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(54) **AEROSOL GENERATION DEVICE AND HEATING ASSEMBLY THEREOF**

(57) The present invention relates to an aerosol generation device and a heating assembly thereof. The heating assembly forms, in the interior thereof, a heating chamber into which an aerosol generating substance is receivable. The heating chamber has a cross-sectional contour that includes at least one concave segment toward the center of the cross-sectional contour. The at least one concave segment is configured to compress the aerosol generating substance. When being inserted into the heating assembly, the aerosol generating substance is compressed by the chamber wall surface of the concave segment, so that air contained in the aerosol generating substance is squeezed out, heat transfer rate increased, and also, a heat transfer distance from the outside surface of the aerosol generating substance to the center thereof is reduced so as to improve issues of a temperature difference between the surface and the center of the aerosol generating substance being greater, the heat transfer efficiency being low, and the pre-heating time being long.

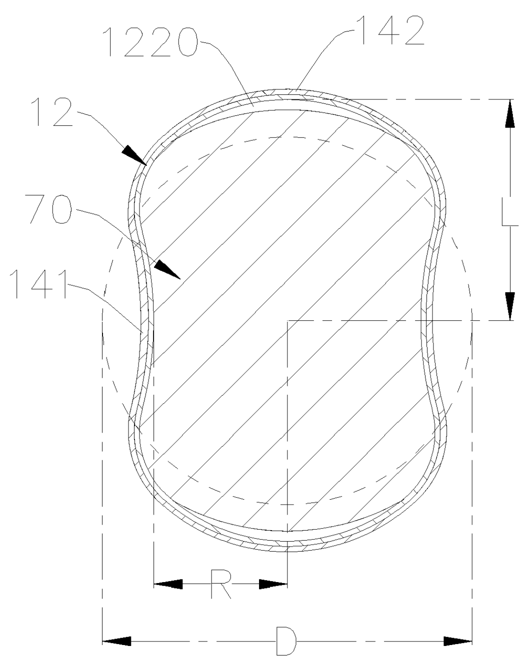

FIG. 6

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to the field of atomization, and more particularly to an aerosol generation device and a heating assembly thereof.

DESCRIPTION OF THE RELATED ART

[0002] A heat-not-burn atomization device is an aerosol generation device that heats an aerosol generating substance in a manner of heating at a low temperature, but not causing burning, to generate an aerosol. Currently, the heat-not-burn atomization devices often adopt tubular outside circumference heating or central embedded heating, in which the tubular outside circumference heating means a heating assembly surrounding outside the aerosol generating substance. In a known aerosol generation device that adopts tubular outside circumference heating, the heating assembly is often arranged in a hollow round tube form, so that after insertion of an aerosol generating substance therein, a circle in which a cross-sectional contour of the aerosol generating substance is located contacts with and is coincident with or tangent to inner walls of the heating assembly and the aerosol generating substance is heated by the heating assembly to generate an aerosol. Such a structural arrangement is deficient in the following. A heat transfer path for heat to transmit from the heating assembly to the center of the aerosol generating substance is long, and the heating efficiency is low, so as to result in a great temperature difference between the center and the surface of the aerosol generating substance. In addition, content of air inside the aerosol generating substance is high and this leads to a low heat transfer efficiency, a long preheating time, and a slow vapor generation speed.

SUMMARY OF THE INVENTION

[0003] The technical issue that the present invention aims to resolve is to provide, in view of the defects of the prior art described above, an improved heating assembly, as well as an aerosol generation device including the heating assembly.

[0004] The technical solution that the present invention adopts to resolve such a technical issue is constructing a heating assembly, and the heating assembly heating assembly forms, in the interior thereof, with a heating chamber into which an aerosol generating substance is receivable, the heating chamber having a cross-sectional contour that comprises at least one concave segment toward the center of the cross-sectional contour, the at least one concave segment arranged to compress the aerosol generating substance.

[0005] In some embodiments, the cross-sectional contour of the heating chamber further comprises at least one connecting segment connected with the at least one concave segment, the furthest distance between the at least one connecting segment and the center of the cross-sectional contour being greater than the radius of the aerosol generating substance.

[0006] In some embodiments, the at least one concave segment and the at least one connecting segment are both in the form of a smooth curve, and the at least one concave segment and the at least one connecting segment are smoothly connected.

[0007] In some embodiments, the at least one concave segment comprises multiple concave segments, the multiple concave segments arranged at regular intervals along the circumference of the heating chamber; the at least one connecting segment comprises multiple connecting segments, the multiple connecting segments arranged at regular intervals along the circumference of the heating chamber.

[0008] In some embodiments, the at least one concave segment comprises two concave segments, the two concave segments arranged opposite to each other along the circumference of the heating chamber; the at least one connecting segment comprises two connecting segments, the two connecting segments arranged opposite to each other along the circumference of the heating chamber; and the two concave segments and the two connecting segments are both arc contours.

[0009] In some embodiments, the radius of curvature of the two concave segments is greater than the radius of curvature of the two connecting segments.

[0010] In some embodiments, in a condition that the aerosol generating substance is received in the heating chamber, at least one gas flow passage is formed between the at least one connecting segment and the outside surface of the aerosol generating substance.

[0011] In some embodiments, the heating assembly comprises a heating tube and a heat generation layer attached to the heating tube; the heating tube is of a tubular form, and the inner wall surface of the heating tube defines the heating chamber.

[0012] In some embodiments, the heat generation layer comprises a heat-generating portion arranged to correspond to the at least one concave segment and an electricity-conducting portion arranged to correspond to the at least one connecting segment, electric resistivity of the heat-generating portion being greater than electrical resistivity of the electricity-conducting portion.

[0013] In some embodiments, the heat generation layer comprises at least two the heating tracks arranged in parallel with each other, the at least two heating tracks distributed in the axial and/or circumferential direction of the heating tube.

[0014] In some embodiments, the heating assembly further comprises an infrared layer attached to the heating tube.

[0015] In some embodiments, the heating assembly further comprises a heat homogenizing layer attached to the heating tube.

[0016] In some embodiments, the infrared layer is arranged over the inner surface of the heating tube, and the heat homogenizing layer is arranged over the outer surface of the heating tube, the heat generation layer disposed over the outer surface of the heat homogenizing layer; and

the heating assembly further comprises a dielectric layer arranged between the heat homogenizing layer and the heat generation layer.

[0017] In some embodiments, a lead-in compartment is formed in the heating assembly, and the lead-in compartment is in communication with the heating chamber for guiding entry of the aerosol generating substance.

[0018] In some embodiments, the lead-in compartment comprises a first end distant from the heating chamber and a second end adjacent to the heating chamber, the shortest distance between the cross-sectional contour of the first end of the lead-in compartment and the center axis line of the lead-in compartment is greater than or equal to the radius of the aerosol generating substance.

[0019] In some embodiments, the cross-sectional area of the lead-in compartment at the first end is greater than the cross-sectional area thereof at the second end.

[0020] In some embodiments, the cross-sectional contour of the lead-in compartment gradually varies as transiting from the first end toward the second end.

