA/210 表(同族专利附件) (2015年1月)