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(72) Inventors:  
• **LUO, Yongjie**  
**Shenzhen (CN)**  
• **YANG, Baomin**  
**Shenzhen (CN)**  
• **FAN, Jichang**  
**Shenzhen (CN)**

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(74) Representative: **Michalski Hüttermann & Partner**  
**Patentanwälte mbB**  
**Kaistraße 16A**  
**40221 Düsseldorf (DE)**

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

(54) **ELECTROMAGNETIC HEATING COIL, HEATING ASSEMBLY, AND ELECTRONIC ATOMIZING DEVICE**

(57) The present application relates to an electromagnetic heating coil, a heating assembly, and an electronic atomizing device. The electromagnetic heating coil includes a plurality of turns arranged in an axial direction. From one end to another end in the axial direction, the electromagnetic heating coil includes a first helical sec-

tion and a second helical section sequentially connected to the first helical section. A pitch between any two adjacent turns of the first helical section is smaller than a pitch between any two adjacent turns of the second helical section.

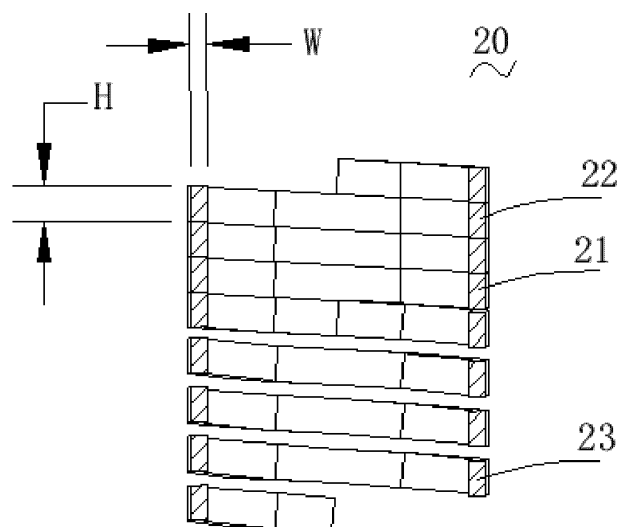


FIG. 6

## Description

### TECHNICAL FIELD

**[0001]** The present application relates to the field of atomization technology, and particularly to electromagnetic heating coils, heating assemblies, and electronic atomizing devices.

### BACKGROUND

**[0002]** An aerosol is a colloidal dispersion system formed by dispersing and suspending small solid or liquid particles in a gas medium. The aerosol can be absorbed by the human body through the respiratory system, providing users with a new alternative absorption method. For example, an electronic atomizing device that can generate aerosols by heating herbal or ointment aerosol-generating substrates can be used in different fields to deliver inhalable aerosols to the users, replacing conventional product forms and absorption methods.

**[0003]** The electronic atomizing device heats an aerosol-generating substrate through a heating assembly to generate an aerosol for the user to inhale. As for the electronic atomizing device using an electromagnetic heating way, the heating assembly includes an electromagnetic heating coil and a heat-generating body. A magnetic field is generated by the electromagnetic heating coil conducting an electric current. The temperature of the heat-generating body located in the magnetic field generated by the electromagnetic heating coil is increased. The aerosol-generating substrate is in contact with the heat-generating body, and thus heated and atomized by the heat-generating body.

**[0004]** However, the conventional electronic atomizing device with the electromagnetic heating generates an aerosol at a low speed, which causes an undesirable user experience.

### SUMMARY

**[0005]** In view of this, aiming to address the problem that the conventional electronic atomizing device generates an aerosol at a low speed, there is a need to provide an electromagnetic heating coil, a heating assembly, and an electronic atomizing device which have a relatively high aerosol-generating speed.

**[0006]** An electromagnetic heating coil includes a plurality of turns arranged in an axial direction. From one end to another end in the axial direction, the electromagnetic heating coil includes a first helical section and a second helical section sequentially connected to the first helical section. A pitch between any two adjacent turns of the first helical section is smaller than a pitch between any two adjacent turns of the second helical section.

**[0007]** In some embodiments, the pitch between every two adjacent turns is constant in the first helical section, and the pitch between every two adjacent turns is con-

stant in the second helical section.

**[0008]** In some embodiments, the pitch between any two adjacent turns of the first helical section is in a range from 0 to 4 mm, and the pitch between any two adjacent turns of the second helical section is in a range from 0.5 mm to 8 mm.

**[0009]** In some embodiments, the number of turns in the first helical section is greater than or equal to the number of turns in the second helical section.

**[0010]** In some embodiments, the electromagnetic heating coil further includes a third helical section, and the second helical section is connected between the first helical section and the third helical section. A pitch between any two adjacent turns of the third helical section is smaller than the pitch between any two adjacent turns of the second helical section.

**[0011]** In some embodiments, the pitch between every two adjacent turns is constant in the third helical section.

**[0012]** In some embodiments, the pitch between any two adjacent turns of the first helical section is smaller than or equal to the pitch between any two adjacent turns of the third helical section.

**[0013]** In some embodiments, the number of turns in the first helical section is greater than or equal to the number of turns in the third helical section.

**[0014]** In some embodiments, the pitch between any two adjacent turns of the third helical section is in a range from 0 to 4 mm.

**[0015]** In some embodiments, the electromagnetic heating coil includes at least one wire bundle helically wound about the axial direction, and each wire bundle includes at least two conducting wires. The at least one wire bundle has a first size in the axial direction and a second size in a radial direction, and the first size is greater than the second size.

**[0016]** A heating assembly, including:

a heat-generating body provided with an accommodating cavity, the heat-generating body defines an opening that is in communication with the accommodating cavity, the opening is disposed at one end of the accommodating cavity in the extending direction of the axis;

an electromagnetic heating coil, sleeved outside the heat-generating body;

wherein in the axial direction, the heat-generating body is disposed on both sides of a central position of the electromagnetic heating coil; the first helical section is disposed above the second helical section.