[0021] In some embodiments, the heating assembly further comprises a support wall arranged at an end of the heating chamber to support the aerosol generating substance.

[0022] In some embodiments, the support wall comprises an end wall and at least one raised platform protruding from the end wall toward the heating chamber.

[0023] The present invention also provides an aerosol generation device, which comprises the heating assembly described in any one of the above statements.

[0024] Implementation of the present invention at least includes the following advantages: The aerosol generating substance, when being inserted into the heating assembly, is compressed by the chamber wall surface of the concave segment, so that air contained in the aerosol generating substance is squeezed out, heat transfer rate increased, and also, a heat transfer distance from the outside surface of the aerosol generating substance to the center thereof is reduced so as to improve issues of a temperature difference between the surface and the center of the aerosol generating substance being greater, the heat transfer efficiency being low, and the pre-heating time being long.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025] A detailed description of the present invention will be provided below with reference to the attached drawings and embodiments thereof, and in the drawings:

FIG. 1 is a perspective view, in a schematic form, showing an aerosol generation device, with an aerosol generating substance inserted therein, according to some embodiments of the present invention;

FIG. 2 is a longitudinal sectional view, in a schematic form, showing the aerosol generation device of FIG. 1, with the aerosol generating substance inserted therein;

FIG. 3 is a perspective view, in a schematic form, showing a heating assembly of FIG. 2;

FIG. 4 is a top plan view of the heating assembly shown in FIG. 3;

FIG. 5 is a longitudinal sectional view, in a schematic form, taken along line A-A of the heating assembly shown in FIG. 3;

FIG. 6 is a longitudinal sectional view, in a schematic form, taken along line B-B of the heating assembly of FIG. 3, with the aerosol generating substance inserted therein;

FIG. 7 is a longitudinal sectional view, in a schematic form, showing a first alternative solution of the heating assembly according to the present invention; and

FIG. 8 is a side elevational view showing a second alternative solution of the heating assembly according to the present invention.

DETAILED DESCRIPTION OF EMBODIMENTS

[0026] For clearer understanding of the technical features, objectives, and advantages of the present invention, embodiments of the present invention will be described in further detail with reference to the attached drawings. The following description expounds numerous specific details for full understanding of the present invention. However, the present invention can be implemented in various ways other than what illustrated herein. Those having ordinary skill in the art may contemplate similar improvement without departing from the content of the present invention, and accordingly, the present invention is not limited to the specific embodiments disclosed hereinafter.

[0027] In the description of the present invention, it is appreciated that the terms "center", "longitudinal", "transverse", "length", "width", "thickness", "up" "down", "front", "rear", "left", "right", "vertical", "horizontal", "top", "bottom", "inside", "outside", "clockwise", "counterclockwise", "axial", "radial", and "circumferential" as used herein to indicate directional or positional relationships are based on the direction or position depicted in the attached drawings, or the directional or positional relationships that a product of the present invention is commonly placed in regular uses thereof, and are adopted for the purposes of easy description of the present invention and for simplifying the description, rather than suggesting or implying a device or component so indicated must take a specific direction, or be constructed or operated in a specific direction, and thus should not be construed as limiting to the present invention.

[0028] Further, the terms "first" and "second" are used solely for the purposes of description and should not be construed as suggesting or implying relative importance or implicitly indicating the number of the technical feature so indicated. Thus, features that are defined as "first" and "second" explicitly or implicitly include at least one of such features. In the description of the present invention, "multiple" refers to at least two, such as two or three, unless a clear limitation is explicitly given otherwise.

[0029] In the present invention, unless being specifically defined or constrained, the terms "mounting", "interconnecting", "connecting", and "fixing" should be interpreted in a broad sense, for example, as being fixedly connected, or being detachably connected, or being combined as a one piece; or being mechanically connected or being electrically connected; or being directly connected or indirectly connected by means of an intervening medium, or being in communication between interiors of two elements or an interacting relationship between two elements, unless otherwise specified. For those having ordinary skill in the art, the specific meaning of such terms as used in the present invention can be appreciated according to any specific situation that they are applied.

[0030] In the present invention, unless being specifically defined or constrained, a first feature being "above" or "below" a second feature can be such that the first and second features are in direct contact, or the first and second features are in indirect contact with an intervening medium therebetween. Further, the first feature being "located upward of', "located above", and "located on an upper side" can be such that the first feature is located exactly above, or inclinedly above of the second feature, or can simply indicate an altitude of the first feature is higher than the second feature. The first feature being "located downward of', "located below", and "located on a lower side" can be such that the first feature is located exactly below, or inclinedly below of the second feature, or can simply indicate an altitude of the first feature is lower than the second feature.

[0031] It is noted that when an element is referred to as being "fixed on" or "attached to" another element, it can be directly set on said another element, or there can be an element existing therebetween. When an element is described as being "connected to" another element, it can be directly connected to said another element, or there can be an element existing therebetween. The terms "vertical", "horizontal", "up", "down", "left", "right", and the like expressions are adopted for the purposes of illustration, and are not used as being an indication of the sole way of embodying.

[0032] FIGS. 1-2 show an aerosol generation device 100 according to some embodiments of the present invention. The aerosol generation device 100, upon being supplied with electricity, carries out heating for low-temperature baking of the aerosol generating substance 70 received therein so as to release an effective substance contained in the aerosol generating substance 70 in a manner of causing no burning to form an aerosol. The aerosol generation device 100 is generally in the form of a rectangular prism. It is appreciated that in other embodiments, the aerosol generation device 100 is not limited to the form of a rectangular prism and can be of other shapes, such as a cylinder or an elliptic cylinder.

[0033] The aerosol generating substance 70 is of a cylindrical form and comprises an atomization substance section 71. The atomization substance section 71 may include one or plural of solid vapor generation materials in the form of filament, flake, pellet, powder, or paste. The solid vapor generation materials, upon heating, release aerosol extracts therefrom. The diameter of the aerosol generating substance 70 can be 5mm - 9mm, such as 7mm. Further, the aerosol generating substance 70 may further comprise a filtration section 72, a temperature-dropping section 73, a mouth-piece section 74, and an external enclosing layer 75. The atomization substance section 71, the filtration section 72, the temperature-dropping section 73, and the mouth-piece section 74 are arranged in sequence in the axial direction of the aerosol generating substance 70, and the external enclosing layer 75 encloses the outside of the atomization substance section 71, the filtration section 72, the temperature-dropping section 73, and the mouth-piece section 74. The filtration section 72 is configured for filtering of the aerosol, in order to achieve an enhanced effect of improving purity of the aerosol. The temperature-dropping section 73 is configured for dropping the temperature of the aerosol generated by the atomization base section 71 to be further fed to the mouth-piece section 74, in order to ensure the aerosol may reach a proper temperature when discharging through the mouth-piece section 74. It is appreciated that in other embodiments, the structure of the aerosol generating substance 70 is not subjected to constraint, and for example, the aerosol generating substance 70 can be of other shapes, such as an elliptic cylinder; and further for example, the aerosol generating substance 70 may not include the filtration section 72 and/or the temperature-dropping section 73 and/or the mouth-piece section 74.

