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(54) AEROSOL GENERATING APPARATUS AND HEATING DEVICE THEREOF

(57) The present invention relates to an aerosol generating apparatus and a heating component (20) therefor. The heating component (20) is configured to heat an aerosol generating article (10) inserted into the aerosol generating apparatus (100) to generate an aerosol, and includes a first wall (201) , where the first wall (201) includes a heating element (21) ; a second wall (202) , where the second wall (202) includes a first clamping component (251) ; and a third wall (203) , where the third wall (203) is arranged between the first wall (201) and the second wall (202) , and the third wall (203) includes a second clamping component (253) .

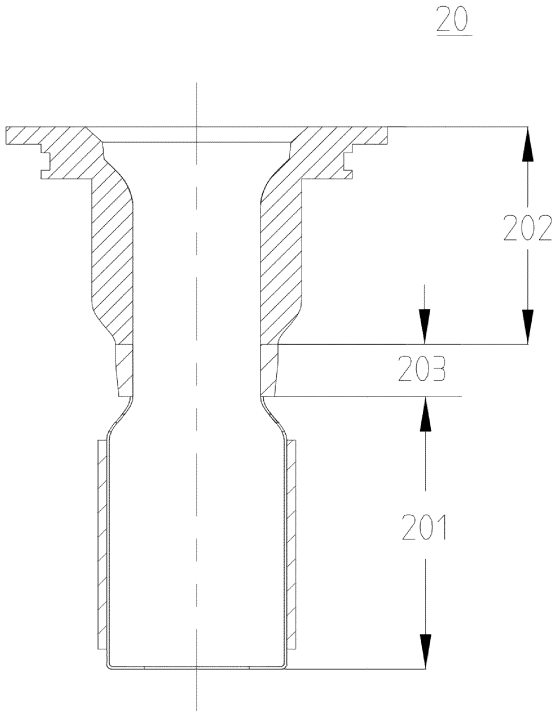

FIG. 1

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Description

TECHNICAL FIELD

[0001] The present invention relates to the technical field of electronic cigarettes, and in particular to an aerosol generating apparatus and a heating component therefor.

BACKGROUND

[0002] The section provides background information related to the present invention, but the information does not necessarily constitute the prior art.

[0003] Owning to popularization of an electronic product in cigarette technology, various heating components for an aerosol generating apparatus have been provided at present. The heating components mainly heats an aerosol generating article by means of a heating element, so as to generate an aerosol inhaled by a smoker. At present, the aerosol generating apparatus usually performs heating in a manner of tubular peripheral heating or central embedded heating. In the tubular peripheral heating, a heating tube surrounds an outer side of the aerosol generating article. A tubular heating component can reach a high heating temperature during actual operation. A high temperature inside the aerosol generating apparatus will be transmitted to a shell of the aerosol generating apparatus when a user holds the aerosol generating apparatus for inhalation, resulting in a hot touch sensation. On the other hand, residual heat of the heating element inside the existing aerosol generating apparatus is dissipated by means of heat conduction of a housing, resulting in poor utilization of its thermal energy and reduction in heating efficiency of its heating element. Thus, aerosol generating efficiency is reduced.

[0004] In the central embedded heating in the related art, the heating component is inserted into the aerosol generating article and makes close contact with the aerosol generating article to heat the aerosol generating article, thereby releasing various volatile compounds from the aerosol generating article. The heating component makes direct contact with the aerosol generating article, and exudates such as e-liquid generated by the aerosol generating article in a heating process inevitably contaminates the heating component, thereby affecting heating efficiency and service life of the heating component. For example, patent application CN104010531A disclosed a heating assembly inserted into an aerosol generating article to heat the aerosol generating article. The heating assembly makes direct contact with the aerosol generating article. In addition, a heating component in the related art is arranged at a bottom of the aerosol generating article, and the bottom of the aerosol generating article is centrally heated by hot air. As a result, the bottom of the aerosol generating article is overheated, while the other end of the aerosol generating article opposite to the bottom is underheated, resulting in uneven heating.

SUMMARY

[0005] The section provides a general summary of the present invention, and is not a comprehensive disclosure of the full scope or all features of the present invention.

[0006] An inventor of the present application finds that aerosol generating efficiency is not high when an aerosol generating article is heated in a manner of tubular peripheral heating or central embedded heating in the prior art, and especially for the manner of the central embedded heating, a heating component makes direct contact with the aerosol generating article, and exudates such as e-liquid generated by the aerosol generating article in a heating process inevitably contaminates the heating component, thereby affecting heating efficiency and service life of the heating component.

[0007] In view of this, it is necessary to improve a heating component for an aerosol generating apparatus, so as to overcome or relieve all or at least part of the technical problems described above.

[0008] A heating component for an aerosol generating apparatus is provided in an exemplary embodiment of the present invention. The heating component may be configured to heat an aerosol generating article inserted into the aerosol generating apparatus to generate an aerosol, and the aerosol generating article includes an aerosol forming substrate.

[0009] The heating component may include: a first wall, where the first wall includes a heating element, where the heating element is configured to have a hollow cylindrical shape to form a hollow accommodating portion, the hollow accommodating portion is configured to accommodate the aerosol forming substrate of the aerosol generating article, and the inner diameter of the hollow accommodating portion of the heating element is set to be greater than an outer diameter of the aerosol forming substrate of the aerosol generating article to be inserted, so as to form a first air channel between the heating element and the aerosol forming substrate; a second wall, where the second wall is arranged coaxial with the first wall along a longitudinal axis, the second wall includes a first clamping component, where the first clamping component is configured to clamp the aerosol generating article inserted into the aerosol generating apparatus and is provided with a ventilation channel, and the second wall is provided with a first ventilation hole penetrating the second wall; and a third wall, where the third wall is arranged between the first wall and the second wall, and the third wall includes a second clamping component, where the second clamping component is arranged in an approximately cylindrical shape, and the inner diameter of the second clamping component is substantially equal to an outer diameter of the aerosol generating article.

[0010] According to the heating component for an aerosol generating apparatus of the present invention,

the heating component and the aerosol forming substrate of the aerosol generating article are spaced apart from each other and form the first air channel, and the heating component does not make direct contact with the aerosol forming substrate, thereby effectively avoiding contamination of exudates such as e-liquid generated in a heating process to the heating component, achieving zero cleaning of the heating component, improving heating efficiency of the heating component, and prolonging service life of the heating component.

[0011] In some exemplary embodiments, the heating component further includes a housing, where the housing extends along a longitudinal axis, a longitudinal extending cavity is formed inside the housing, the longitudinal extending cavity is configured to accommodate the first wall, at least part of the second wall, and the third wall of the heating component, and the housing is arranged around the heating element to form a second air channel between the housing and the heating element.

[0012] In the heating component according to the exemplary embodiments of the present invention, the heating component forms a unique airflow flow path including the first air channel and the second air channel, thereby evenly and effectively heating the aerosol forming substrate. Specifically, heated hot air in the first air channel may sufficiently preheat the aerosol forming substrate, heated hot air in the second air channel and the heated hot air in the first air channel are merged at a bottom of the aerosol generating article and enter the aerosol forming substrate from a distal end of the aerosol forming substrate, and two streams of hot airflow together efficiently heat the aerosol forming substrate, thereby heating the aerosol forming substrate by means of the heated hot air from a periphery and a bottom of the aerosol forming substrate.

[0013] In some exemplary embodiments, the first clamping component is provided with an insertion opening for accommodating the aerosol generating article, a plurality of protrusions are arranged on the inner surface of the first clamping component adjacent to the insertion opening, the plurality of protrusions are spaced apart from each other in a circumferential direction, and the ventilation channel is formed between adjacent protrusions.

[0014] In the heating component according to exemplary embodiments of the present invention, external ambient air enters the heating component from the insertion opening of the first clamping component through the ventilation channel during inhalation of the aerosol generating article by a user, and the insertion opening of the first clamping component may act as an air inlet, thereby providing sufficient and even intake air.

[0015] In some exemplary embodiments, the plurality of protrusions extend from the inner surface of the first clamping component towards the longitudinal axis, and the plurality of protrusions are configured to make contact with an outer surface of the aerosol generating article.

[0016] In some exemplary embodiments, the second wall includes a tapered portion connected to the third wall, where the one or more first ventilation holes penetrating a wall portion of the tapered portion are provided at the tapered portion, and the first ventilation holes are configured to be arranged in a circumferential direction of the tapered portion, so as to allow airflow from the ventilation channel of the first clamping component into the second air channel through the first ventilation holes.

[0017] In the heating component according to the exemplary embodiments of the present invention, external ambient air enters the ventilation channel of the first clamping component from the insertion opening of the first clamping component, and incoming airflow enters the second air channel from the ventilation channel through the first ventilation holes provided on the tapered portion. In a case that the heating element of the heating component is energized to generate heat, a temperature of the airflow entering the second air channel is increased, thereby forming a hot airflow.

[0018] In some exemplary embodiments, the first wall includes a first wall proximal end adjacent to the third wall and a first wall distal end opposite to the first wall proximal end, where the first wall distal end is provided with an opening.

[0019] In some exemplary embodiments, the first wall includes one or more second ventilation holes, where the one or more second ventilation holes penetrate a wall portion of the first wall adjacent to the first wall proximal end, and the one or more second ventilation holes are configured to be provided in the circumferential direction.

[0020] In a case that the heating element of the heating component is energized to generate heat, the air in the first air channel is heated to sufficiently heat the aerosol forming substrate. The heated hot air in the second air channel merges with the heated hot air in the first air channel at the first wall distal end through the opening located at the first wall distal end, and the two streams of hot airflow together enter the aerosol forming substrate from the distal end of the aerosol forming substrate to efficiently heat the aerosol forming substrate, thereby evenly heating the aerosol forming substrate from the periphery and the bottom of the aerosol forming substrate by means of a hot air stream. Thus, the aerosol forming substrate may be heated as a whole to a maximum extent, thereby improving a heat storage effect of the heating component.

[0021] In addition, external ambient air is continuously input through the second air channel of the heating component during inhalation of the aerosol generating article by the user, thereby further reducing heat conducted to a shell of the aerosol generating apparatus, effectively achieving heat insulation and heat control of the shell of the aerosol generating apparatus, and improving user experience.

[0022] In some exemplary embodiments, the heating element may be configured to include a first material portion arranged radially inwards and a second material portion arranged around the first material portion.

[0023] In some exemplary embodiments, the heating element is configured to include a cylindrical ceramic body and a metal wire arranged around the ceramic body. Optionally, the metal wire extends around an outer peripheral surface of the ceramic body in a helical manner.

[0024] Thermal conductivity of the heating component may be improved by means of the heating element including the ceramic body and the metal wire, such that the heating component has the advantages of excellent thermal insulation performance, strong mechanical performance, corrosion resistance, and magnetic field resistance.