**[0017]** In some embodiments, the electromagnetic heating coil further includes a third helical section, and the second helical section is connected between the first helical section and the third helical section. A pitch between any two adjacent turns of the third helical section is smaller than the pitch between any two adjacent turns of the second helical section.

**[0018]** In some embodiments, the heating assembly

further includes a mounting frame, wherein the electromagnetic heating coil is sleeved outside the mounting frame, and the heat-generating body is disposed inside the mounting frame. The mounting frame includes a positioning groove extending helically about the axial direction, and the electromagnetic heating coil is embedded in the positioning groove.

**[0019]** In some embodiments, the heating assembly further includes a magnetic shield, sleeved outside the electromagnetic heating coil.

**[0020]** An electronic atomizing device includes an aerosol-generating substrate and the heating assembly, wherein the aerosol-generating substrate includes a tube body and a core body located inside the tube body, the aerosol-generating substrate is adapted to be operably accommodated in the accommodating cavity through the opening. In the axial direction, a size of the core body of the aerosol-generating substrate is smaller than a size of the accommodating cavity.

**[0021]** In some embodiments, on a condition that the aerosol-generating substrate is accommodated in the accommodating cavity, an end surface of the core body adjacent to the opening is located in the electromagnetic heating coil.

**[0022]** Compared to the conventional electromagnetic heating coil with a uniform pitch, in the above-described electromagnetic heating coil, heating assembly, and electronic atomizing device, when a magnetic field is induced by an electric current, the heat-generating body in the magnetic field generates heat, and the temperature of the heat-generating body opposite to the first helical section is increased, so that end of the core body of the aerosol-generating substrate adjacent to the user suction end heats up faster to generate an aerosol quickly from the electronic atomizing device, thereby improving the user experience.

#### BRIEF DESCRIPTION OF THE DRAWINGS

##### **[0023]**

FIG. 1 is an axonometric view of an electronic atomizing device provided by an embodiment of the present application.

FIG. 2 is a cross-sectional view of the electronic atomizing device shown in FIG. 1.

FIG. 3 is a cross-sectional view of a heating assembly of the electronic atomizing device shown in FIG. 1.

FIG. 4 is a structural partial view of the electronic atomizing device shown in FIG. 1.

FIG. 5 is an axonometric view of an electromagnetic heating coil of the electronic atomizing device shown in FIG. 1.

FIG. 6 is a cross-sectional view of the electromagnetic heating coil shown in FIG. 5.

FIG. 7 is a cross-sectional view of an electromagnetic heating coil of an electronic atomizing device

provided by another embodiment of the present application.

FIG. 8 is a comparison view of a temperature field of a heat-generating body of an electronic atomizing device provided in another embodiment of the present application and a temperature field of an electronic atomizing device in prior art.

#### Reference signs:

**[0024]** 100, electronic atomizing device; 200, heating assembly; 10, heat-generating body; 11, accommodating cavity; 12, opening; 20, electromagnetic heating coil; 21, turn; 22, first helical section; 23, second helical section; 24, third helical section; 30, mounting frame; 31, positioning groove; 40, magnetic shield; H, first size; W, second size; 300, aerosol-generating substrate; 301, tube body; 302, core body.

#### DETAILED DESCRIPTION

**[0025]** In order to make the above objectives, features and advantages of the present application more clear and understandable, embodiments of the present disclosure will be described in detail below with reference to the accompanying drawings. In the following description, many specific details are described to make the present disclosure fully understandable. However, the present disclosure can be implemented in many other ways different from those described herein, and those skilled in the art can make similar improvements without departing from the connotation of the present disclosure. Therefore, the present disclosure is not limited by the specific embodiments disclosed below.

**[0026]** In the description of the present disclosure, it should be understood that the terms "central", "longitudinal", "transverse", "length", "width", "thickness", "upper", "lower", "front", "rear", "left", "right", "vertical", "horizontal", "top", "bottom", "inner", "outer", "clockwise", "counterclockwise", "axial", "radial", "circumferential", etc. indicate the orientations or positional relationships on the basis of the drawings. These terms are only for describing the present disclosure and simplifying the description, rather than indicating or implying that the related devices or elements must have the specific orientations, or be constructed or operated in the specific orientations, and therefore cannot be understood as limitations of the present disclosure.

**[0027]** In addition, the terms "first" and "second" are used merely as labels to distinguish one element having a certain name from another element having the same name, and cannot be understood as indicating or implying any priority, precedence, or order of one element over another, or indicating the quantity of the element. Therefore, the element modified by "first" or "second" may explicitly or implicitly includes at least one of the elements. In the description of the present disclosure, "a plurality of" means at least two, such as two, three, etc., unless

otherwise specifically defined.

**[0028]** In the present disclosure, unless otherwise clearly specified and defined, the terms "installed", "connected", "coupled", "fixed" and other terms should be interpreted broadly. For example, an element, when being referred to as being "installed", "connected", "coupled", "fixed" to another element, unless otherwise specifically defined, may be fixedly connected, detachably connected, or integrated to the other element, may be mechanically connected or electrically connected to the other element, and may be directly connected to the other element or connected to the other element via an intermediate element. For those of ordinary skill in the art, the specific meaning of the above-mentioned terms in the present disclosure can be understood according to specific circumstances.

**[0029]** In the present disclosure, unless otherwise specifically defined, an element, when being referred to as being located "on" or "under" another element, may be in direct contact with the other element or contact the other element via an intermediate element. Moreover, the element, when being referred to as being located "on", "above", "over" another element, may be located right above or obliquely above the other element, or merely located at a horizontal level higher than the other element; the element, when being referred to as being located "under", "below", "beneath" another element, may be located right below or obliquely below the other element, or merely located at a horizontal level lower than the other element.