[0034] The aerosol generation device 100 comprises a heating assembly 10, an enclosure 20, a battery 30, and a circuit board 40. The heating assembly 10, the battery 30, and the circuit board 40 are all received in the enclosure 20. The heating assembly 10 is of a tubular form and receives and heats, upon being supplied with electricity, the aerosol generating substance 70. The enclosure 20 is provided, in a top thereof, with an insertion opening 21. The aerosol generating substance 70 is insertable through the insertion opening 21 into the heating assembly 10. The heating assembly 10, upon being supplied with electricity, heats up the aerosol generating substance 70. The battery 30 is electrically connected with the heating assembly 10 and the circuit board 40 and configured for supplying electricity to the heating assembly 10 and the circuit board 40. The circuit board 40 is configured for arrangement of a related control circuit.

[0035] In some embodiments, the aerosol generation device 100 may further comprise a dust-shielding cover 50 that covers or exposes the insertion opening 21. When it is not necessary to use the aerosol generation device 100, the dust-shielding cover 50 can be so pushed as to cover the insertion opening 21, so as to prevent dusts from entering the aerosol generation device 100. When use is desired, the dust-shielding cover 50 is so pushed as to expose the insertion opening 21, in order to allow the aerosol generating substance 70 to insert through the insertion opening 21.

[0036] As shown in FIGS. 3-6, the heating assembly 10 comprises a heating tube 12. The heating tube 12 is of a tubular form having a hollow interior, and the inside wall surface of the heating tube 12 defines a heating chamber 120. The heating chamber 120 is configured for receiving and heating the aerosol generating substance 70. The cross-section of the heating chamber 120 is of a non-circular shape and is of a partly concaved shape. The heating chamber 120 has a cross-sectional contour that includes at least one concave segment 121 recessed toward the center of the cross-sectional contour. The at least one concave segment 121 can compress the aerosol generating substance 70 to an extreme limit so as to be more favorable for heat transfer. The shortest distance R between the concave segment 121 and the center of the cross-sectional contour satisfies: $R<D/2$, where D is the diameter of the aerosol generating substance 70. In some embodiments, D-2R=0.2mm - 3.5mm, and further, D-2R=0.2mm - 2mm, in order to guarantee the aerosol generating substance 70 may have a proper amount of compression.

[0037] The cross-sectional contour of the heating chamber 120 further comprises at least one connecting segment 122 connected to the at least one concave segment 121. The at least one connecting segment 122 and the at least one concave segment 121 jointly and circumferentially defines a closed or non-closed cross-sectional contour of the heating chamber 120. The shortest distance between the connecting segment 122 and the center of the cross-sectional contour is greater than or equal to the radius of the aerosol generating substance 70, and The furthest distance L between the connecting segment 122 and the center of the cross-sectional contour is greater than the radius, D/2, of the aerosol generating substance 70, for example 2L-D=0.2mm - 3mm. When the aerosol generating substance 70 is received in the heating chamber 120, the outside surface of the aerosol generating substance 70 and a chamber wall surface of the heating chamber 120 form therebetween at least one gas flow passage 1220 for gas to flow therethrough in order to ensure the gas may flow smoothly when vaping. The at least one gas flow passage 1220 and the at least one connecting segment 122 are arranged to correspond to each other in a circumferential direction of the heating chamber 120. The at least one gas flow passage 1220 may be extended in the axial direction of the heating chamber 120.

[0038] In some embodiments, the cross-sectional contour of the heating chamber 120 is of a shape of axial symmetry and includes multiple concave segments 121 and multiple connecting segments 122, and every two adjacent ones of the concave segments 121 are connected by one of the connecting segments 122 therebetween, and every two adjacent ones of the connecting segments 122 are connected by one of the concave segments 121 therebetween. The multiple concave segment 121 are arranged at regular intervals along the circumference of the heating chamber 120 in order to achieve uniform compression of the aerosol generating substance 70 in the circumferential direction.

[0039] Specifically, in the instant embodiment, the cross-sectional contour of the heating chamber 120 is of a butterfly shape, which comprises two concave segments 121 and two connecting segments 122. The two concave segments 121 are arranged opposite to each other, and the two connecting segment 122 are arranged opposite to each other. Two ends of each of the connecting segments 122 are each connected to one end of one of the two concave segment 121. The two connecting segments 122 and the outside surface of the aerosol generating substance 70 form two gas flow passages 1220, respectively. Further, the concave segments 121 are of circular arc shapes recessed toward the heating chamber 120, and the connecting segments 122 are of circular shapes protruding toward outside of the heating chamber 120, and the radius of curvature of the concave segments 121 is greater than the radius of curvature of the connecting segments 122, so that the contact area and heat transfer area between the heating tube 12 and the aerosol generating substance 70 are enlarged. Further, the concave segments 121 and the connecting segments 122 are smoothly connected by means of for example rounded corners. The shortest distance R between the concave segments 121 and the center of the cross-sectional contour may be greater than 2.5mm. It is appreciated that in other embodiments, the cross-sectional contour of the heating chamber 120 is not limited to a butterfly shape, and can be such that for example the numbers of the concave segments 121 and the connecting segments 122 are three or more than three.

[0040] When inserted into the heating chamber 120, the aerosol generating substance 70 is compressed by the chamber wall surface of the heating chamber 120 into a butterfly shape similar to the cross-sectional shape of the heating chamber 120. FIG. 6 shows a cross-sectional view for the aerosol generating substance 70 that was of a cylindrical form received in the heating chamber 120, wherein phantom lines indicate a cross-sectional outer contour line of the aerosol generating substance 70 before being compressed. The concave segment 121 can compress the aerosol generating substance 70 to an extreme limit so as to squeeze out air contained in the interior of the atomization substance section 71 to enhance the heat transfer efficiency of the atomization substance section 71. Further, the heat transfer distance for heat to transmit from the outside surface of the aerosol generating substance 70 toward the center thereof is reduced, so as to improve issues of a temperature difference between the surface and the center of the aerosol generating substance 70 being greater, the heat transfer efficiency being low, and the pre-heating time being long. For the heating assembly 10 of the instant embodiment, the amount of smoke for the first two pulls and the total quantity of smoke are significantly increased, and the effective substance released with the aerosol is more complete, making the user's experience good.

[0041] In the instant embodiment, the shape of the cross-sectional outer contour of the heating tube 12 corresponds to the shape of the cross-sectional contour of the heating chamber 120. The heating tube 12 has a uniform wall thickness in both axial and circumferential directions thereof. In other embodiments, the shape of the cross-sectional outer contour of the heating tube 12 can be different from the shape of the cross-sectional contour of the heating chamber 120, and the heating tube 12 may have non-uniform wall thickness in the axial and/or circumferential direction.