[0025] In some exemplary embodiments, the heating element may be configured to include one of the following portions: a first heating portion, where the first heating portion includes one or more first concave portions or first convex portions extending in a longitudinal direction on an outer surface of the first heating portion; a second heating portion, where the second heating portion includes one or more second concave portions or second convex portions extending in a circumferential direction on an outer surface of the second hearing portion; a third heating portion, where the third heating portion includes one or more third concave portions or third convex portions extending in a serpentine form in a circumferential direction on an outer surface of the third heating portion; a fourth heating portion, where the fourth heating portion includes one or more longitudinal concave portions or longitudinal convex portions extending in a longitudinal direction on an outer surface of the fourth heating portion; and one or more circumferential concave portions or circumferential convex portions extending in a circumferential direction on an outer surface of the fourth heating portion; and a fifth heating portion, where the fifth heating portion includes one or more longitudinal concave portions or longitudinal convex portions extending in a serpentine form in an approximately longitudinal direction on an outer surface of the fifth heating portion; and one or more circumferential concave portions or circumferential convex portions extending in a serpentine form in an approximately circumferential direction on an outer surface of the fifth heating portion.

[0026] By configuring the heating element to have patterns having concave-convex forms, the heating component has a compact structure, thereby effectively increasing a heat transfer area per unit volume of the heating element. Thus, heat transfer efficiency of the heating component is improved.

[0027] In some exemplary embodiments, the present invention provides an aerosol generating apparatus. The aerosol generating apparatus includes: one or more heating components, where at least one heating component in the one or more heating components is the heating component described above; a power supply device, where the power supply device is configured to be electrically connected to the heating components and supply power to the heating components; and a controller, where the controller is configured to control the power supplied from the power supply device to the heating components.

[0028] According to the aerosol generating apparatus of the exemplary embodiments of the present invention, the heating component and the aerosol forming substrate of the aerosol generating article are spaced apart from each other and form the first air channel, and the heating component does not make direct contact with the aerosol forming substrate, thereby effectively avoiding contamination of exudates such as e-liquid generated in a heating process to the heating component, achieving zero cleaning of the heating component, improving heating efficiency of the heating component, and prolonging service life of the heating component. Moreover, a unique airflow heat transfer path is formed by the first air channel and the second air channel, thereby evenly and effectively heating the aerosol forming substrate; and the heating component can efficiently utilize heat energy, thereby saving power. Furthermore, when the aerosol generating apparatus is used, atomization efficiency of the aerosol forming substrate is high, and the housing of the aerosol generating apparatus is not prone to heat, thereby significantly improving user experience.

BRIEF DESCRIPTION OF THE DRAWINGS

[0029] The exemplary embodiments of the present invention will be described in detail below with reference to the accompanying drawings, and the above and other purposes, features, and advantages of the present invention can be understood more easily. In all the accompanying drawings, the same or corresponding technical features or components are represented by the same or corresponding reference numerals. In the accompanying drawings, the dimension and relative position of each component are not necessarily drawn to scale. In the figures:

FIGs. 1-3 are a schematic longitudinal sectional view, a schematic perspective view and a schematic side view of a heating component according to an exemplary embodiment of the present invention;

FIG. 4 is a schematic perspective view of a heating component according to another exemplary embodiment of the present invention, where an aerosol generating article is inserted into the heating component;

FIG. 5 is a schematic longitudinal sectional view of the heating component shown in FIG. 4;

FIG. 6 is a schematic sectional view of an aerosol generating article according to an exemplary embodiment of the present invention;

FIG. 7 is a schematic side view of a heating component according to another embodiment of the present invention;

FIG. 8 is a schematic perspective view of a first heating portion of a heating component according to an exemplary embodiment of the present invention;

FIG. 9 is a schematic perspective view of a second heating portion of a heating component according to an exemplary embodiment of the present invention;

FIGs. 10 and 11 are a schematic perspective view and a schematic side view of a third heating portion of a heating component according to an exemplary embodiment of the present invention;

FIG. 12 is a schematic perspective view of a fourth heating portion of a heating component according to an exemplary embodiment of the present invention;

FIGs. 13 and 14 are a schematic perspective view and a schematic side view of a fifth heating portion of a heating component according to an exemplary embodiment of the present invention; and

FIG. 15 is a schematic perspective view of an aerosol generating apparatus according to an exemplary embodiment of the present invention.

DETAILED DESCRIPTIONS OF THE EMBODIMENTS

[0030] The present invention will be described in detail below with reference to the accompanying drawings and the exemplary embodiments. It should be noted that the exemplary embodiments of the present invention are intended to enable those of ordinary skill in the art to easily implement the present invention, and various embodiments of the present invention can be implemented in many different forms and should not be construed to be limited to the embodiments described in the present invention. Correspondingly, the following detailed description of the present invention is for illustrative purposes only and is in no way a limitation of the present invention. In addition, the same elements are designated by the same reference numerals in various accompanying drawings.

[0031] In the description of the present application, it is to be understood that the terms "central", "longitudinal", "transverse", "length", "width", "thickness", "upper", "lower", "front", "back", "left", "right", "vertical", "horizontal", "top", "bottom", "inner", "outer", "clockwise", "counterclockwise", "axial", "radial", "circumferential", etc. indicate azimuthal or positional relations based on those shown in the drawings only for ease of description of the present application and for simplicity of description, and are not intended to indicate or imply that the referenced device or element must have a particular orientation and be constructed and operative in a particular orientation, and thus may not be construed as a limitation on the present application.

[0032] In addition, the terms "first" and "second" are for descriptive purposes only and are not to be construed as indicating or implying their relative importance or implicitly specifying the number of indicated technical features. Thus, a feature defined with "first" and "second" can explicitly or implicitly include at least one of the features. In the description of the present application, "plurality" means at least two, for example, two, three, etc., unless expressly specified otherwise.

[0033] In the present application, unless expressly specified and defined otherwise, the terms "mount", "connect", "connected", "fix", etc. are to be construed broadly. For instance, they may denote fixed connection, detachable connection or integral formation, denote mechanical connection or electrical connection, denote direct connection or indirect connection by means of an intermediate medium, or denote communication between interiors of two elements or interaction between two elements, unless expressly defined otherwise. For those of ordinary skill in the art, the specific meanings of the above terms in the present application can be understood according to specific circumstances.

[0034] In the present application, unless expressly specified and defined otherwise, a first feature being "above" or "below" a second feature may be direct contact between the first feature and the second feature, or indirect contact between the first feature and the second feature by means of an intermediate medium. Moreover, the first feature being "on", "above", and "over" the second feature may be the first feature being directly above or obliquely above the second feature, or simply mean that the first feature is at a higher level than the second feature. The first feature being "beneath", "below", and "under" the second feature may be the first feature being directly below or obliquely below the second feature, or simply mean that the first feature is at a lower level than the second feature.

[0035] It should be further noted that for the sake of clarity, not all features of the actual particular embodiment are described and shown in the description and the accompanying drawings. Moreover, in order to prevent unnecessary details from blurring the technical solution of the present invention to which attention is paid, only a device structure closely related to the technical solution of the present invention is described and shown in the accompanying drawings and the description, and other details that are not related to the technical content of the present invention and are known to those skilled in the art are omitted.

[0036] Next, a heating component according to an exemplary embodiment of the present invention will be described with reference to FIGs. 1-3. The heating component 20 is configured to heat an aerosol generating article inserted into an aerosol generating apparatus to generate an aerosol.

[0037] The heating component 20 may include a first wall 201, where the first wall includes a heating element 21, where the heating element 21 is configured to have a

hollow cylindrical shape to form a hollow accommodating portion, the hollow accommodating portion is configured to accommodate an aerosol forming substrate 11 of an aerosol generating article, and the inner diameter of the hollow accommodating portion of the heating element 21 is set to be greater than an outer diameter of the aerosol forming substrate 11 of the aerosol generating article 10 to be inserted, so as to form a first air channel 51 between the heating element 21 and the aerosol forming substrate 11; a second wall 202, where the second wall 202 is arranged coaxial with the first wall 201 along a longitudinal axis A-A, the second wall 202 includes a first clamping component 251, where the first clamping component 251 is configured to clamp the aerosol generating article 10 inserted into the aerosol generating apparatus and is provided with a ventilation channel, and the second wall 202 is provided with a first ventilation hole 71 penetrating the second wall 201; and a third wall 203, where the third wall 203 is arranged between the first wall 201 and the second wall 202, and the third wall 203 includes a second clamping component 253, where the second clamping component 253 is arranged in an approximately cylindrical shape, and the inner diameter of the second clamping component 253 is substantially equal to an outer diameter of the aerosol generating article 10. In the present application, the third wall 203 may be part of the first wall 201 or the second wall 202. A position of the third wall 203 may be understood as a "waist" portion.

[0038] The first clamping component 251 and the second clamping component 253 are configured to clamp the aerosol generating article 10 inserted into the aerosol generating apparatus to fix the aerosol forming substrate 11 of the aerosol generating article 10 to correspond to the hollow accommodating portion of the heating element 21. In other words, the first clamping component 251 and the second clamping component 253 are configured to fix the aerosol forming substrate 11 in place in use, thereby arranging the heating element 21 around the aerosol forming substrate 11 to heat the aerosol forming substrate 11 in the circumferential direction.

[0039] An aerosol generating article will be described below with reference to FIGs. 4-6. As shown in FIG. 6, the aerosol generating article 10 includes an aerosol forming substrate 11, a support portion 13, a cooling portion 15, and a filter portion 17. The aerosol forming substrate 11, the support portion 13, the cooling portion 15 and the filter portion 17 are packaged by a packages 19. As shown in FIG. 5, when the aerosol forming substrate 11 of the aerosol generating article 10 is completely inserted into the heating component 20 of the aerosol generating apparatus, the aerosol forming substrate 11 is located inside the aerosol generating apparatus, and at least portion of the cooling portion 15 may be exposed to an exterior of the aerosol generating apparatus 100. A user may inhale an aerosol by means of the filter portion 17. When the aerosol forming substrate 11 is heated by means of the heating component 20, the aerosol is generated from the aerosol forming substrate 11. Moreover, the generated aerosol may be transported to a mouth of the user as air introduced into the aerosol generating article 10 passes through the support portion 13, the cooling portion 15, and the filter portion 17.

[0040] In an example, the aerosol forming substrate 11 of the aerosol generating article 10 may include an aerosol generating material and/or a tobacco material including nicotine. When the aerosol forming substrate 11 is heated to an appropriate temperature (for example, 180°C to 400°C), an aerosol inhaled by a user is generated.

[0041] The aerosol generating material may include, but not limited to, glycerol, propylene glycol, ethylene glycol, dipropylene glycol, diethylene glycol, triethylene glycol, tetraethylene glycol, and oleyl alcohol, for example. In addition, the aerosol forming substrate 11 may contain other additives such as fragrances, wetting agents and/or organic acids. In addition, the tobacco material may be formed by using a tobacco sheet or a tobacco strip, for example. The tobacco material may include a corrugated tobacco sheet, a crimped tobacco sheet, etc.

[0042] When the aerosol generating article 10 is inserted into the aerosol generating apparatus, the aerosol forming substrate 11 may be fixed to be surrounded by the heating element 21 of the heating component 20. The heating element 21 generates heat when electrically coupled to a power supply device, and evenly transfers heat to the aerosol forming substrate 11 to increase a temperature of the aerosol forming substrate 11, so as to generate an aerosol.