**[0030]** It should be noted that an element, when being referred to as being "fixed" or "mounted" to another element, may be directly fixed or mounted to the other element or via an intermediate element. Such terms as "vertical", "horizontal", "up", "down", "left", "right" and the like used herein are for illustrative purposes only and are not meant to be the only ways for implementing the present disclosure.

**[0031]** As mentioned in the background section, the conventional electronic atomizing device with the electromagnetic heating generates an aerosol at a low speed, which causes an undesirable user experience.

**[0032]** The inventors have found through research that the fundamental cause of the above problem is that the pitch of the electromagnetic heating coil in the conventional electronic atomizing device does not change in the axial direction, so that the heat-generating body, which faces the electromagnetic heating coil, has a higher temperature in the middle in the axial direction. The aerosol-generating substrate is heated and atomized by the heat-generating body. As the higher temperature occurs in the middle of the heat-generating body, an upper portion of a core body of the aerosol-generating substrate will not be the first portion to be heated and atomized, causing a relatively low generation speed and a small volume of an aerosol at the first puff.

**[0033]** In view of the above problems, referring to FIG. 1, the present application provides an electronic atomiz-

ing device 100, which can be used for heating and atomizing an aerosol-generating substrate 300, which is a liquid, solid, or ointment of flowers, leaves, herbs, or synthetics.

**[0034]** Referring to FIG. 2, the electronic atomizing device 100 includes a heating assembly 200. The heating assembly 200 includes a heat-generating body 10 and an electromagnetic heating coil 20 sleeved outside the heat-generating body 10. The electromagnetic heating coil 20 helically extends about the axial direction. At least a portion of the heat-generating body 10 is opposite to the electromagnetic heating coil 20 in the radial direction. The electromagnetic heating coil 20 is adapted to conduct an electric current thereby generating a magnetic field. The heat-generating body 10 is disposed in the magnetic field generated by the electromagnetic heating coil 20, thereby generating heat. The heat-generating body 10 is configured to heat the aerosol-generating substrate 300. Specifically, the electromagnetic heating coil 20 has a central position in the axial direction. The heat-generating body 10 extends in the axial direction to both sides of the central position. That is, the heat-generating body 10 is opposite to the electromagnetic heating coil 20 on both sides of the central position.

**[0035]** Referring to FIG. 2 and FIG. 3, the heat-generating body 10 is provided with an accommodating cavity 11. An opening 12 is defined at one end of the heat-generating body 10 in the axial direction, and the opening 12 is in communication with the accommodating cavity 11. An aerosol-generating substrate 300 includes a tube body 301 and a core body 302 located inside the tube body 301. The aerosol-generating substrate 300 can be accommodated in the accommodating cavity 11 through the opening 12. The electromagnetic heating coil 20 is adapted to conduct an electric current to generate a magnetic field, and the heat-generating body 10 is disposed in the magnetic field to generate heat. Since the core body 302 of the aerosol-generating substrate 300 is accommodated in the accommodating cavity 11, at this time, the heat-generating body 10 transfers heat to the core body 302 of the aerosol-generating substrate 300, and the temperature of the core body 302 of the aerosol-generating substrate 300 rises and the aerosol-generating substrate 300 is atomized to form an aerosol.

**[0036]** In an embodiment, in the axial direction, both ends of the heat-generating body 10 protrude from the electromagnetic heating coil 20, so that entire of the electromagnetic heating coil 20 in the axial direction is opposite to the heat-generating body 10, reducing waste of energy. Of course, in some other embodiments, the length of the heat-generating body 10 in the axial direction can be smaller than the length of the electromagnetic heating coil 20 in the axial direction, and at least one end of the heat-generating body 10 in the axial direction is located inside the electromagnetic heating coil 20.

**[0037]** In the axial direction, the size of the core body 302 of the aerosol-generating substrate 300 is smaller than the size of the accommodating cavity 11, so as to

ensure that the entire core body 302 is accommodated in the accommodating cavity 11, and the entire core body 302 is in contact with the heat-generating body 10 and is thereby heated and atomized by heat-generating body 10.

**[0038]** Specifically, when the aerosol-generating substrate 300 is accommodated in the accommodating cavity 11, the end surface of the core body 302 adjacent to the opening 12 is located in the electromagnetic heating coil 20. It should be understood that, in other embodiments, when the aerosol-generating substrate 300 is accommodated in the accommodating cavity 11, the end surface of the core body 302 adjacent to the opening 12 can be in alignment with the end surface of the electromagnetic heating coil 20, which is not limited herein.

**[0039]** The heating assembly 200 further includes a mounting frame 30. The electromagnetic heating coil 20 is helically wound around the mounting frame 30, and the heat-generating body 10 is disposed inside the mounting frame 30. In this way, the assembly and fixing between the heat-generating body 10 and the electromagnetic heating coil 20 are facilitated.

**[0040]** Referring to FIG. 4, the mounting frame 30 includes a positioning groove 31 extending helically about the axial direction. The electromagnetic heating coil 20 is embedded in the positioning groove 31. Specifically, the positioning groove 31 is a shape-matching groove that matches the electromagnetic heating coil 20 in shape, so that the electromagnetic heating coil 20 can be firmly fixed on the mounting frame 30.

**[0041]** Referring to FIG. 3, the heating assembly 200 further includes a magnetic shield 40, and the magnetic shield 40 is arranged outside the electromagnetic heating coil 20. On the one hand, the magnetic shield 40 can fix the electromagnetic heating coil 20, and on the other hand, the magnetic shield 40 can prevent the electromagnetic heating coil 20 from radiating electromagnetic waves to the outside. Specifically, the magnetic shield 40 is adhered and fixed to the electromagnetic heating coil 20.