[0042] Further, the heating assembly 10 further comprises a guide tube 11 and a support wall 13. The guide tube 11 and the support wall 13 are respectively arranged at two opposite ends of the heating tube 12 in the axial direction. The support wall 13 closes a lower end of the heating tube 12 and supports the aerosol generating substance 70 thereof for supporting and positioning of the aerosol generating substance 70 inside the heating chamber 120. The support wall 13 can be integrated with the heating tube 12 as one piece, or can alternatively be manufactured separately with respect to the heating tube 12 and then assembled together.

[0043] In some embodiments, the support wall 13 comprises an end wall 131 in the form of a flat plate and at least one raised platform 132 protruding from the end wall 131 toward interior of the heating chamber 120. When the aerosol generating substance 70 is received in the heating chamber 120, the bottom of the aerosol generating substance 70 is positioned on the at least one raised platform 132, and a gas flow gap is formed between the bottom of the aerosol generating substance 70 and the end wall 131 to allow gas to flow therethrough. In the instant embodiment, one raised platform 132 is provided, and the one raised platform 132 is located at the center of the end wall 131. In other embodiments, there may be multiple ones of raised platform 132.

[0044] The guide tube 11 is arranged at an upper end of the heating tube 12, and can be integrated with the heating tube 12 as one piece, or can alternatively be manufactured separate with respect to the heating tube 12 to be then assembled together. The guide tube 11 is of a tubular form having an inner wall surface that defines a lead-in compartment 110 for guiding the entry of the aerosol generating substance 70. The lead-in compartment 110 includes a first end 111 that is distant from the heating chamber 120 and a second end 112 that is adjacent to the heating chamber 120. A cross-sectional area of the lead-in compartment 110 at the first end 111 is greater than or equal to a cross-sectional area of the aerosol generating substance 70 before being compressed, or alternatively, the shortest distance between a cross-sectional contour of the lead-in compartment 110 at the first end 111 and the center axis line of the lead-in compartment 110 is greater than or equal to the radius of the aerosol generating substance 70 to facilitate the entry of the aerosol generating substance 70.

[0045] A cross-sectional shape of the lead-in compartment 110 at the first end 111 may include a shape that is different from both the cross-sectional shape of the aerosol generating substance 70 and the cross-sectional shape of the heating chamber 120. In the instant embodiment, the cross-sectional shape of the lead-in compartment 110 at the first end 111 is generally in the form of a running track of which the long axis direction and the short axis direction are respectively coincident with the long axis direction and the short axis direction of the heating chamber 120. In other embodiments, the cross-sectional shape of the lead-in compartment 110 at the first end 111 may correspond to the cross-sectional shape of the aerosol generating substance 70 or the cross-sectional shape of the heating chamber 120, for example the cross-sectional shape of the lead-in compartment 110 at the first end 111 being circular or a butterfly shape.

[0046] The cross-sectional area of the lead-in compartment 110 at the second end 112 is smaller than the cross-sectional area at the first end 111, and the cross-sectional shape of the lead-in compartment 110 at the second end 112 is identical to the cross-sectional shape of the heating chamber 120. In the instant embodiment, the second end 112 of the lead-in compartment 110 is directly connected to the upper end of the heating chamber 120, and the cross-sectional size of the lead-in compartment 110 at the second end 112 is equal to the cross-sectional size of the heating chamber 120. The lead-in compartment 110 can be made in a smooth and gradual transition form from the first end 111 to the second end 112, so as to allow the aerosol generating substance 70 to be smoothly inserted into the heating tube 12. Specifically, in the instant embodiment, the cross-sectional shape of the lead-in compartment 110 varies from the form of running track at the first end 111 toward the butterfly shape at the second end 112, and is connected to the heating tube 12 at the second end 112.

[0047] In the instant embodiment, the shape of the cross-sectional outer contour of the guide tube 11 corresponds to the shape of the cross-sectional contour of the lead-in compartment 110, and the guide tube 11 has a uniform wall thickness in both axial and circumferential directions thereof. In other embodiments, the shape of the cross-sectional outer contour of the guide tube 11 can be different from the shape of the cross-sectional contour of the lead-in compartment 110, and the guide tube 11 includes a non-uniform wall thickness in the axial and/or circumferential direction thereof.

[0048] Further, the upper end of the guide tube 11 that is distant from the heating tube 12 is extended outward from the outside wall surface thereof to form a flange 113. The flange 113 functions for mounting and positioning in the enclosure 20 of the heating assembly 10.

[0049] In some embodiments, the heating assembly 10 may be formed with multiple through apertures in communication with the heating chamber 120 and/or the lead-in compartment 110. The multiple through apertures can be formed in the heating assembly 10 at any position as desired, for example being formed in the guide tube 11 and/or the heating tube 12 and/or the support wall 13. No limitation is imposed on the shape, size, and number of the through apertures.

[0050] The heating assembly 10 is not limited to any specific way of heating, and it can be for example of various ways of heating, such as electrical resistance heating, infrared radiation heating, electromagnetic induction heating, or compound heating. The heating assembly 10 further comprises a heat generation layer 14 disposed on an inside surface and/or an outside surface of the heating tube 12. The heat generation layer 14 may comprise a heating film, a heating filament, a heating sheet, or a heating net, which upon being supplied with electricity, generates heat.

[0051] In the instant embodiment, the heat generation layer 14 is a heating film disposed on the outside surface of the heating tube 12. Upon being supplied with electricity, the heat generation layer 14 generates heat and transmits the heat so generated from the outside surface of the heating tube 12 to the aerosol generating substance 70 received in the heating tube 12 to heat up the aerosol generating substance 70. The heating tube 12 can be made of a metallic or non-metallic material that has a relatively high thermal conductivity coefficient to help fast transfer of heat, and make homogeneity of temperature field of the heating tube 12 under fast temperature rising. The high thermal conductivity coefficient metallic material may comprise stainless steel, aluminum, or aluminum alloy. The high thermal conductivity coefficient non-metallic material may comprise ceramics, such as ceramic materials of aluminum oxide, silicon carbide, aluminum nitride, and silicon nitride. Further, the inside and/or outside surface of the heating tube 12 may be further provided with a heat homogenizing layer thereon. The heat homogenizing layer has a thermal conductivity coefficient higher than the heating tube 12, so as to further enhance uniform of heating toward the aerosol generating substance 70.

[0052] In some embodiments, the heat generation layer 14 may comprise a heat-generating portion 141 and an electricity-conducting portion 142. The heat-generating portion 141 and the electricity-conducting portion 142 are arranged to respectively correspond to the concave segment 121 and the connecting segment 122. Electrical resistivity of the electricity-conducting portion 142 is less than electrical resistivity of the heat-generating portion 141, so that during the supply of electricity, the amount of heat generated by the electricity-conducting portion 142 is less than the amount of heat generated by the heat-generating portion 141, for example the amount of heat generated by the electricity-conducting portion 142 being less than or equal to 1/2 of the amount of heat generated by the heat-generating portion 141. The heat-generating portion 141 primarily functions for generating heat, while the electricity-conducting portion 142 is primarily for electrical conduction toward the heat-generating portion 141. Since the concave segment 121 and the aerosol generating substance 70 are set in tight contact engagement with each other, while a major portion of the connecting segment 122 is not in contact with the aerosol generating substance 70, setting the amount of heat generated by the heat-generating portion 141 greater than the amount of heat generated by the electricity-conducting portion 142 can greatly increase utilization of energy.