[0043] The support portion 13 may include an aerosol generating material and/or a tobacco material, or the support portion 13 may be only used as a spacer.

[0044] The cooling portion 15 may be made of a polymer material or a biodegradable polymer material, and may have a cooling function. For example, the cooling portion 15 may be only made of, but not limited to, pure polylactic acid. For example, the cooling portion 15 may be made of a cellulose acetate filter having a plurality of holes. However, the cooling portion 15 is not limited to the above example as long as the cooling portion 15 may cool the aerosol. For example, the cooling portion 15 may include a tubular filter.

[0045] The filter portion 17 may be a cellulose acetate filter. In addition, a shape of the filter portion 17 is not limited. For example, the filter portion 17 may be a cylindrical rod including a hollow inner portion. In addition, in some examples, the filter portion 17 may consist of a plurality of segments, and at least one segment of the plurality of segments may be manufactured into a different shape.

[0046] The aerosol generating article 10 may be packed by a package 19. The package 19 may be provided with at least one hole, and external air flows into or out of the package by means of the at least one hole. In FIG. 6, the package 19 is shown as a single package. In addition, in some examples, the package 19 may include

a plurality of package bodies.

[0047] As shown in FIG. 5, the inner diameter of a hollow accommodating portion of a heating member 21 may be set to be greater than an outer diameter of the aerosol forming substrate 11 of the aerosol generating article 10 to be inserted, such that a first air channel 51 is formed between the heating element 21 and the aerosol forming substrate 11 when the aerosol generating article 10 is inserted into the aerosol generating apparatus.

[0048] The heating component 20 and the aerosol forming substrate 11 of the aerosol generating article are spaced apart from each other, and the heating component 20 does not make direct contact with the aerosol forming substrate 11, thereby effectively avoiding contamination of exudates such as e-liquid generated in a heating process to the heating component 20, achieving zero cleaning of the heating component 20, improving heating efficiency of the heating component 20, and prolonging service life of the heating component.

[0049] In addition, in some exemplary embodiments, the heating component 20 may include a housing 24. As shown in FIG. 5, the housing 24 extends along a longitudinal axis A-A, a longitudinal extending cavity is formed inside the housing 24, and the longitudinal extending cavity is configured to accommodate the first wall 201, part of the second wall 202, and the third wall 203 of the heating component 20. The housing 24 is arranged around the heating element 21 to form a second air channel 52 between the housing 24 and the heating element 21. In the present application, the housing 24 may be a shell of the heating component 20, or a shell for the aerosol generating apparatus.

[0050] In an embodiment shown in FIGs. 2 and 5, the heating component 20 may include a first clamping component 251, a tapered portion 252, and a second clamping component 253. In some examples, a first clamping component 251, a tapered portion 252, and a second clamping component 253 may be formed as an integrated member. In another example, a first clamping component 251, a tapered portion 252, and a second clamping component 253 may be formed as separate components respectively. The tapered portion 252 is arranged between the first clamping component 251 and the second clamping component 253, the first clamping component 251 is provided with an insertion opening for accommodating the aerosol generating article 10, and a plurality of protrusions 70 are arranged on the inner surface of the first clamping component adjacent to the insertion opening. The plurality of protrusions 70 are spaced apart from each other in a circumferential direction, and the ventilation channel is formed between adjacent protrusions. The second clamping component 253 may be arranged in an approximately cylindrical shape, and the inner diameter of the second clamping component 253 is substantially equal to an outer diameter of the aerosol generating article 10.

[0051] Optionally, as shown in FIG. 2, a plurality of protruding ribs are arranged on the inner surface of the first clamping component 251 adjacent to the insertion opening, the plurality of protruding ribs may make close contact with the aerosol generating article 10, and the inner surface of the second clamping component 253 may make close contact with an outer surface of the aerosol generating article 10 to fix the aerosol generating article 10 in place. The insertion opening of the first clamping component 251 may be formed in a trumpet shape to allow sufficient ambient air to be supplied. In an example, protrusions 70 may be configured to extend in a radial direction from the inner surface of a first clamping component 251 towards a longitudinal axis A-A, so as to clamp the aerosol generating article 10 in place in a circumferential direction. The first clamping component 251 and the second clamping component 253 of the present invention are not limited to configurations of the clamping components described herein as long as the clamping components may fix the aerosol generating article 10 in place.

[0052] In some exemplary embodiments, a second wall 202 and a third wall 203 may be formed as an integrated member, and a first wall 201 may be detachably connected to the second wall 202 and the third wall 203. The first wall 201 may be connected to the third wall 203 by means of one of the following manners: a buckled connection, an adhesive connection, and a threaded connection. In other examples, a second wall 202 may be detachably connected to a third wall 203.

[0053] It should be understood that the aerosol generating article 10 includes a proximal end and a distal end. The aerosol generated by the aerosol forming substrate 11 passes through the proximal end to exit the aerosol generating article 10 and is transported to the user. In use, the user may inhale the proximal end of the aerosol generating article 10 to inhale the aerosol generated by the aerosol forming substrate 11. In addition, in the description herein, the proximal end refers to an end close to the user and the distal end refers to an end opposite to the proximal end and away from the user.

[0054] In the context of the present invention, the longitudinal direction may in particular denote a length direction of the heating element (for example, an extension direction of the longitudinal axis A-A shown in FIG. 5), the circumferential direction may in particular denote a direction perpendicular to the longitudinal direction of the heating element, and the radial direction may be perpendicular to the longitudinal direction of the heating element, and in particular denote a diameter direction of the heating element. In addition, the expression "plurality" denoting a number in the context of the present invention may be understood to denote two or more.

[0055] As shown in FIG. 2, the second wall 202 includes one or more first ventilation holes 71 provided at the tapered portion 253. The first ventilation holes 71 penetrate a wall portion of the tapered portion 253, and the first ventilation holes 71 are configured to be provided in a circumferential direction of the tapered portion 253, so as to allow airflow from the ventilation channel of the

first clamping portion 251 into the second air channel 52 through the first ventilation holes 71.

[0056] In addition, the first wall 201 includes a first wall proximal end adjacent to the third wall 203 and a first wall distal end opposite to the first wall proximal end. The first wall distal end is provided with an opening 27.

[0057] In some exemplary embodiments, a first wall 201 includes one or more second ventilation holes 72. The one or more second ventilation holes 72 penetrate a wall portion of the first wall 201 adjacent to the first wall proximal end, and the one or more second ventilation holes 72 are configured to be provided in the circumferential direction.

[0058] The first ventilation holes 71 or the second ventilation holes 72 may be configured to have any one of the following shapes: a circle, a rectangle, a rhombus, a triangle, an ellipse, a trapezoid, and an irregular shape. A shape, size and configuration mode of the first ventilation holes 71 or the second ventilation holes 72 are not limited to the configurations described in the present invention, but may be changed according to inhalation resistance adjustment requirements of the aerosol generating apparatus.

[0059] External ambient air passes through the first ventilation holes 71 of the second wall 202 via the ventilation channel between the plurality of protrusions 70 from the proximal end of the first clamping component 251 to enter the second air channel 52 of the heating component 20 under the condition that the heating element 21 of the heating component 20 is energized to generate heat. Air in the second air channel 52 is heated by the heating element 21 to form hot airflow. In addition, air in the first air channel 51 is heated by the heating element 21 to form hot airflow, and the hot airflow sufficiently preheats the aerosol forming substrate 11 of the aerosol generating article 10 in the circumferential direction. In addition, part of the hot airflow in the second air channel 52 may enter the first air channel 51 through the second ventilation holes 72.

[0060] The hot airflow in the second air channel 52 may merge with the hot airflow in the first air channel 51 through the opening 27 at the first wall distal end, such that merged two streams of hot airflow enter the aerosol forming substrate 11 of the aerosol generating article 10 from the distal end of the aerosol generating article10 to heat the hot airflow.

[0061] Thus, the heating component 20 in the exemplary embodiment of the present invention forms a unique airflow heat transfer path including the first air channel 51 and the second air channel 52, thereby evenly and effectively heating the aerosol forming substrate 11. Specifically, heated hot air in the first air channel 51 may sufficiently preheat the aerosol forming substrate around the aerosol forming substrate 11, heated hot air in the second air channel 52 and the heated hot air in the first air channel 51 may be merged at the first wall distal end to enter the a bottom of the aerosol generating article and enter the aerosol generating article 10 from a bottom of the aerosol forming substrate 11, and two streams of hot airflow together efficiently heat the aerosol forming substrate 11, thereby heating the aerosol forming substrate by means of the heated hot air from a periphery and the bottom of the aerosol forming substrate. By means of such an airflow heat transfer path, the heating component 20 can achieve zero cleaning and can effectively utilize heat energy, thereby saving power.

[0062] In addition, heat generated when the heating element 21 is energized is substantially completely absorbed by the aerosol forming substrate 11 of the aerosol generating article 10, thereby improving a heat utilization rate. Thus, energy consumption can be further saved, and preheating time is reduced.

[0063] In addition, external ambient air is continuously input through the second air channel 52 of the heating component 20 during inhalation of the aerosol generating article 10 by the user, thereby further reducing heat conducted to a shell of the aerosol generating apparatus, and effectively achieving heat insulation and heat control of the shell of the aerosol generating apparatus to some extent.

[0064] In some examples, a first clamping component 251 may be made of a plastic material. Optionally, the plurality of protrusions 70 may be made of elastic plastic materials.

[0065] In addition, it should be understood that the heating component of the present application may further include another heating element. The another heating element is configured to heat the aerosol forming substrate 11 of the aerosol generating article 10 in other ways. For example, the another heating element is inserted into the aerosol forming substrate to heat the aerosol forming substrate.

[0066] The heating element 21 of the heating component 20 will be described below with reference to FIGs. 5 and 7.

[0067] The heating element 21 of the heating component 20 may be formed of any suitable resistive material. For example, the suitable resistive material may be a metal or a metal alloy. The metal or a metal alloy includes, but not limited to, titanium, zirconium, tantalum, platinum, nickel, cobalt, chromium, hafnium, niobium, molybdenum, tungsten, tin, gallium, manganese, iron, copper, stainless steel, or a nickel chromium alloy. In addition, the heating element 21 may be implemented by a metal wire, a metal plate on which a conductive trace is arranged, or a ceramic heating element, but is not limited thereto.

[0068] As shown in FIG. 5, the heating element 21 may be configured to have a cylindrical shape. In an example, the heating element 21 mat be a cylindrical portion made of a thermal conductive metal material.

[0069] In other exemplary embodiments, a heating element 21 includes a first layer of material portion arranged radially inwards and a second layer of material portion arranged around the first layer of material portion. Optionally, in some examples, the first layer of material

portion may be a metal carrier made of a metal and act as a heat conductor, and the second layer of material portion is made of a metal heating mesh or an alloy heating wire and acts as an active heating element.

[0070] In other examples, the first layer of material portion may be an active heat generating member made of a metal, and the second layer of material portion may be made of a thermal insulation material.