**[0042]** Referring to FIG. 5, the electromagnetic heating coil 20 includes a plurality of coil turns 21 arranged in the axial direction. Specifically, the electromagnetic heating coil 20 is at least one wire bundle helically wound around the axial direction. Each wire bundle includes at least two strands of conducting wires, i.e., each wire bundle includes at least two conducting wires. Each wire bundle is formed by twisting the at least two conducting wires (two strands of conducting wires) together.

**[0043]** Referring to FIG. 6, in each turn 21, the at least one wire bundle has a first size H in the axial direction and a second size W in the radial direction. The first size H is greater than the second size W.

**[0044]** In the electromagnetic heating coil 20, the size of the at least one wire bundle in the radial direction is smaller than the size of the at least one wire bundle in the axial direction. Compared with prior art in which the electromagnetic heating coil composed of a wire bundle

with a circular cross-section, so that the radial size and the axial size of the wire bundle are equal to each other, the electromagnetic heating coil 20 has the following advantages:

1. The size of the electromagnetic heating coil 20 in the radial direction is reduced, so that the size of the electronic atomizing device 100 in the radial direction (e.g., a horizontal direction) is reduced, which is beneficial to the miniaturization of the electronic atomizing device 100.

2. On the condition that the diameter of the entire electromagnetic heating coil 20 is the same as that in the prior electromagnetic heating coil, the outer surface area of the electromagnetic heating coil 20 is relatively large, which is more conducive to the heat dissipation of the electromagnetic heating coil 20, thus reduces the temperature of the electromagnetic heating coil 20 and the loss of the electromagnetic heating coil 20, and improves the service life of the electromagnetic heating coil 20.

3. On the condition that the diameter of the entire electromagnetic heating coil 20 is the same as that in the prior electromagnetic heating coil, the area of the orthographic projection of the electromagnetic heating coil 20 on the outer surface of the heat-generating body 10 is relatively large, which can increase the heating area and improve the uniformity of the magnetic field.

**[0045]** Meanwhile, in the present embodiment, the electromagnetic heating coil 20 is formed by at least one wire bundle helically wound about the axial direction, and each wire bundle includes at least two conducting wires. Compared with prior art in which the electromagnetic heating coil is formed by helically wound flat metal strips, the AC resistance of the electromagnetic heating coil 20 under a high-frequency alternating current can be reduced, and the energy loss of the electronic atomizing device 100 can be reduced.

**[0046]** In an embodiment, the cross-sectional shape of the wire bundle is a rectangle. In the rectangle, the length of one pair of sides is greater than the length of the other pair of sides. When the cross-sectional shape of the wire bundle is a rectangle, the pair of longer sides is arranged along the axial direction, and the pair of shorter sides is arranged along the radial direction, which can ensure that the size of the wire bundle in the axial direction is larger than the size of the wire bundle in the radial direction, i.e., ensure that the first size H is larger than the second size W.

**[0047]** In another embodiment, the cross-sectional shape of the wire bundle is an ellipse. The ellipse has a major axis and a minor axis. When the cross-sectional shape of the wire bundle is an ellipse, the major axis is arranged along the axial direction, and the minor axis is arranged along the radial direction, which can ensure that the size of the wire bundle in the axial direction is

larger than the size of the wire bundle in the radial direction, i.e., ensure that the first size H is larger than the second size W.

**[0048]** It can be understood that, in some other embodiments, the cross-sectional shape of the wire bundle is not limited to the above-described rectangle and ellipse, and can be set as needed.

**[0049]** In an embodiment, the electromagnetic heating coil 20 is a wire bundle helically wound about the axial direction. Each wire bundle includes 15 to 300 conducting wires, and a diameter of each conducting wire is 0.02 mm to 0.5 mm. In an embodiment, each wire bundle includes 100 conducting wires, and the diameter of each conducting wire is 0.1 mm. In preparation of the electromagnetic heating coil 20, 100 conducting wires with a diameter of 0.1 mm are twisted together to form the wire bundle, then the wire bundle is compressed into the required cross-sectional shape by using a special equipment, and finally the wire bundle is helically wound about the axial direction to form the electromagnetic heating coil 20.

**[0050]** In another embodiment, the electromagnetic heating coil 20 includes a plurality of wire bundles helically wound about the axial direction. Each wire bundle includes 15 to 300 conducting wires, and a diameter of each conducting wire is 0.02 mm to 0.5 mm. In an embodiment, the electromagnetic heating coil 20 is formed by three wire bundles helically wound about the axial direction, each wire bundle includes 100 conducting wires, and the diameter of each conducting wire is 0.1 mm. In preparation of the electromagnetic heating coil 20, 100 conducting wires with a diameter of 0.1 mm are twisted together to form each wire bundle, then three wire bundles are twisted together, and the three wire bundles as a whole are compressed into the required cross-sectional shape by using a special equipment, and finally the three wire bundles that are compressed into the specific shape are helically wound about the axial direction to form the electromagnetic heating coil 20.

**[0051]** Of course, in some other embodiments, the number of the wire bundles in the electromagnetic heating coil 20, the number of conducting wires in each wire bundle, and the diameter of each conducting wire are not specifically limited. For example, in some embodiments, the electromagnetic heating coil 20 is formed by helically winding two wire bundles about the axial direction, each wire bundle includes 150 conducting wires, and the diameter of each conducting wire is 0.05 mm.