[0053] FIG. 7 shows a first alternative solution of the heating assembly 10 according to the present invention, of which a primary difference from the previous embodiment is that the heating assembly 10 of the instant embodiment adopts infrared heating, and correspondingly, the heating assembly 10 further comprises an infrared layer 15 disposed on a surface of the heating tube 12. The instant embodiment uses penetration of infrared to heat the aerosol generating substance 70, forming a three-dimensional heating field to better excite the smell of the aerosol generating substance 70 and the utilization of heat is better and the energy consumption is reduced.

[0054] Specifically, in the instant embodiment, the infrared layer 15 is disposed on the inner surface of the heating tube 12 to generate infrared radiation. The heating tube 12 can be made of a metallic or non-metallic material having a low thermal conductivity coefficient in order to reduce outward transmission of heat and thus reduce loss of heat. It is appreciated that in other embodiments, the infrared layer 15 may be disposed on the outside surface of the heating tube 12, and under this condition, the heating tube 12 can be made of a material of high infrared transmission rate, such as quartz.

[0055] Further, the heating assembly 10 may further comprise a protective layer 16 disposed on the inner surface of the heating tube 12. The protective layer 16 is attached to the inside of the infrared layer 15 and may comprise a vitreous glaze layer or a ceramic coating layer. The heating tube 12 and the infrared layer 15 contact, by means of the protective layer 16, the aerosol generating substance 70. The protective layer 16 has a relatively high surface smoothness to facilitate insertion and removal of the aerosol generating substance 70, and the aerosol generating substance 70 does not easily attach to the protective layer 16 after heating.

[0056] Further, in the instant embodiment, the heating assembly 10 further comprise a heat homogenizing layer 17 disposed on the outside surface of the heating tube 12 and a dielectric layer 18 disposed between the heat homogenizing layer 17 and the heat generation layer 14. The heat homogenizing layer 17, the dielectric layer 18, and the heat generation layer 14 are arranged, in sequence from inside to outside, on the outside surface of the heating tube 12. The heat homogenizing layer 17 is made of a heat homogenizing material for homogenizing the temperature field. In some embodiments, the heat homogenizing layer 17 is made of a material of high thermal conductivity, such as copper or silver. The dielectric layer 18 functions for carrying the heat generation layer 14 to increase structural stability of the heat generation layer 14 and prevent detachment of the heat generation layer 14.

[0057] FIG. 8 shows a second alternative solution of the heating assembly 10 according to the present invention, of which a primary difference from the previous embodiments is that the heat generation layer 14 of the instant embodiment comprises at least two heating tracks 140. The at least two heating tracks 140 are arranged in parallel with each other and are separately connected to the circuit board 40, so as to operate individually or jointly under the control of the circuit board 40. The at least two heating tracks 140 are distributed in the axial and/or circumferential direction of the heating tube 12, so as to achieve sectionized heating of the heating tube 12 in the axial and/or circumferential direction.

[0058] It is appreciated that each of the technical features described can be combined arbitrarily with one another without being subjected to any constraint.

[0059] The embodiments provided above illustrate only specific way of embodying the present invention, and the illustration is made in a relatively concrete and detailed way, but should not be construed as limiting to the scope of the claims of the present invention. It is noted that for artisans having ordinary skill in the field, the technical features described above can be combined in a non-limited way without departing from the gist of the present invention, so as to make various modifications and improvements, these being considered within the scope of protection of the present invention. Thus, all equivalent substitutions and modifications for what defined in the claims of the present invention should be construed falling within the scope of the claims of the present invention.

Claims

1. A heating assembly, **characterized in that** the heating assembly (10) forms, in the interior thereof, a heating chamber (120) configured for receiving an aerosol generating substance (70), the cross-sectional contour of the heating chamber (120) comprises at least one concave segment (121) toward the center of the cross-sectional contour, the shortest distance between the concave segment (121) and the center of the cross-sectional contour is less than the radius of the aerosol generating substance (70), cross-sectional contour of the heating chamber (120) further comprises at least one connecting segment (122) connected with the at least one concave segment (121).

2. The heating assembly according to claim 1, **characterized in that** the furthest distance between the at least one connecting segment (122) and the center of the cross-sectional contour is greater than the radius of the aerosol generating substance (70).

3. The heating assembly according to claim 1, **characterized in that** the at least one concave segment (121) and the at least one connecting segment (122) are both in the form of a smooth curve, and the at least one concave segment (121) and the at least one connecting segment (122) are smoothly connected.

4. The heating assembly according to claim 1, **characterized in that** the at least one concave segment (121) comprises multiple concave segments (121) arranged at regular intervals along the circumference of the heating chamber (120), and the at least one connecting segment (122) comprises multiple connecting segments (122) arranged at regular intervals along the circumference of the heating chamber (120).

5. The heating assembly according to claim 1, **characterized in that** the at least one concave segment (121) comprises two concave segments (121) arranged opposite to each other along the circumference of the heating chamber (120), the at least one connecting segment (122) comprises two connecting segments (122) arranged opposite to each other along the circumference of the heating chamber (120).

6. The heating assembly according to claim 3, **characterized in that** the two concave segments (121) and the two connecting segments (122) are both arc-shaped.

7. The heating assembly according to claim 6, **characterized in that** the radius of curvature of the two concave segments (121) is greater than that of the two connecting segments (122).

8. The heating assembly according to claim 1, **characterized in that** the heating assembly (10) comprises a heating tube (12) and a heat generation layer (14) attached to the heating tube (12); the heating tube (12) is of a tubular form, and the inner wall surface of the heating tube (12) defines the heating chamber

(120).

9. The heating assembly according to claim 8, **characterized in that** the heat generation layer (14) comprises a heat-generating portion (141) arranged to correspond to the at least one concave segment (121) and an electricity-conducting portion (142) arranged to correspond to the at least one connecting segment (122), the electric resistivity of the heat-generating portion (141) being greater than that of the electricity-conducting portion (142).

10. The heating assembly according to claim 8, **characterized in that** the heat generation layer (14) comprises at least two the heating tracks (140) arranged in parallel with each other, the at least two heating tracks (140) distributed in the axial and/or circumferential direction of the heating tube (12).

11. The heating assembly according to claim 8, **characterized in that** the heating assembly (10) further comprises an infrared layer (15) attached to the heating tube (12).

12. The heating assembly according to claim 11, **characterized in that** the heating assembly (10) further comprises a heat homogenizing layer (17) attached to the heating tube (12).

13. The heating assembly according to claim 12, **characterized in that** the infrared layer (15) is arranged over the inner surface of the heating tube (12), and the heat homogenizing layer (17) is arranged over the outer surface of the heating tube (12), the heat generation layer (14) disposed over the outer surface of the heat homogenizing layer (17).