[0071] In an embodiment shown in FIG. 7, a heating element 21 may be configured to include a cylindrical ceramic body 80 and a metal wire 81 arranged around the ceramic body 80. Optionally, the metal wire 81 extends around the ceramic body 80 in a helical manner along an outer peripheral surface of the ceramic body. In addition, as shown in FIG. 7, the heating element 21 may include a groove 60 located on an outer surface of the heating element. The groove 60 extends around the outer surface of the heating element 21 in a helical manner, and the metal wire is accommodated in the groove 60. Optionally, a plurality of grooves 60 and a plurality of metal wires may be set according to requirements. In some examples, the groove is formed on the outer surface of the heating element 21 by laser cutting, etching and machining.

[0072] Optionally, the metal wire 81 may be an electric conductive trace formed on the ceramic body 80 by thick film printing, sintering and etching. Optionally, the metal wire 81 may be made of tungsten, gold, platinum, silver, copper, nickel, palladium, or a combination of the tungsten, the gold, the platinum, the silver, the copper, the nickel and the palladium.

[0073] As shown in FIG. 8, a heating element 21 may be configured to include a first heating portion 211. The first heating portion 211 includes one or more first concave portions or first convex portions extending in a longitudinal direction of the first heating portion 211 on an outer surface of the first heating portion. By providing the one or more first concave portions or first convex portions, a heat conduction area of the first heating portion 211 is increased, thereby improving heat conduction efficiency.

[0074] As shown in FIG. 9, a heating element 21 may be configured to include a second heating portion 212. The second heating portion 212 includes one or more second concave portions or second convex portions extending in a circumferential direction of the second heating portion 212 on an outer surface of the second hearing portion. By providing the one or more second concave portions or second convex portions, a heat conduction area of the second heating portion 212 is increased, thereby improving heat conduction efficiency.

[0075] As shown in FIGs. 10 and 11, a heating element 21 may be configured to include a third heating portion 213. The third heating portion 213 includes one or more third concave portions or third convex portions extending in a serpentine form in a circumferential direction of the third heating portion 213 on an outer surface of the third heating portion. For example, the plurality of third concave portions are arranged in a corrugated shape in the circumferential direction of the third heating portion 213. Optionally, the plurality of third concave portions may be spaced apart from each other at the same interval or at different intervals. By providing the one or more third concave portions or third convex portions, a heat conduction area of the third heating portion 213 is increased, thereby improving heat conduction efficiency.

[0076] As shown in FIG. 12, a heating element 21 may be configured to include a fourth heating portion 214. The fourth heating portion 214 includes one or more longitudinal concave portions or longitudinal convex portions extending in a longitudinal direction on an outer surface of the fourth heating portion; and one or more circumferential concave portions or circumferential convex portions extending in a circumferential direction on an outer surface of the fourth heating portion. Optionally, the plurality of longitudinal concave portions or the plurality of longitudinal convex portions may be spaced apart from each other at the same interval or different intervals, and the plurality of circumferential concave portions or the plurality of circumferential convex portions may be spaced apart from each other at the same interval or different intervals.

[0077] As shown in FIGs. 13 and 14, a heating element 21 may be configured to include a fifth heating portion 215. The fifth heating portion 215 includes one or more longitudinal concave portions or longitudinal convex portions extending in a serpentine form in an approximately longitudinal direction on an outer surface of the fifth heating portion; and one or more circumferential concave portions or circumferential convex portions extending in a serpentine form in an approximately circumferential direction on an outer surface of the fifth heating portion 215.

[0078] In an example, a heating element may include one or more concave portions or convex portions extending in a helical manner on an outer surface of the heating element.

[0079] It should be understood that the heating element 21 may be configured to include any one of the first heating portion 211, the second heating portion 212, the third heating portion 213, the fourth heating portion 214, and the fifth heating portion 215, or a combination of the first heating portion, the second heating portion, the third heating portion, the fourth heating portion, and the fifth heating portion. A specific shape and size of a pattern arranged on a surface of the heating element 21 of the present application are not limited to the configurations described above and shown in the accompanying drawings, and a heat transfer element of the heating element 21 may include other various shapes, and a shape and size of a pattern for increasing a heat conduction surface of the heating element 21 may be changed according to actual requirements.

[0080] According to some exemplary embodiments of the present application, an aerosol generating apparatus 100 is provided. As shown in FIG. 15, the aerosol generating apparatus 100 may include one or more heating

components. At least one heating component in the one or more heating components may be the heating component 20 described above. Some of the plurality of heating components may be inserted into an aerosol generating article 10 and other heating components may be arranged at an outer side of the aerosol generating article 10.

[0081] The aerosol generating apparatus 100 may include a power supply device. The power supply device may be configured to supply power to the heating components. In other words, the power supply device may be electrically connected to the heating components, such that the heating components may be heated. The power supplied from the power supply device to the heating components may be controlled by a controller. The power supply device may start supplying the power to the heating components, increase or reduce supplied power, or cut off supplied power according to a command of the controller. The power supply device may include, for example, a battery (disposable or rechargeable), a lithium ion battery, a solid state battery and a supercapacitor, or a combination of the battery, the lithium ion battery, the solid state battery and the supercapacitor.

[0082] The aerosol generating apparatus 100 may include the controller. The controller is configured to control the power supplied from the power supply device to the heating components, such that an aerosol generating article inserted into the aerosol generating apparatus 100 is suitably heated. Thus, an aerosol inhaled by a user is generated from the aerosol generating article.

[0083] The present invention has been explained above with reference to the accompanying drawings and by means of the description of the embodiments, but the present invention is not limited to the above embodiments. Those skilled in the art can understand that modifications and variations can be made without departing from the technical idea of the present invention, and these modifications and variations also fall within the scope of protection of the present invention.

Industrial applicability

[0084] The present invention provides an aerosol generating apparatus and a heating component therefor. The heating component is configured to heat an aerosol generating article inserted into the aerosol generating apparatus to generate an aerosol, and the aerosol generating article includes an aerosol forming substrate; and the heating component includes: a first wall, where the first wall includes a heating element, where the heating element is configured to have a hollow cylindrical shape to form a hollow accommodating portion, the hollow accommodating portion is configured to accommodate the aerosol forming substrate of the aerosol generating article, and the inner diameter of the hollow accommodating portion of the heating element is set to be greater than an outer diameter of the aerosol forming substrate of the aerosol generating article to be inserted, so as to form a first air channel between the heating element and the aerosol forming substrate; a second wall, where the second wall is arranged coaxial with the first wall along a longitudinal axis, the second wall includes a first clamping component, where the first clamping component is configured to clamp the aerosol generating article inserted into the aerosol generating apparatus and is provided with a ventilation channel, and the second wall is provided with a first ventilation hole penetrating the second wall; and a third wall, where the third wall is arranged between the first wall and the second wall, and the third wall includes a second clamping component, where the second clamping component is arranged in an approximately cylindrical shape, and the inner diameter of the second clamping component is substantially equal to an outer diameter of the aerosol generating article. The heating component can achieve zero cleaning. Moreover, heat generated by the heating component is substantially completely absorbed by the aerosol forming substrate, thereby improving a heat utilization rate.

[0085] In addition, it may be understood that the aerosol generating apparatus and the heating component therefor of the present invention are reproducible and applicable in various industrial applications. For example, the aerosol generating apparatus and the heating component therefor of the present invention may be applied to the technical field of electronic cigarettes.

Claims

1. A heating component for an aerosol generating apparatus, wherein the heating component (20) is configured to heat an aerosol generating article (10) inserted into the aerosol generating apparatus (100) to generate an aerosol, and the aerosol generating article (10) comprises an aerosol forming substrate (11); and the heating component (20) comprises:

   a first wall (201), wherein the first wall (201) comprises a heating element (21), wherein the heating element (21) is configured to have a hollow cylindrical shape to form a hollow accommodating portion, the hollow accommodating portion is configured to accommodate the aerosol forming substrate (11) of the aerosol generating article (10), and the inner diameter of the hollow accommodating portion of the heating element (21) is set to be greater than the outer diameter of the aerosol forming substrate (11) of the aerosol generating article (10) to be inserted, so as to form a first air channel (51) between the heating element (21) and the aerosol forming substrate (11);
   a second wall (202), wherein the second wall (202) is arranged coaxial with the first wall (201) along a longitudinal axis, the second wall (202)

comprises a first clamping component (251), wherein the first clamping component (251) is configured to clamp the aerosol generating article (10) inserted into the aerosol generating apparatus (100) and form a ventilation channel, and the second wall (202) is provided with a first ventilation hole (71) penetrating the second wall; and

a third wall (203), wherein the third wall (203) is arranged between the first wall (201) and the second wall (202), and the third wall (203) comprises a second clamping component (253), wherein the second clamping component (253) is arranged in an approximately cylindrical shape, and the inner diameter of the second clamping component (253) is substantially equal to the outer diameter of the aerosol generating article (10).

2. The heating component according to claim 1, wherein the heating component (20) further comprises a housing (24), wherein the housing (24) extends along a longitudinal axis (A-A), a longitudinal extending cavity is formed inside the housing (24), the longitudinal extending cavity is configured to accommodate the first wall (201), part of the second wall (202), and the third wall (203) of the heating component (20), and the housing (24) is arranged around the heating element (21) to form a second air channel (52) between the housing (24) and the heating element (21).

3. The heating component according to claim 1, wherein the first clamping component (251) is provided with an insertion opening for accommodating the aerosol generating article (10), a plurality of protrusions (70) are arranged on the inner surface of the first clamping component adjacent to the insertion opening, the plurality of protrusions (70) are spaced apart from each other in a circumferential direction, and the ventilation channel is formed between adjacent protrusions.

4. The heating component according to claim 3, wherein the plurality of protrusions (70) extend from the inner surface of the first clamping component (251) towards the longitudinal axis, and the plurality of protrusions (70) are configured to make contact with the outer surface of the aerosol generating article (10).

5. The heating component according to claim 3, wherein the second wall (202) comprises a tapered portion (252) connected to the third wall (203), wherein the one or more first ventilation holes (71) penetrating a wall portion of the tapered portion (252) are provided at the tapered portion (252), and the first ventilation holes (71) are configured to be arranged in a circumferential direction of the tapered portion (252), so as to allow airflow from the ventilation channel of the first clamping component (251) into the second air channel (52) through the first ventilation holes (71).

6. The heating component according to claim 5, wherein the first wall (201) comprises a first wall proximal end adjacent to the third wall (203) and a first wall distal end opposite to the first wall proximal end, wherein the first wall distal end is provided with an opening (27); and

the first wall (201) comprises one or more second ventilation holes (72), wherein the one or more second ventilation holes (72) penetrate a wall portion of the first wall (201) adjacent to the first wall proximal end, and the one or more second ventilation holes (72) are configured to be provided in the circumferential direction.

7. The heating component according to any one of claims 1-6, wherein the heating element (21) is configured to comprise a first material portion arranged radially and a second material portion arranged around the first material portion.

8. The heating component according to any one of claims 1-6, wherein the heating element (21) is configured to comprise a cylindrical ceramic body (80) and a metal wire (81) arranged around the ceramic body (80).