**[0052]** Referring still to FIG. 6, from one end to the other end in the axial direction, the electromagnetic heating coil 20 includes a first helical section 22 and a second helical section 23 sequentially connected to the first helical section 22. The pitch between any two adjacent turns 21 of the first helical section 22 is smaller than the pitch between any two adjacent turns 21 of the second helical section 23.

**[0053]** Referring to FIG. 2, taking the directions shown in FIG. 2 as an example, the axial direction of the elec-

tromagnetic heating coil 20 is the up-down direction in FIG. 2, and the radial direction is the left-right direction in FIG. 2.

**[0054]** The opening 12 is disposed at the upper end of the heat-generating body 10, and the aerosol-generating substrate 300 is inserted into the accommodating cavity 11 from the top to the bottom. At this time, the core body 302 of the aerosol-generating substrate 300 is accommodated in the accommodating cavity 11. The first helical section 22 is disposed on the upper end of the second helical section 23.

**[0055]** The pitch between any two adjacent turns 21 of the first helical section 22 is smaller than the pitch between any two adjacent turns 21 of the second helical section 23. Compared with the conventional electromagnetic heating coil having uniform pitch in the axial direction, when an electric current is conducted through the electromagnetic heating coil 20, the electromagnetic induction of the electromagnetic heating coil 20 changes, so that the temperature of the upper portion of the heat-generating body 10 opposite to the electromagnetic heating coil 20 is increased, and thus the temperature rising speed of the upper portion of the core body 302 accommodated in the accommodating cavity 11 is increased, thereby increasing the generation speed and volume of the aerosol generated by the electronic atomizing device 100 at the first puff, and improving the taste of the aerosol.

**[0056]** It should be noted that the pitch between the two adjacent turns 21 is the axial distance between the two adjacent turns 21.

**[0057]** Further, referring to FIG. 5 and FIG. 6, the pitch between every two adjacent turns 21 is constant in the first helical section 22, and the pitch between every two adjacent turns 21 is constant in the second helical section 23. In this way, the preparation of the electromagnetic heating coil 20 is facilitated. It should be understood that, in some other embodiments, the pitches between adjacent turns 21 in the first helical section 22 are unequal or partially unequal to each other, and the pitches between adjacent turns 21 in the second helical section 23 are unequal or partially unequal to each other.

**[0058]** In an embodiment, the number of turns 21 in the first helical section 22 is greater than or equal to the number of turns 21 in the second helical section 23, so as to further increase the temperature of the upper portion of the electric heat-generating body 10 in the axial direction. Of course, in some other embodiments, the number of turns 21 in the first helical section 22 can be smaller than the number of turns 21 in the second helical section 23.

**[0059]** The pitch between any two adjacent turns 21 of the first helical section 22 is in a range from 0 to 4 mm, and the pitch between any two adjacent turns 21 of the second helical section 23 is in a range from 0.5 mm to 8 mm. It should be noted that the pitch between two adjacent turns 21 of the first helical section 22 and the pitch between two adjacent turns 21 of the second helical section 23 are not specifically limited, and can be set as

needed.

**[0060]** In an embodiment, referring to FIG. 7, the electromagnetic heating coil 20 further includes a third helical section 24. The second helical section 23 is connected between the first helix section 22 and the third helical section 24. The pitch between any two adjacent turns 21 of the third helical section 24 is smaller than the pitch between any two adjacent turns 21 of the second helical section 23.

**[0061]** In this way, the pitch between any two adjacent turns 21 of the first helical section 22 and the pitch between any two adjacent turns 21 of the third helical section 24 are smaller than the pitch between any two adjacent turns 21 of the second helical section 23. Compared with the conventional electromagnetic heating coil having a uniform pitch, when an electric current is conducted through the electromagnetic heating coil 20, the electromagnetic induction of the electromagnetic heating coil 20 changes, so that the temperature of the upper portion of the heat-generating body 10 opposite to the electromagnetic heating coil 20 is increased, and the temperature difference among the upper, middle, and lower portions of the heat-generating body 10 in the axial direction is decreased, so that the attenuation of aerosol volume is slowed, and the uniformity of aerosol volume during the suction process is improved.

**[0062]** The pitch between every two adjacent turns 21 is constant in the third helical section 24 to facilitate the preparation of the electromagnetic heating coil 20. It should be understood that, in some other embodiments, the pitches between adjacent turns 21 in the third helical section 24 are unequal or partially equal to each other.

**[0063]** Further, the pitch between any two adjacent turns 21 of the first helical section 22 is smaller than or equal to the pitch between any two adjacent turns 21 of the third helical section 24. Of course, in some other embodiments, the pitch between any two adjacent turns 21 of the first helical section 22 can be greater than the pitch between any two adjacent turns 21 of the third helical section 24, or the pitch between any two adjacent turns 21 of the first helical section 22 is greater than the pitch between any two adjacent turns 21 of the third helical section 24.

**[0064]** In an embodiment, the number of turns 21 in the first helical section 22 is greater than or equal to the number of turns 21 in the third helical section 24, so as to further increase the temperature of the upper portion of the electric heat-generating body 10 in the axial direction. Of course, in other embodiments, the number of turns 21 in the first helical section 22 can be smaller than the number of turns 21 in the third helical section 24.

**[0065]** The pitch between any two adjacent turns 21 of the third helical section 24 is in a range from 0 to 4 mm. It should be noted that the pitch between two adjacent turns 21 of the third helical section 24 is not specifically limited, and can be set as needed.

**[0066]** In order to understand the present application more clearly, an embodiment and a comparative exam-

ple are given below for illustration.

**[0067]** Both the embodiment and the comparative example have the following parameters:

The size of the electromagnetic heating coil 20 in the axial direction is 18 mm. The length of the core body 302 is 20 mm. The core body 302 is entirely accommodated in the accommodating cavity 11 of the heat-generating body 10. The upper end surface of the core body 302 is 3 mm higher than the upper end surface of the electromagnetic heating coil 20. The axial size of the wire bundle for each turn 21 is 1.6 mm.