14. The heating assembly according to any one of claims 1-13, **characterized in that** a lead-in compartment (110) is formed in the heating assembly (10), and the lead-in compartment (110) is in communication with the heating chamber (120) for guiding entry of the aerosol generating substance (70), the lead-in compartment (110) comprises a first end (111) distant from the heating chamber (120) and a second end (112) adjacent to the heating chamber (120), a shortest distance between a cross-sectional contour of the first end (111) of the lead-in compartment (110) and the center axis line of the lead-in compartment (110) is greater than or equal to the radius of the aerosol generating base material (70).

15. An aerosol generation device, **characterized by** comprising the heating assembly (10) according to any one of claims 1-14.

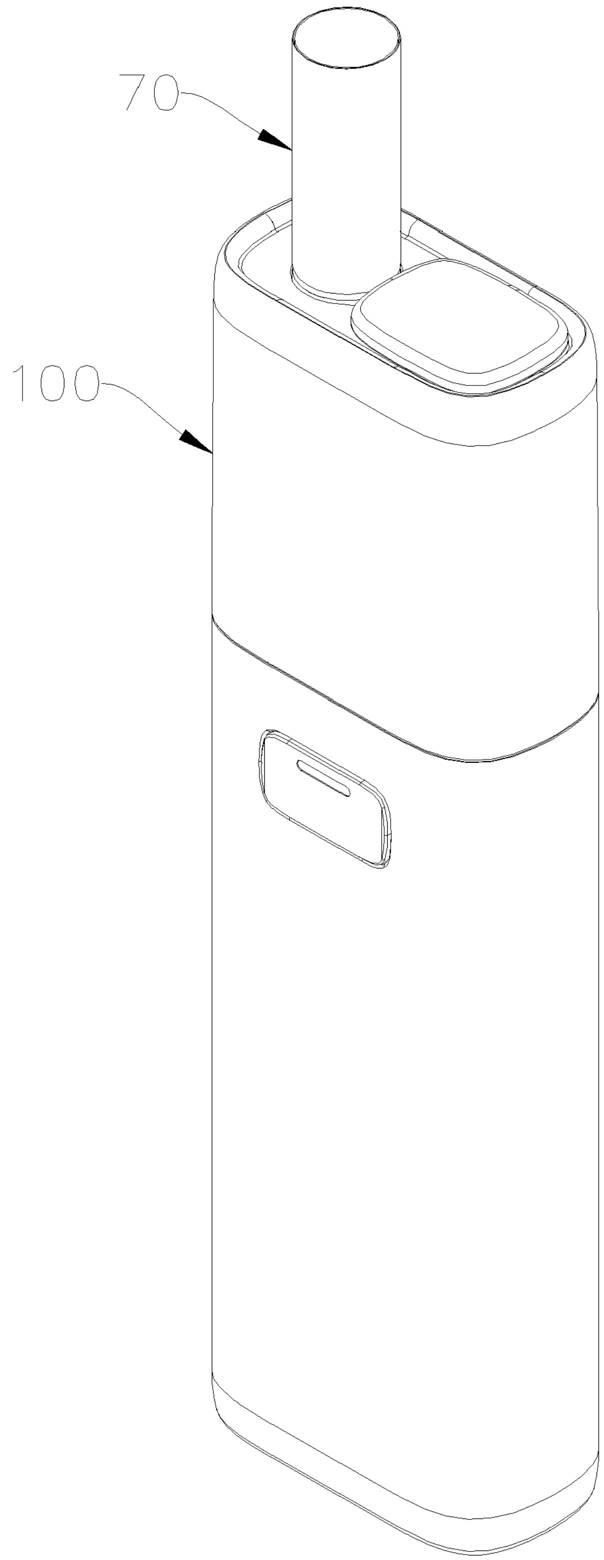

FIG. 1

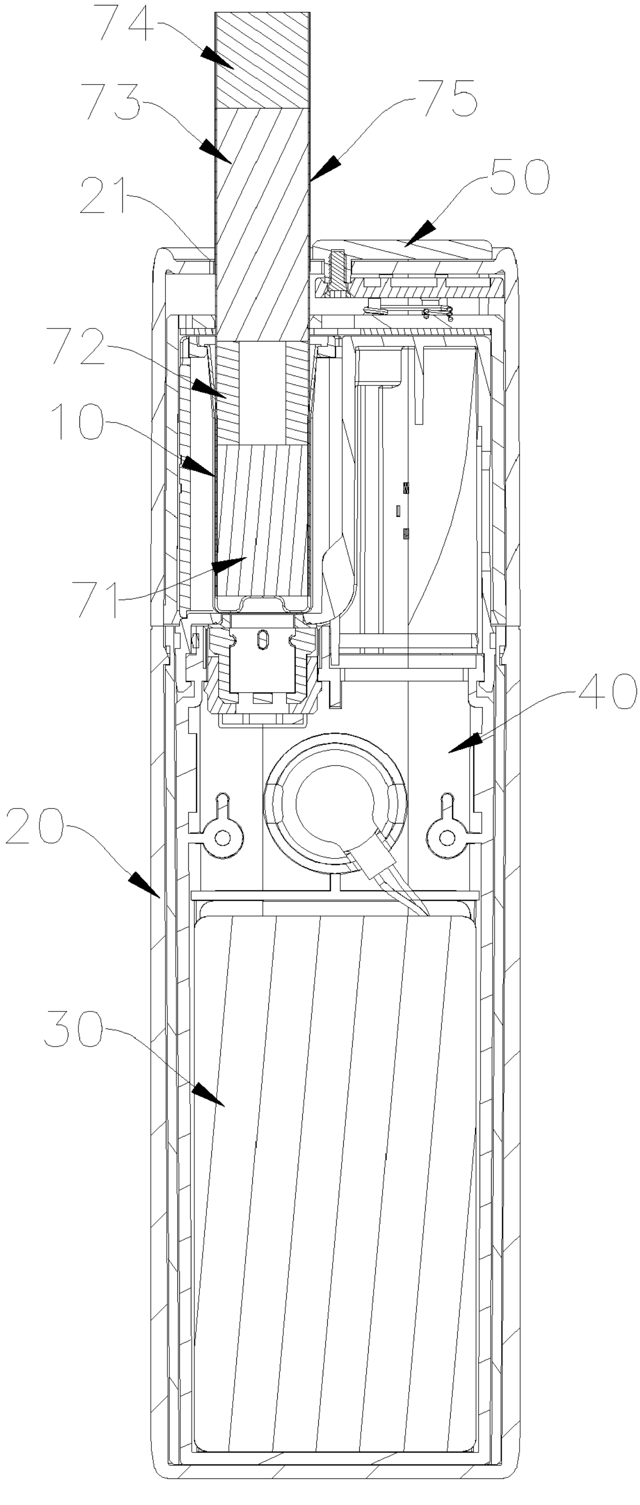

FIG. 2