9. The heating component according to any one of claims 1-6, wherein the heating element (21) is configured to comprise one of the following portions:

a first heating portion (211), wherein the first heating portion (211) comprises one or more first concave portions or first convex portions extending in a longitudinal direction on the outer surface of the first heating portion;

a second heating portion (212), wherein the second heating portion (212) comprises one or more second concave portions or second convex portions extending in a circumferential direction on the outer surface of the second hearing portion;

a third heating portion (213), wherein the third heating portion (213) comprises one or more third concave portions or third convex portions extending in a serpentine form in a circumferential direction on the outer surface of the third heating portion;

a fourth heating portion (214), wherein the fourth heating portion (214) comprises: one or more longitudinal concave portions or longitudinal convex portions extending in a longitudinal direction on the outer surface of the fourth heating portion; and one or more circumferential con-

cave portions or circumferential convex portions extending in a circumferential direction on the outer surface of the fourth heating portion; and a fifth heating portion (215), wherein the fifth heating portion (215) comprises one or more longitudinal concave portions or longitudinal convex portions extending in a serpentine form in an approximately longitudinal direction on the outer surface of the fifth heating portion; and one or more circumferential concave portions or circumferential convex portions extending in a serpentine form in an approximately circumferential direction on the outer surface of the fifth heating portion.

10. An aerosol generating apparatus, comprising:

one or more heating components, wherein at least one heating component in the one or more heating components is the heating component according to any one of claims 1-9;
a power supply device, wherein the power supply device is configured to be electrically connected to the heating components and to supply power to the heating components; and
a controller, wherein the controller is configured to control the power supplied from the power supply device to the heating components.