**[0068]** Referring to FIG. 8, the three circles in each electronic atomizing device 100 shown in FIG. 8 from top to bottom represent the high temperature field, the medium temperature field, and the low temperature field theoretically formed by the heat-generating body 20.

**[0069]** In the comparative example, the electromagnetic heating coil 20 is a uniformly wound coil, that is, the pitches between adjacent turns 21 of the electromagnetic heating coil 20 are equal to each other.

**[0070]** It can be seen from FIG. 8 that in the comparative example, the center of the theoretical high-temperature field of the heat-generating body 10 is at the center position of the electromagnetic heating coil 20 in the axial direction, that is, 6 mm lower than the upper end surface of the core body 302.

**[0071]** In the embodiment, the electromagnetic heating coil 20 includes the first helical section 22 and the second helical section 23, the axial size of the first helical section 22 is 8 mm, and the axial size of the second helical section 23 is 10 mm. The first helical section 22 includes five turns 21, and the pitch between every two adjacent turns 21 of the first helical section 22 in the axial direction is 0. The second helical section 23 includes 3 turns 21, and the pitch between every two adjacent turns 21 of the second helical section 23 in the axial direction is about 2 mm.

**[0072]** As can be seen from FIG. 8, in the embodiment, the center of the theoretical high temperature field of the heat-generating body 10 is above the center position of the electromagnetic heating coil 20 in the axial direction, that is, 3 mm lower than the upper end surface of the core body 302.

**[0073]** Through the above comparison, it can be seen that the temperature of the upper portion of the heat-generating body 10 can be increased by using the electromagnetic heating coil 20 provided in the embodiment of the present application, thereby ensuring the electronic atomizing device 100 generating an aerosol quickly at the first puff and having a good user experience.

**[0074]** Another embodiment of the present application further provides the heating assembly 200 included in the above-mentioned electronic atomizing device 100.

**[0075]** Another embodiment of the present application further provides the electromagnetic heating coil 20 included in the above heating assembly 200. The electromagnetic heating coil 20 includes a plurality of turns 21 arranged in the axial direction, and, from one end to the other end in the axial direction, includes a first helical

section 22 and a second helical section 23 sequentially connected one another. The pitch between any two adjacent turns 21 of the first helical section 22 is smaller than the pitch between any two adjacent turns 21 of the second helical section 23. In this way, compared to the conventional electromagnetic heating coil with a uniform pitch, when the magnetic field is induced by an electric current, the heat-generating body 10 in the magnetic field generates heat, and the temperature of the heat-generating body 10 opposite to the first helical section 22 is increased, so that end of the core body 302 of the aerosol-generating substrate 300 adjacent to the user suction end heats up faster to generate an aerosol quickly from the electronic atomizing device 100, thereby improving the user experience.

**[0076]** The technical features of the above-mentioned embodiments can be combined arbitrarily. In order to make the description concise, not all possible combinations of the technical features are described in the embodiments. However, as long as there is no contradiction in the combination of these technical features, the combinations should be considered as being disclosed in the present disclosure.

**[0077]** The above-described embodiments are only several implementations of the present disclosure, and the descriptions are relatively specific and detailed. It should be understood by those of ordinary skill in the art that various modifications and improvements can be made without departing from the present disclosure.

## Claims

1. An electromagnetic heating coil adapted to be used in an electronic atomizing device (100), **characterized in that** the electromagnetic heating coil (20) comprises a plurality of turns (21) arranged in an axial direction; wherein from one end to another end in the axial direction, the electromagnetic heating coil (20) comprises a first helical section (22) and a second helical section (23) sequentially connected to the first helical section (22); a pitch between any two adjacent turns (21) of the first helical section (22) is smaller than a pitch between any two adjacent turns (21) of the second helical section (23).
2. The electromagnetic heating coil according to claim 1, wherein the pitch between every two adjacent turns (21) is constant in the first helical section (22), and the pitch between every two adjacent turns (21) is constant in the second helical section (23).
3. The electromagnetic heating coil according to claim 1, wherein the pitch between any two adjacent turns (21) of the first helical section (22) is in a range from 0 to 4 mm, and the pitch between any two adjacent turns (21) of the second helical section (23) is in a

range from 0.5 mm to 8 mm.

4. The electromagnetic heating coil according to claim 1, wherein the number of turns (21) in the first helical section (22) is greater than or equal to the number of turns (21) in the second helical section (23).
5. The electromagnetic heating coil according to any one of claims 1 to 4, further comprising a third helical section (24), and the second helical section (23) is connected between the first helical section (22) and the third helical section (24); a pitch between any two adjacent turns (21) of the third helical section (24) is smaller than the pitch between any two adjacent turns (21) of the second helical section (23).
6. The electromagnetic heating coil according to claim 5, wherein the pitch between every two adjacent turns (21) is constant in the third helical section (24).
7. The electromagnetic heating coil according to claim 5, wherein the pitch between any two adjacent turns (21) of the first helical section (22) is smaller than or equal to the pitch between any two adjacent turns (21) of the third helical section (24).
8. The electromagnetic heating coil according to claim 5, wherein the number of turns (21) in the first helical section (22) is greater than or equal to the number of turns (21) in the third helical section (24).
9. The electromagnetic heating coil according to claim 5, wherein the pitch between any two adjacent turns (21) of the third helical section (24) is in a range from 0 to 4 mm.
10. The electromagnetic heating coil according to claim 1, wherein the electromagnetic heating coil (20) comprises at least one wire bundle helically wound about the axial direction, and each wire bundle comprises at least two conducting wires; the at least one wire bundle has a first size (H) in the axial direction and a second size (W) in a radial direction, and the first size (H) is greater than the second size (W).
11. A heating assembly, comprising:
  - a heat-generating body (10) provided with an accommodating cavity (11), the heat-generating body (10) defines an opening (12) that is in communication with the accommodating cavity (11), the opening (12) is disposed at one end of the accommodating cavity (11) in the extending direction of the axis;
  - an electromagnetic heating coil (20) according to any one of claims 1 to 10, sleeved outside the

heat-generating body (10);  
 wherein in the axial direction, the heat-generating body (10) is disposed on both sides of a central position of the electromagnetic heating coil (20); the first helical section (22) is disposed above the second helical section (23). 5