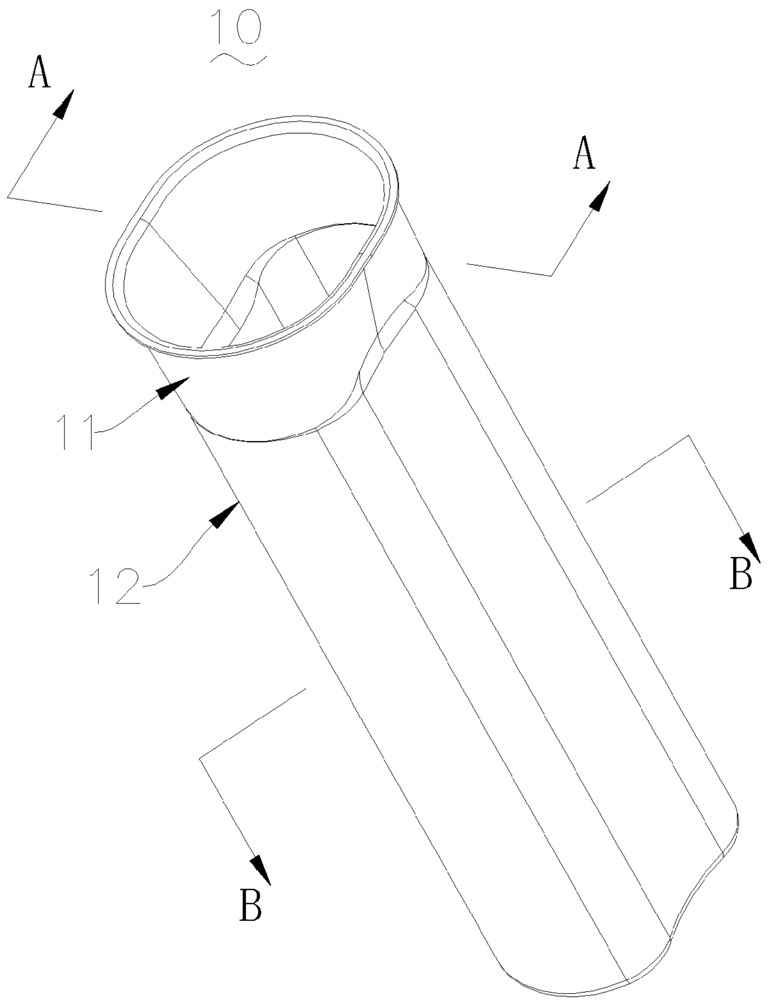

FIG. 3

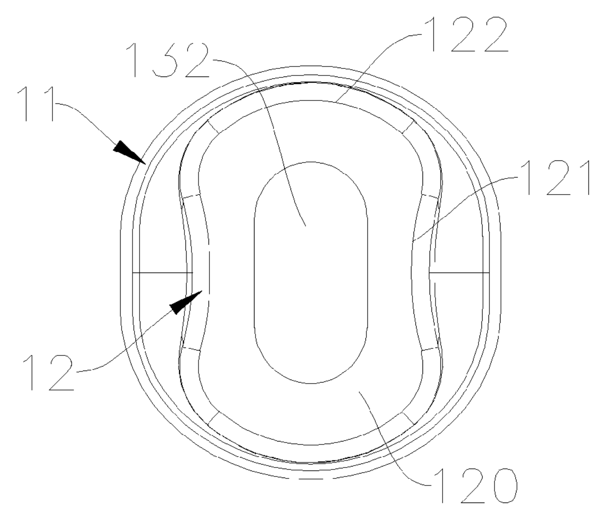

FIG. 4

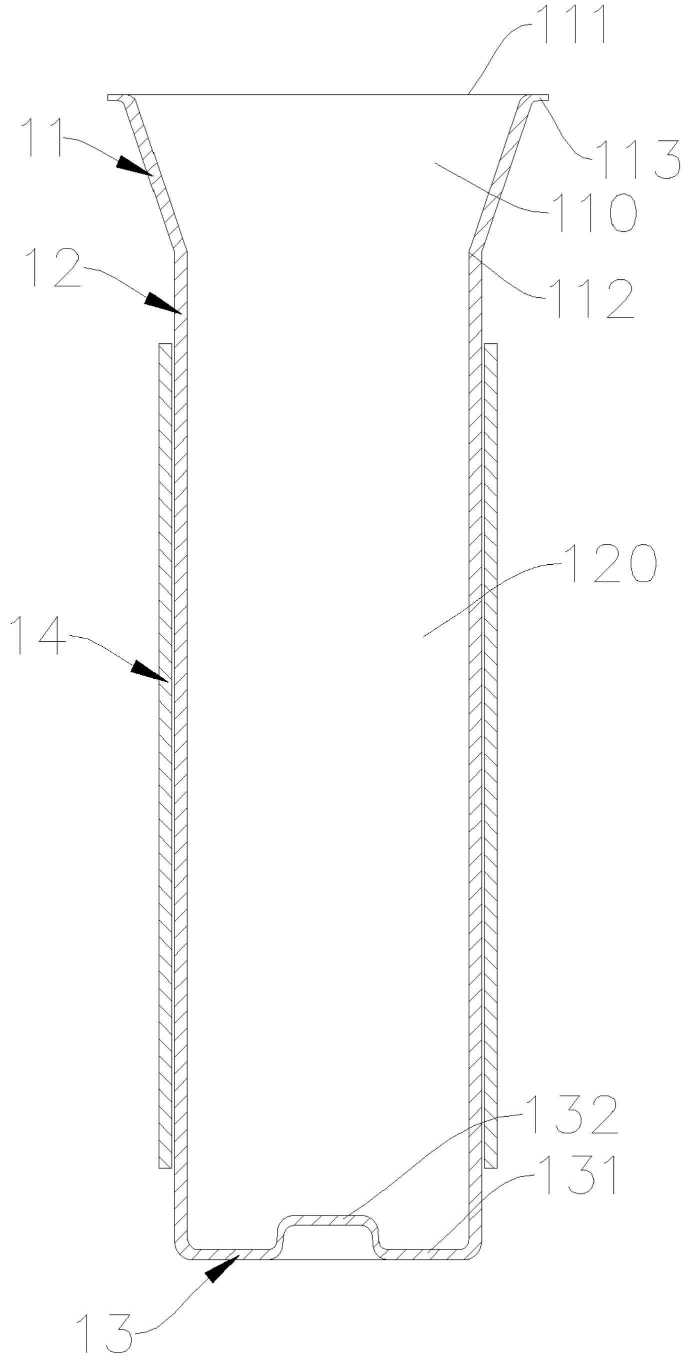

FIG. 5

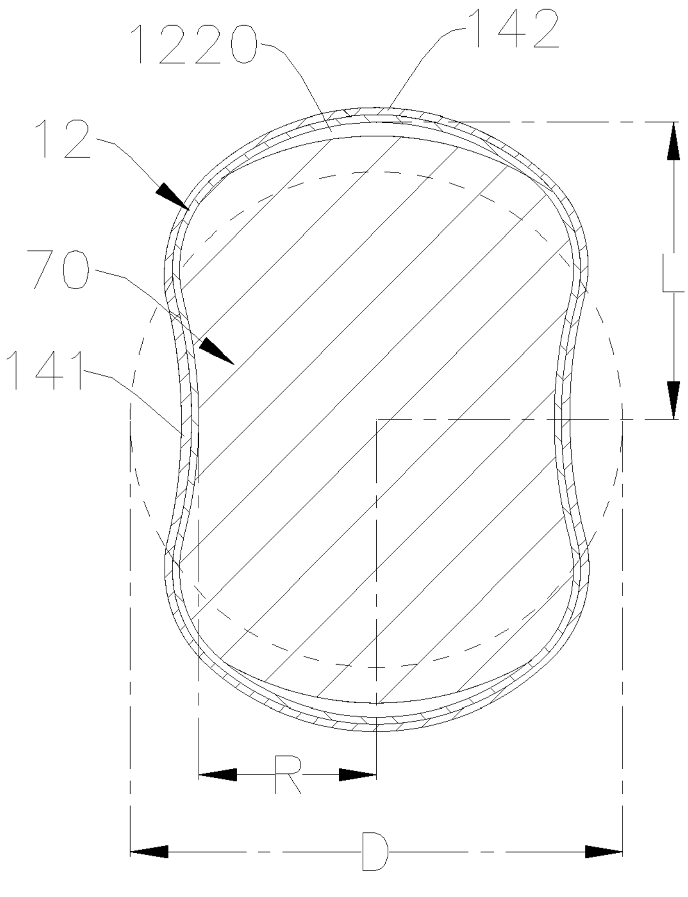

FIG. 6

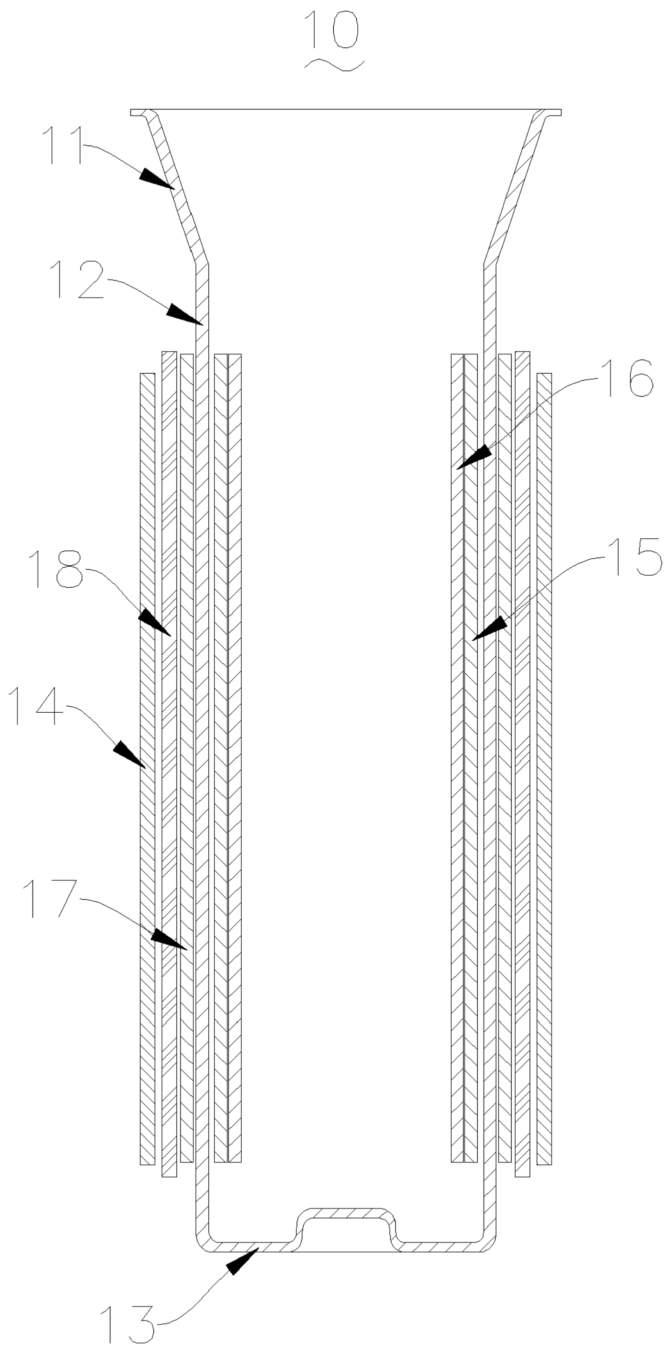

FIG. 7

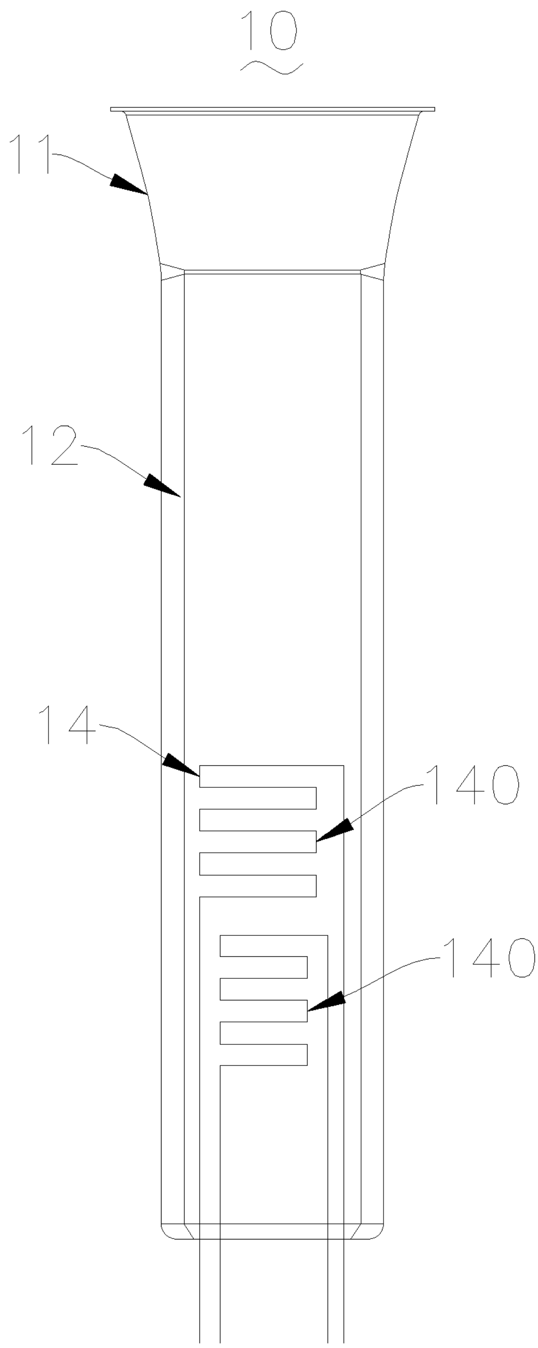

FIG. 8

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A24F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	7 November 2023	Klintebäck, Daniel

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