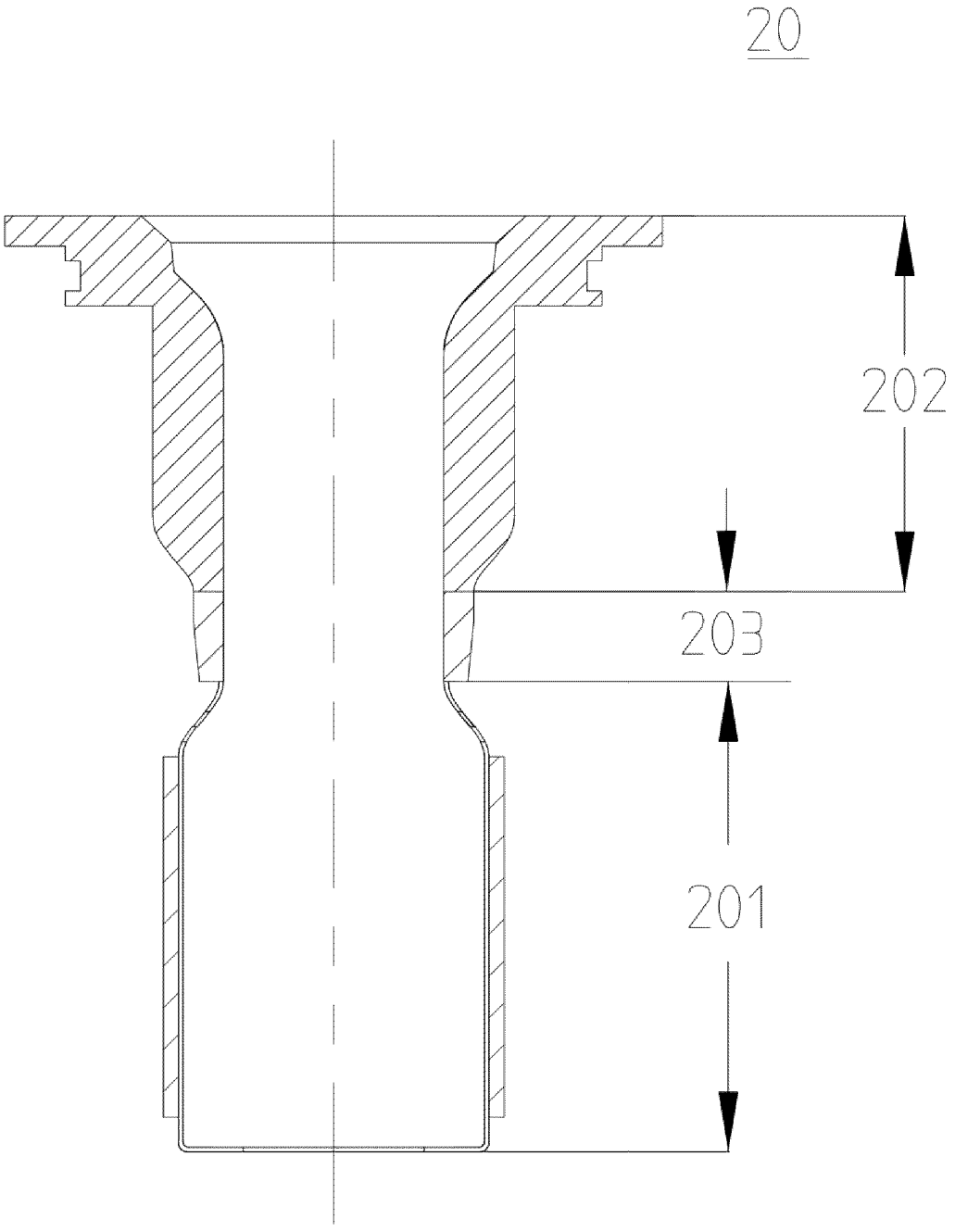

FIG. 1

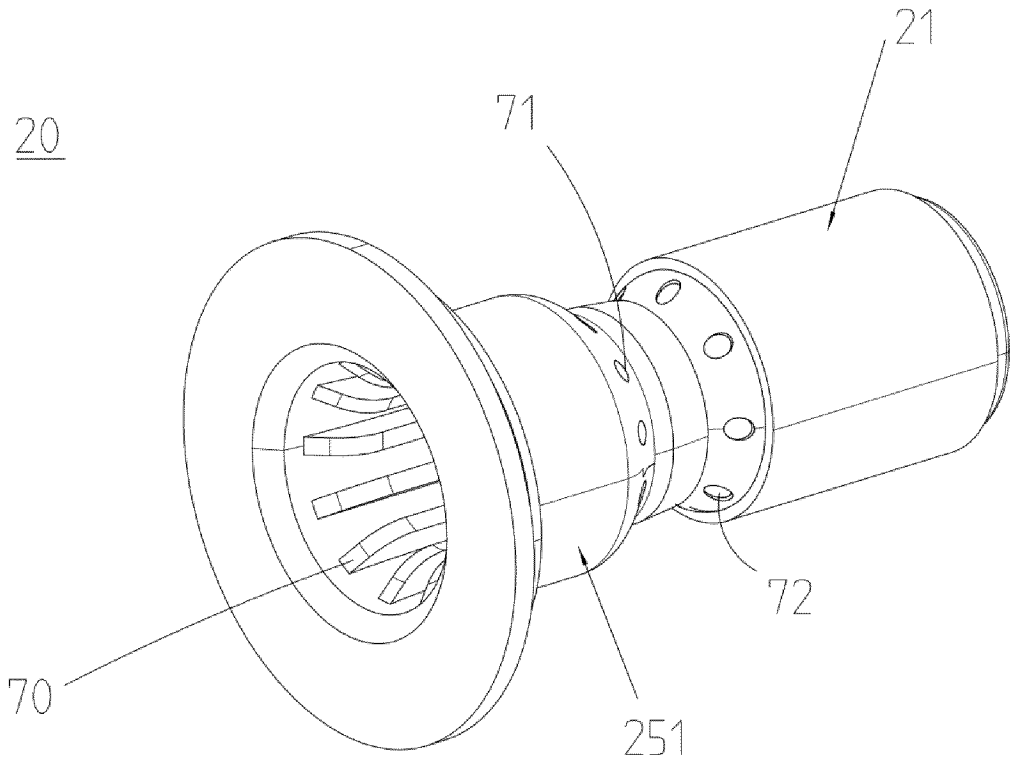

FIG. 2

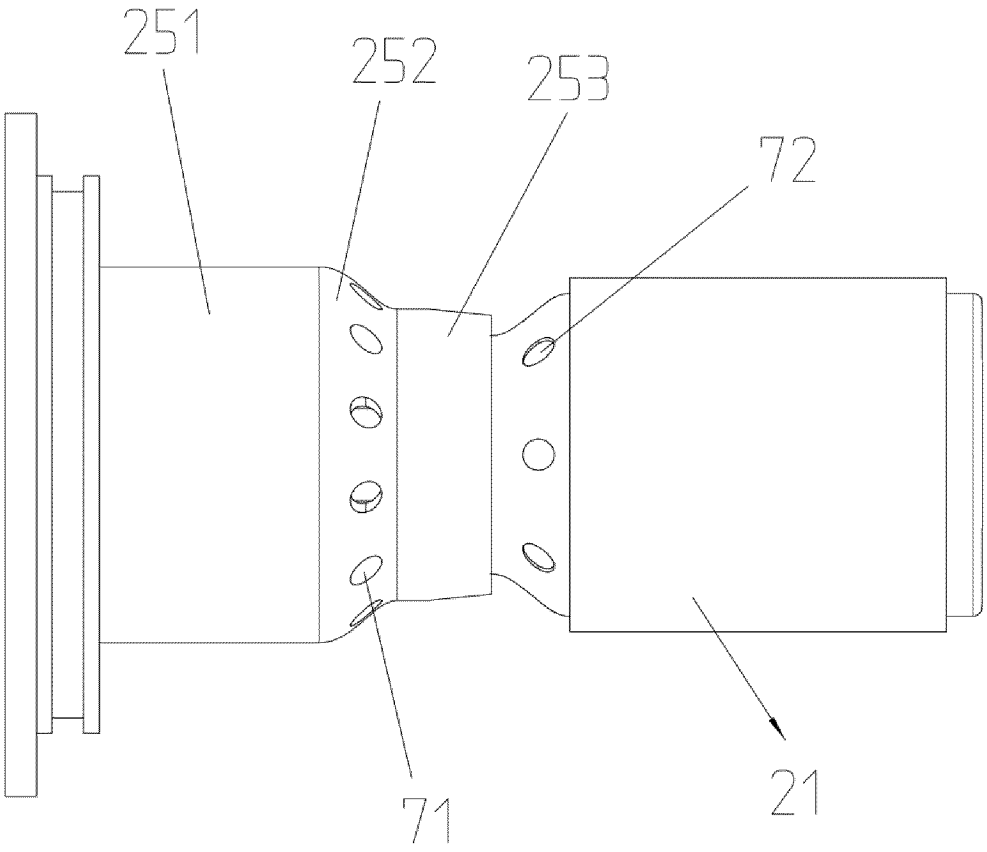

FIG. 3

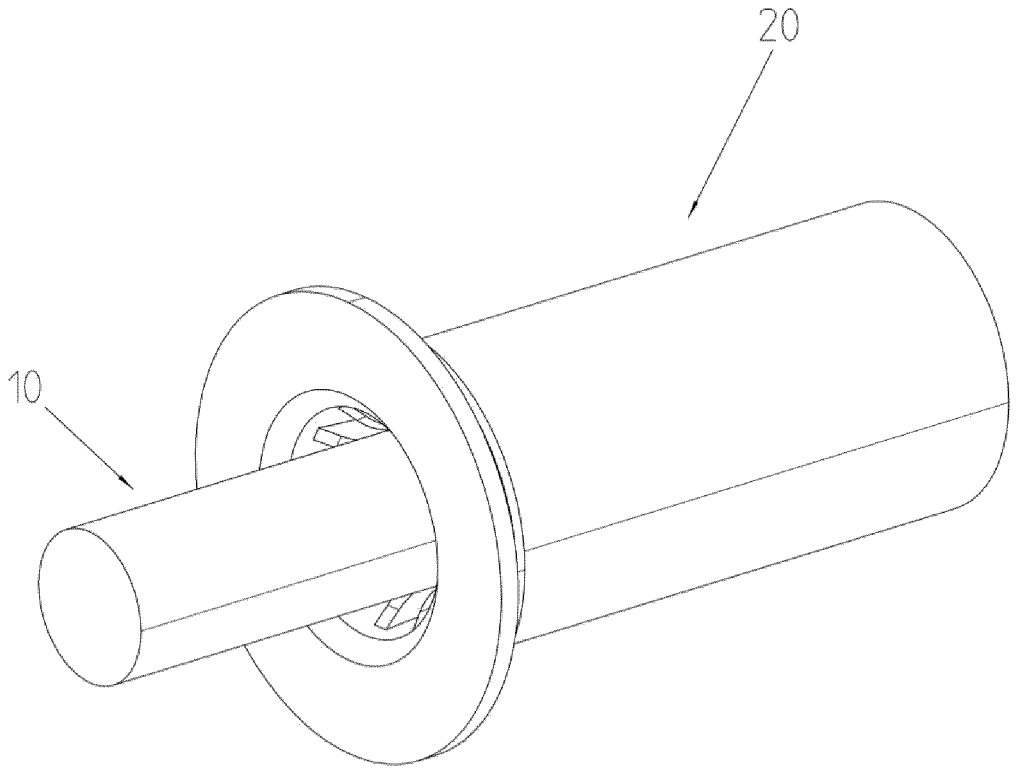

FIG. 4

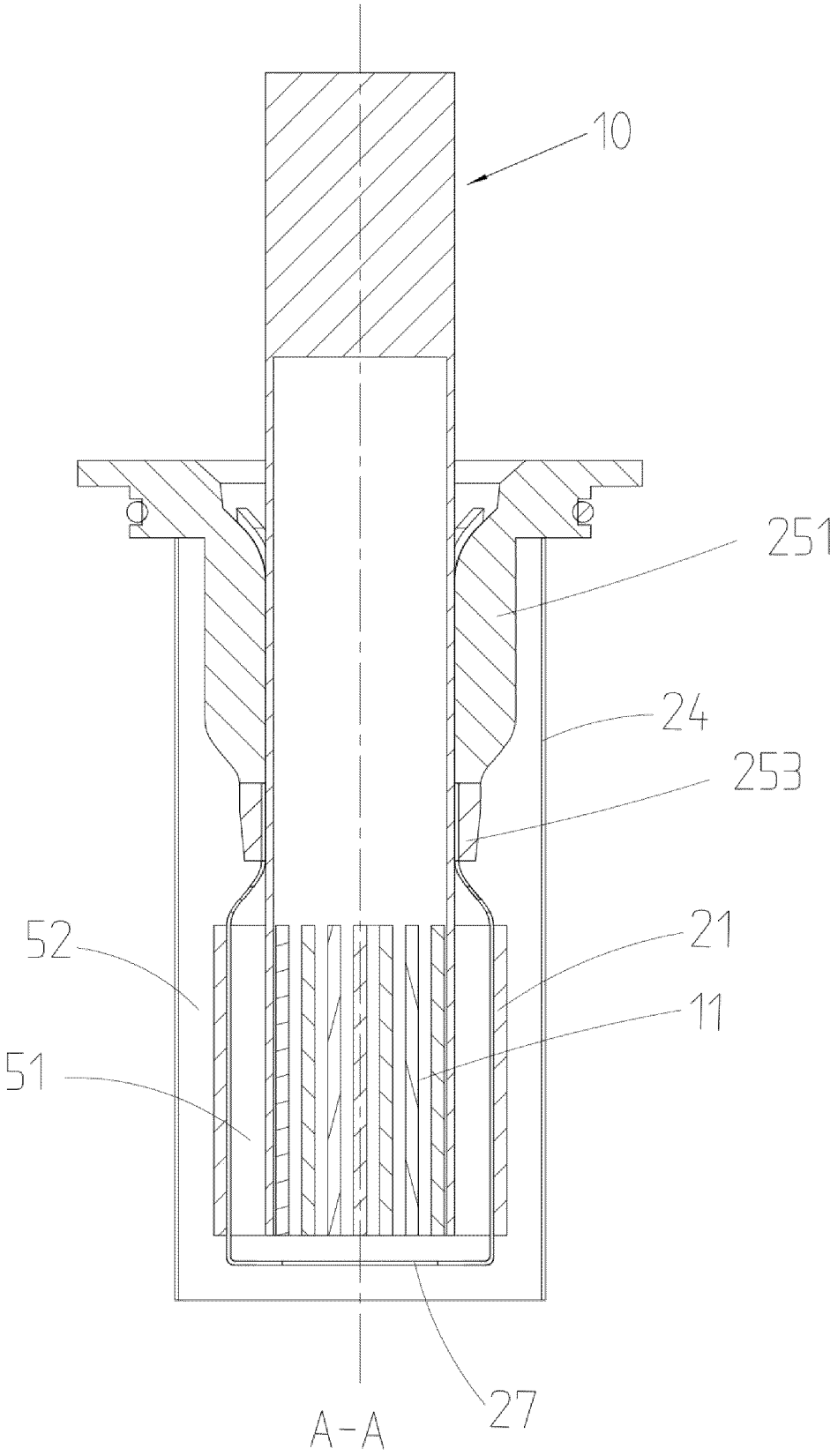

FIG. 5

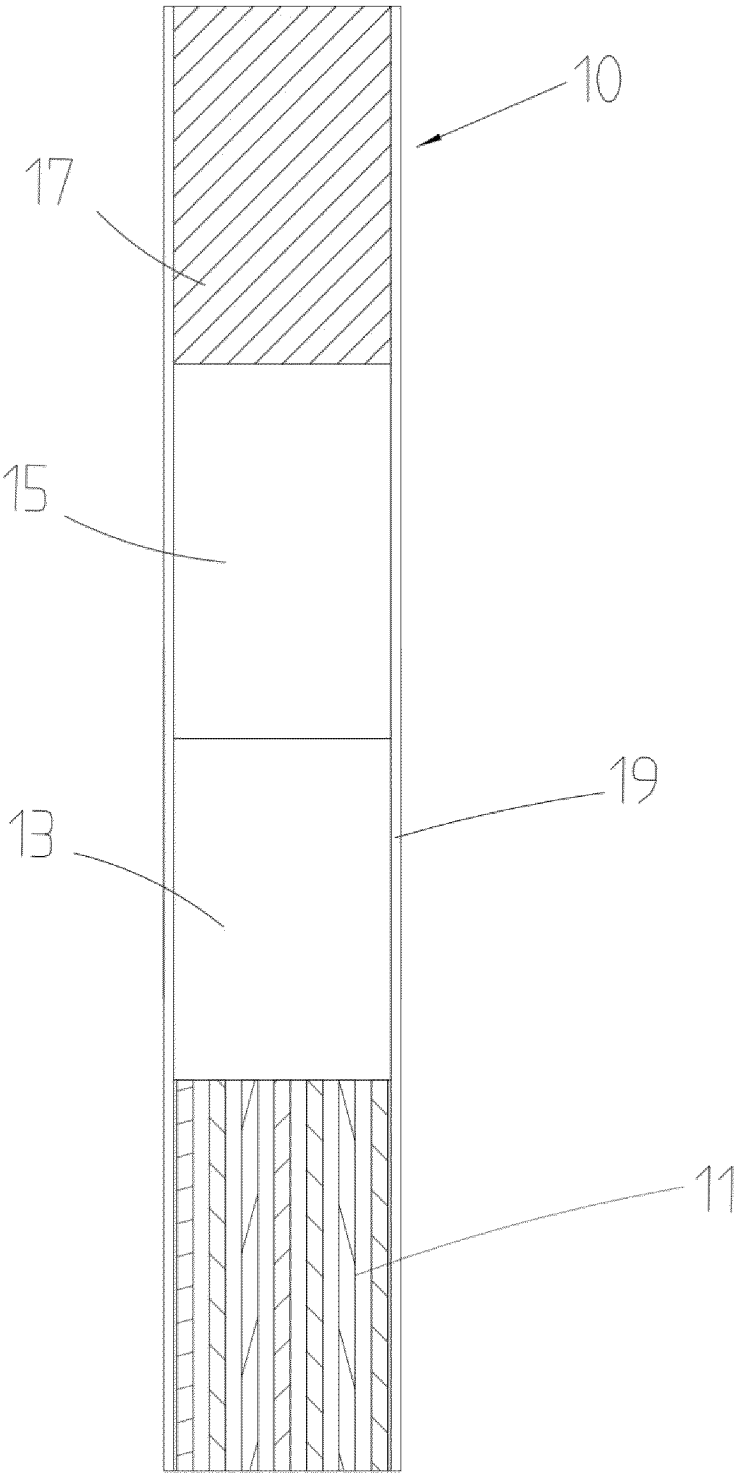

FIG. 6

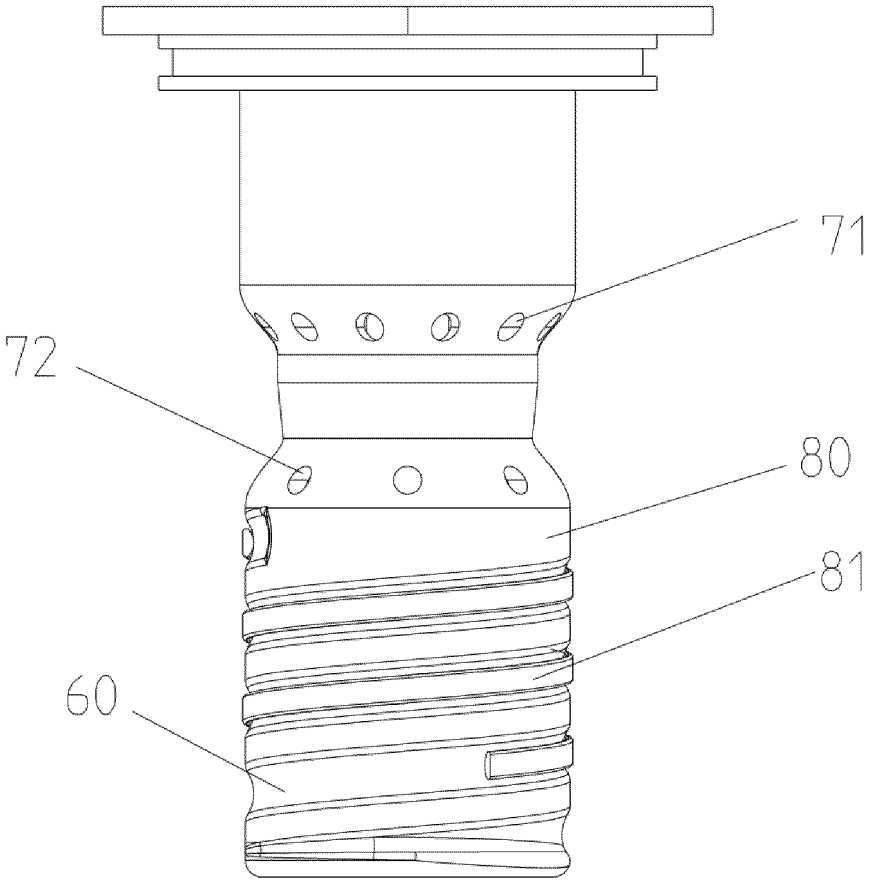

FIG. 7

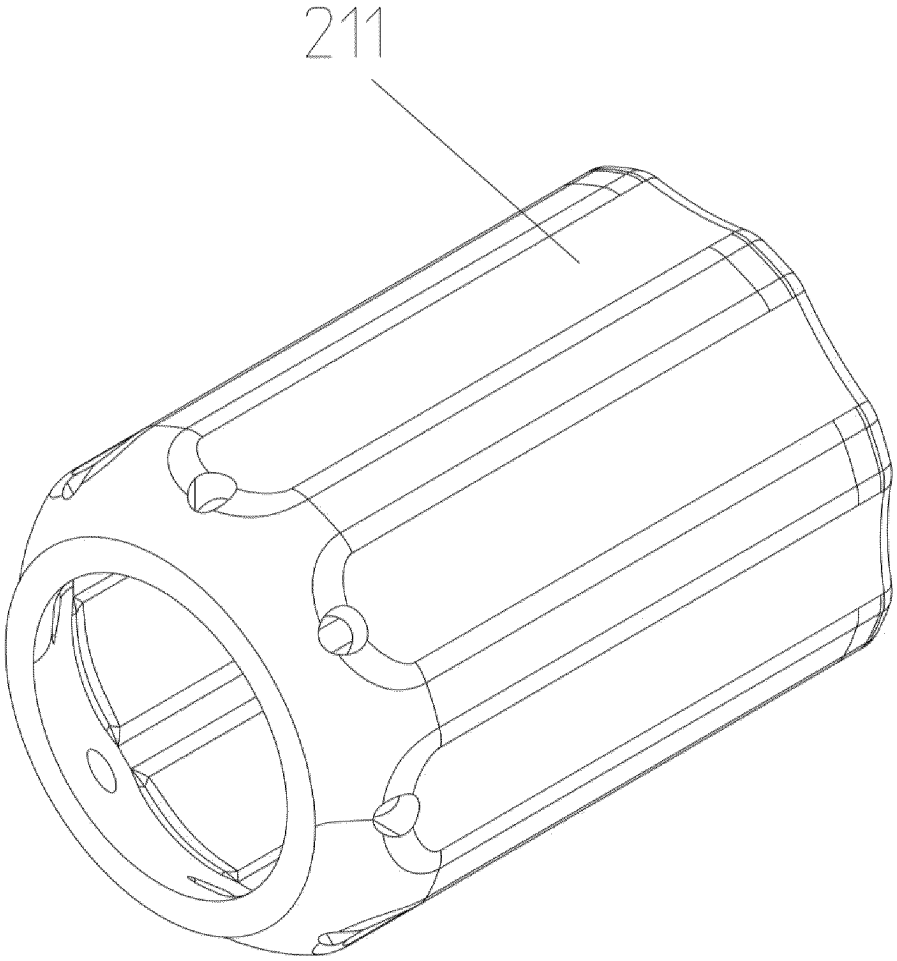

FIG. 8

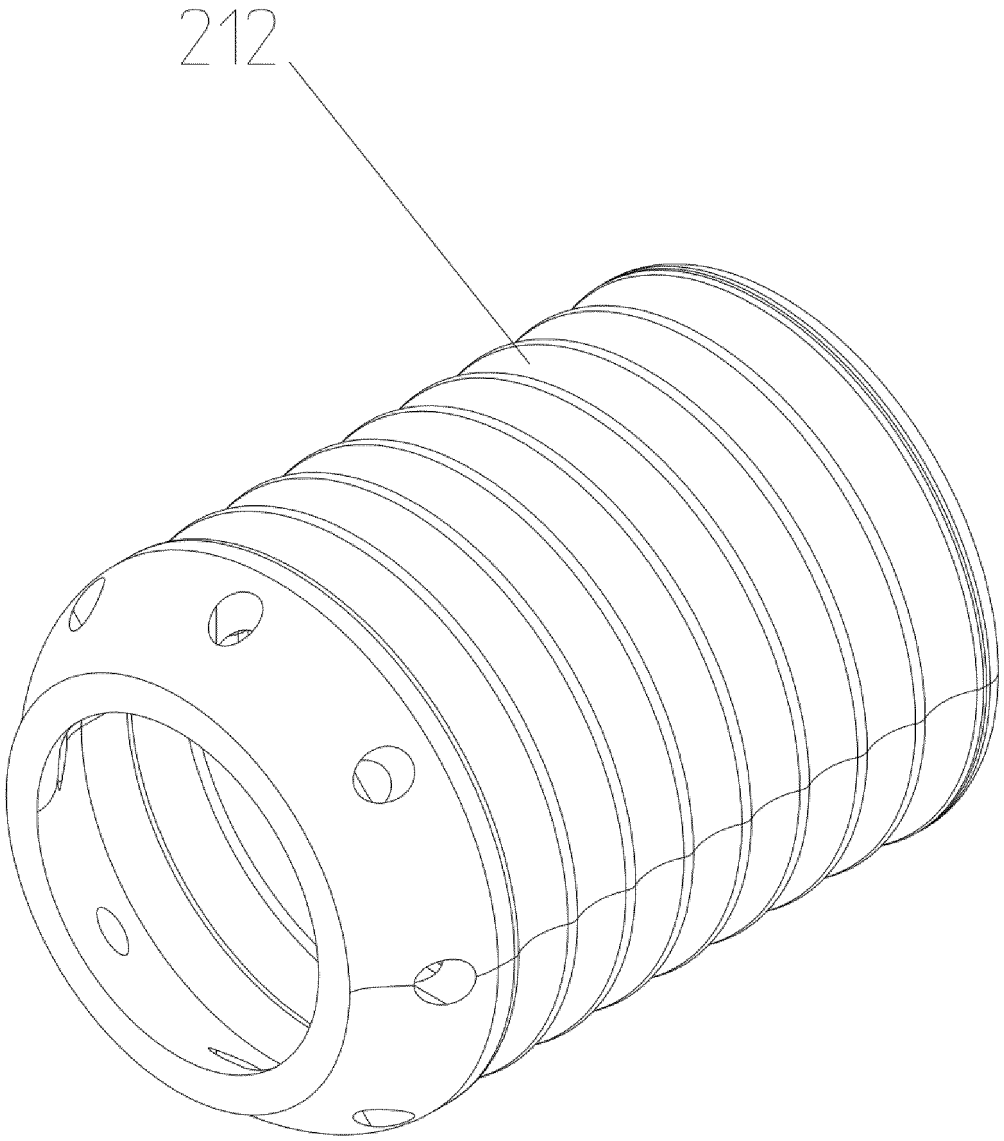

FIG. 9

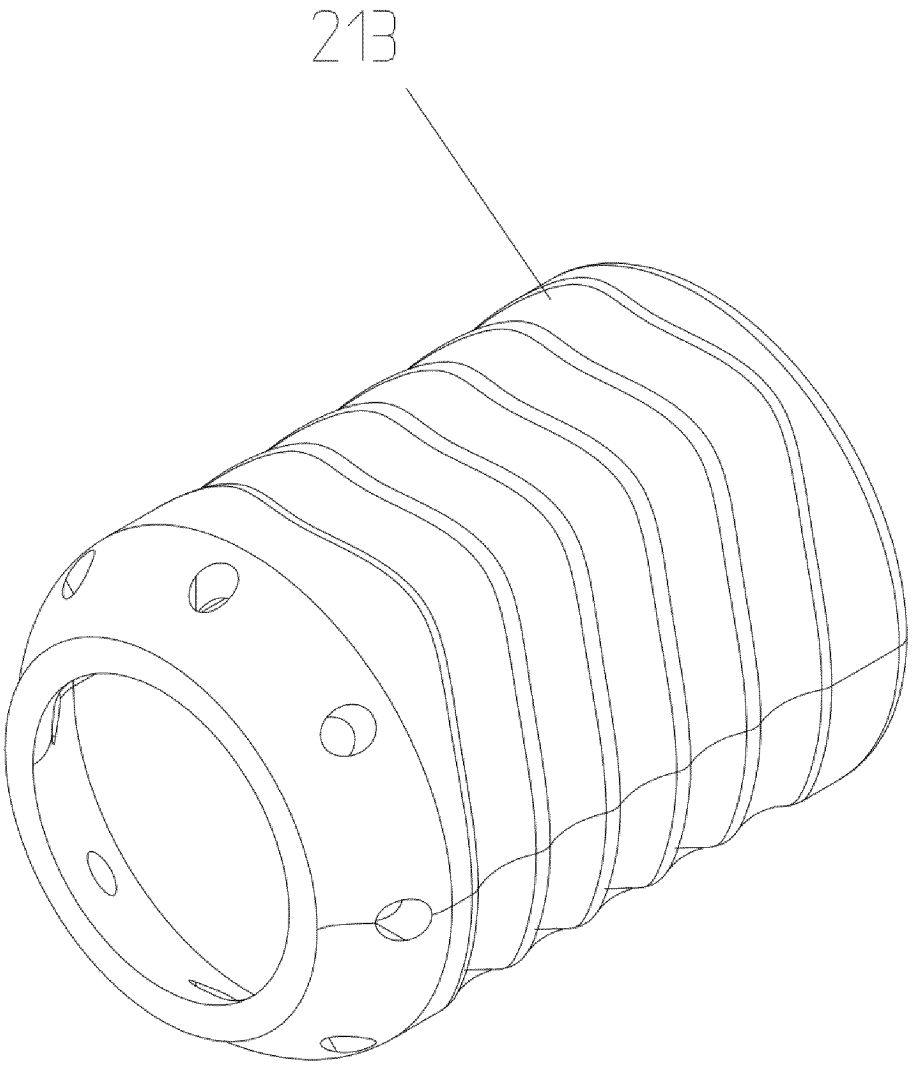

FIG. 10

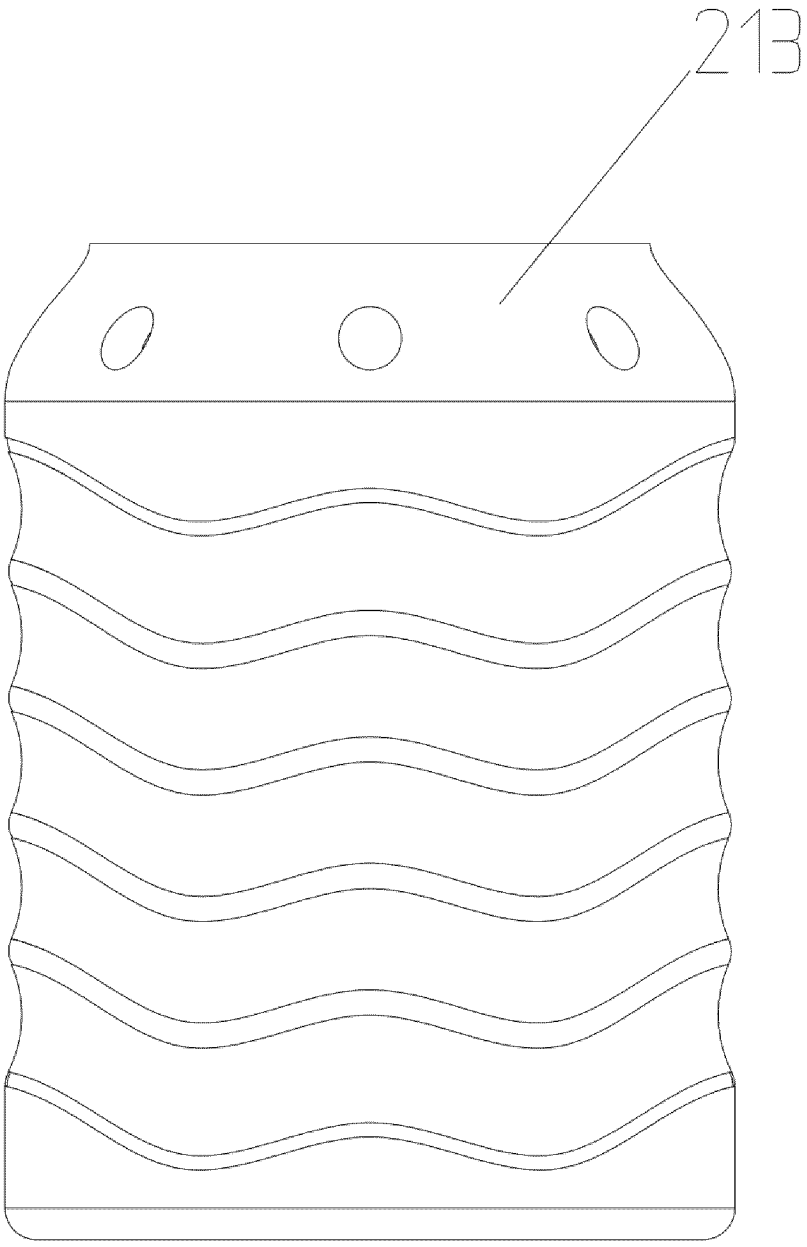

FIG. 11

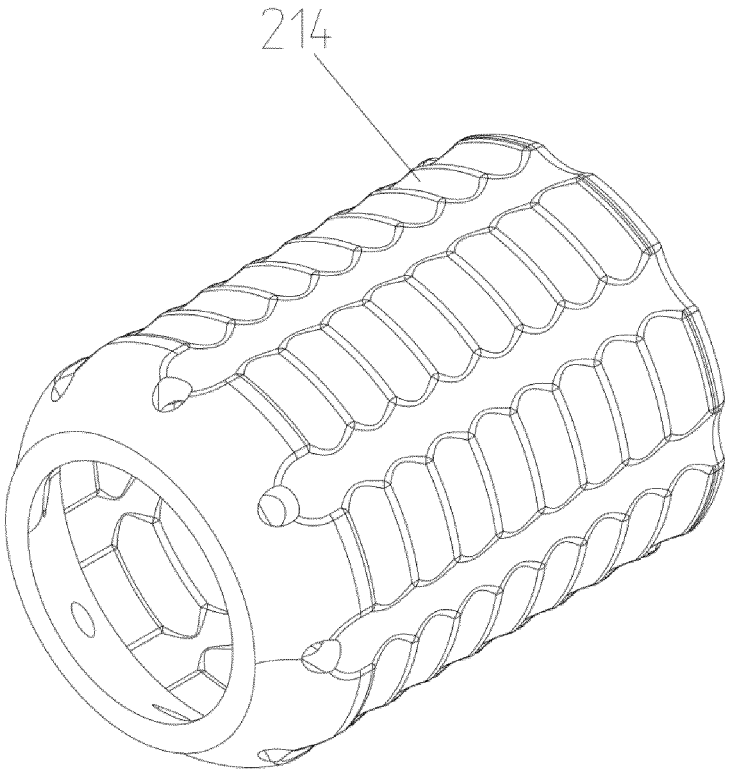

FIG. 12

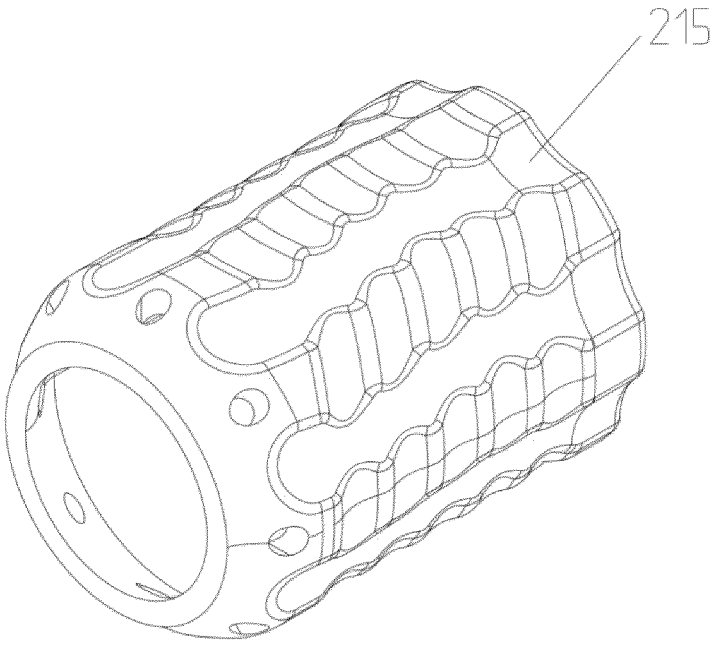

FIG. 13

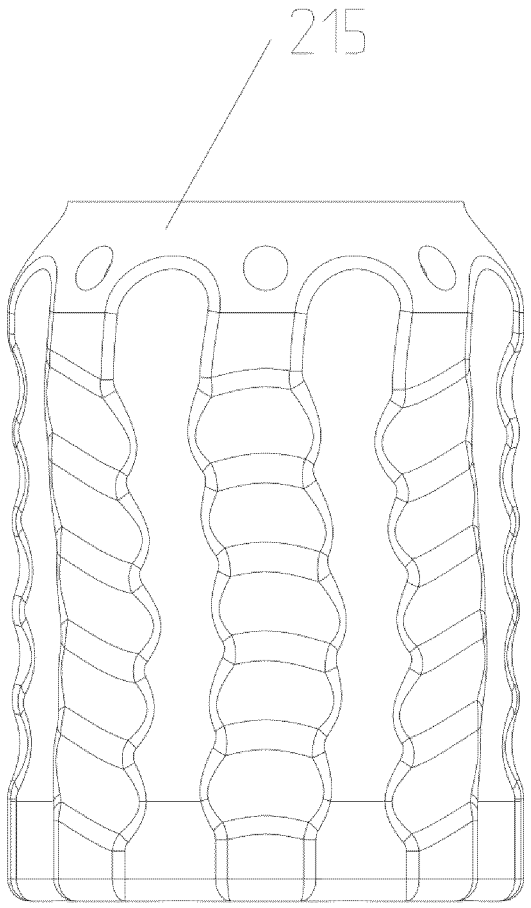

FIG. 14

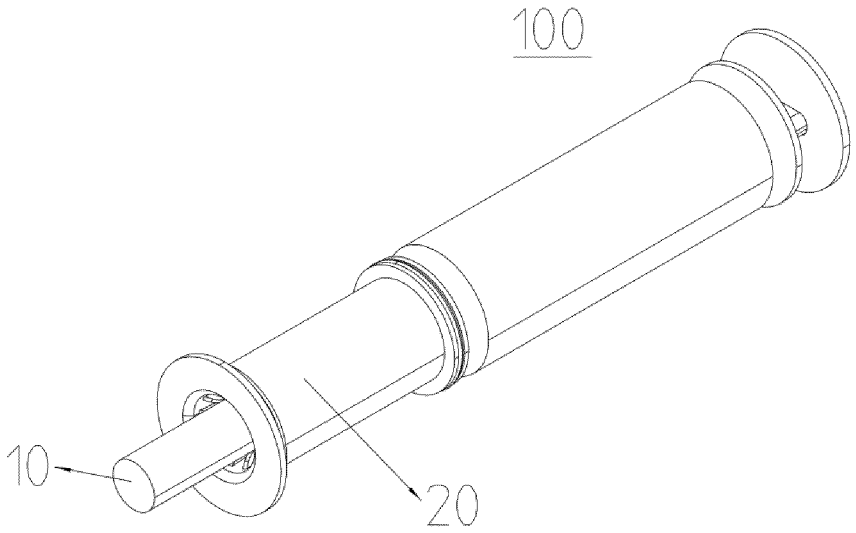

FIG. 15

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2022/115566

A. CLASSIFICATION OF SUBJECT MATTER

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

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A24F