12. The heating assembly according to claim 11, wherein the electromagnetic heating coil (20) further comprises a third helical section (24), and the second helical section (23) is connected between the first helical section (22) and the third helical section (24); a pitch between any two adjacent turns (21) of the third helical section (24) is smaller than the pitch between any two adjacent turns (21) of the second helical section (23). 10 15

13. The heating assembly according to claim 11, further comprising a mounting frame (30), wherein the electromagnetic heating coil (20) is sleeved outside the mounting frame (30), and the heat-generating body (10) is disposed inside the mounting frame (30); the mounting frame (30) comprises a positioning groove (31) extending helically about the axial direction, and the electromagnetic heating coil (20) is embedded in the positioning groove (31). 20 25

14. The heating assembly according to claim 11, further comprising a magnetic shield (40), sleeved outside the electromagnetic heating coil (20). 30

15. An electronic atomizing device, comprising an aerosol-generating substrate (300) and the heating assembly (200) according to any one of claims 9 to 14, wherein the aerosol-generating substrate (300) comprises a tube body (301) and a core body (302) located inside the tube body (301), the aerosol-generating substrate (300) is adapted to be operably accommodated in the accommodating cavity (11) through the opening (12); in the axial direction, a size of the core body (302) of the aerosol-generating substrate (300) is smaller than a size of the accommodating cavity (11). 35 40 45 50 55