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

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

CNTXT; VEN; WPABSC; ENTXT; USTXT; EPTXT; JPTXT; CNKI: 电子烟, 烟草, 烟弹, 电热, 加热, 不接触, 非接触, 气流, 气道, 空气, 热气, 孔, electronic cigarette, tobacco, airflow, airway, heat+, non-contact, hole

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN 212414741 U (SHENZHEN CHANGNENG HUIKE TECHNOLOGY CO., LTD.) 29 January 2021 (2021-01-29) description, paragraphs [0010]-[0026], and figure 2	1-10
A	CN 110710721 A (XIAMEN FENGTAO CERAMICS CO., LTD.) 21 January 2020 (2020-01-21) entire document	1-10
A	CN 109561736 A (HUIZHOU KIMREE TECHNOLOGY CO., LTD. SHENZHEN BRANCH) 02 April 2019 (2019-04-02) entire document	1-10
A	US 2018317557 A1 (JUUL LABS, INC.) 08 November 2018 (2018-11-08) entire document	1-10

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

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
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"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
30 November 2022	**13 December 2022**
Name and mailing address of the ISA/CN **China National Intellectual Property Administration (ISA/CN)** **No. 6, Xitucheng Road, Jimenqiao, Haidian District, Beijing 100088, China** Facsimile No. **(86-10)62019451**	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2022/115566

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
CN 212414741 U	29 January 2021	CN 111449302 A	28 July 2020
CN 110710721 A	21 January 2020	WO 2020228778 A1	19 November 2020
		CN 211298449 U	21 August 2020
		EP 3970529 A4	08 June 2022
		WO 2020228774 A1	19 November 2020
		KR 20220008846 A	21 January 2022
		JP 2022533064 W	21 July 2022
		EP 3970529 A1	23 March 2022
CN 109561736 A	02 April 2019	WO 2020087516 A1	07 May 2020
US 2018317557 A1	08 November 2018	US 10709173 B2	14 July 2020

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

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- CN 104010531 A **[0004]**