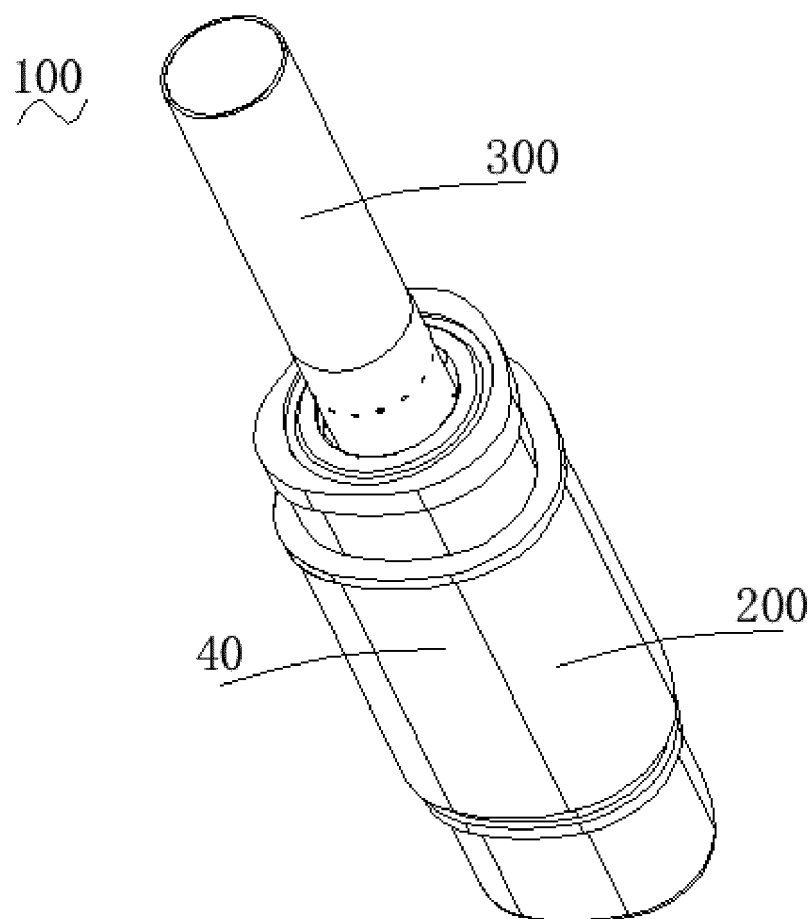


FIG. 1

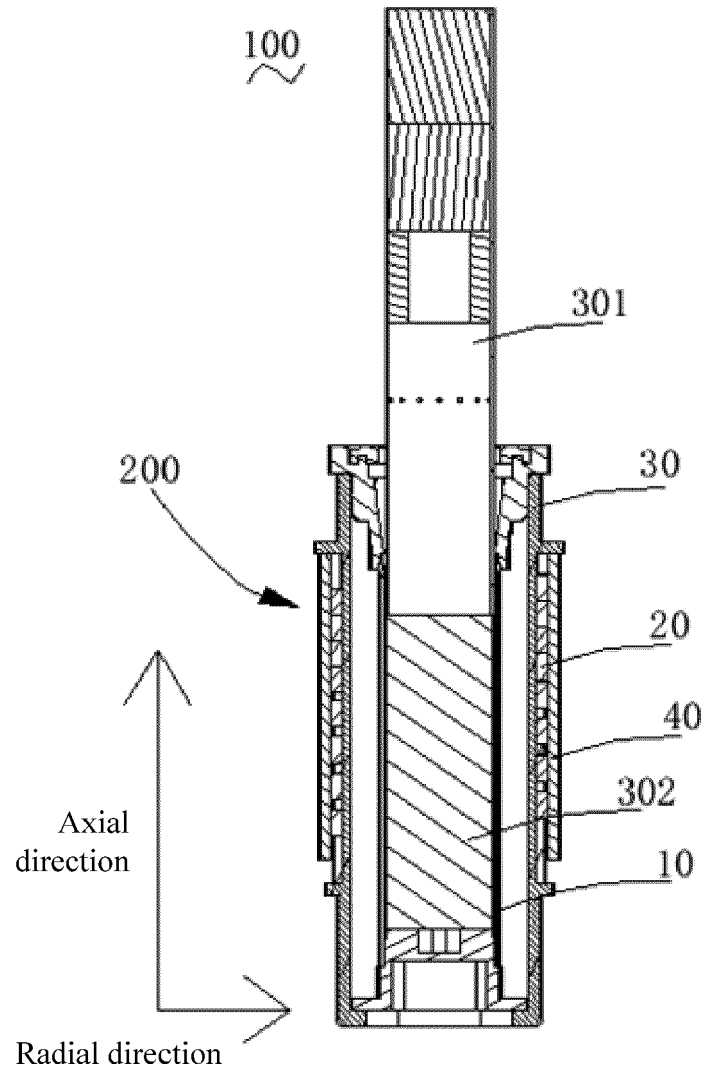


FIG. 2

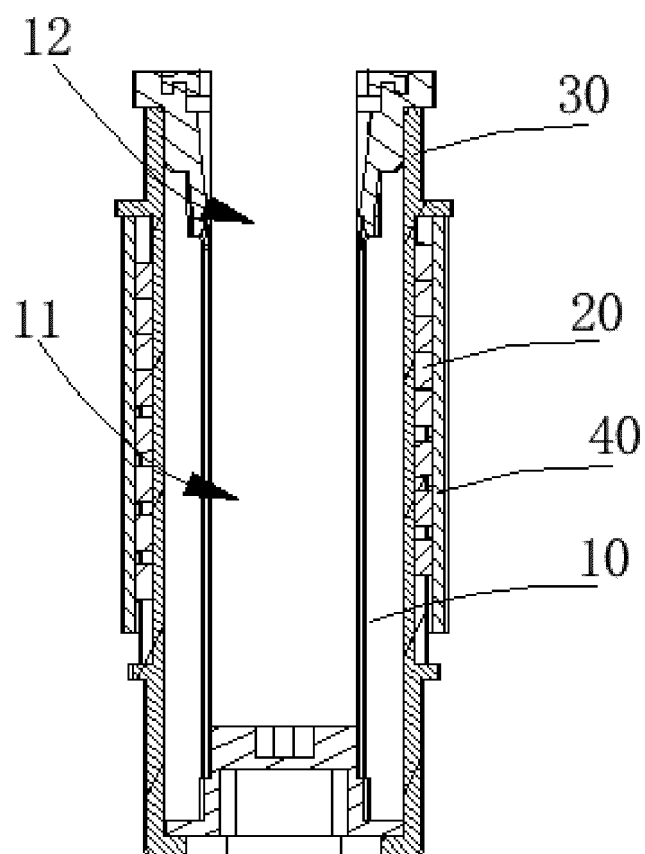


FIG. 3

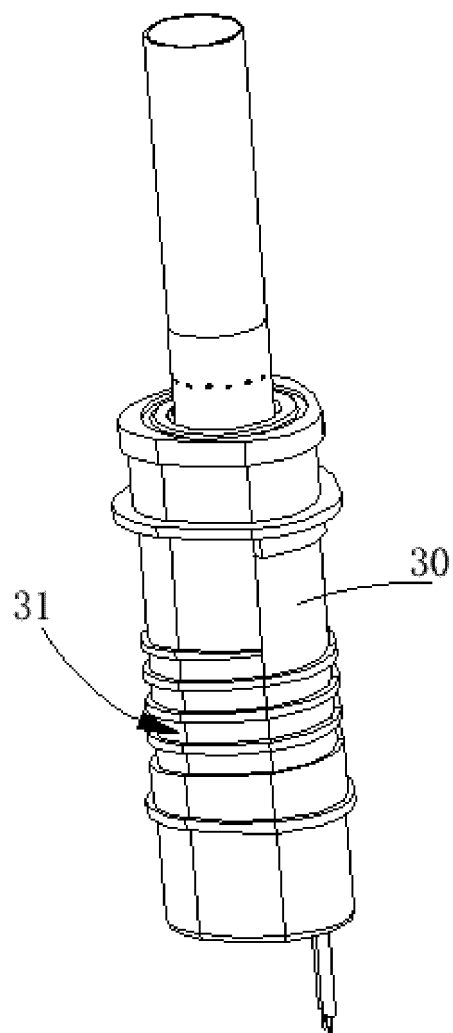


FIG. 4

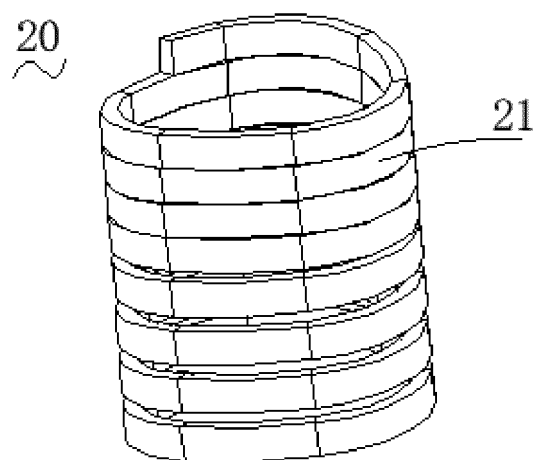


FIG. 5

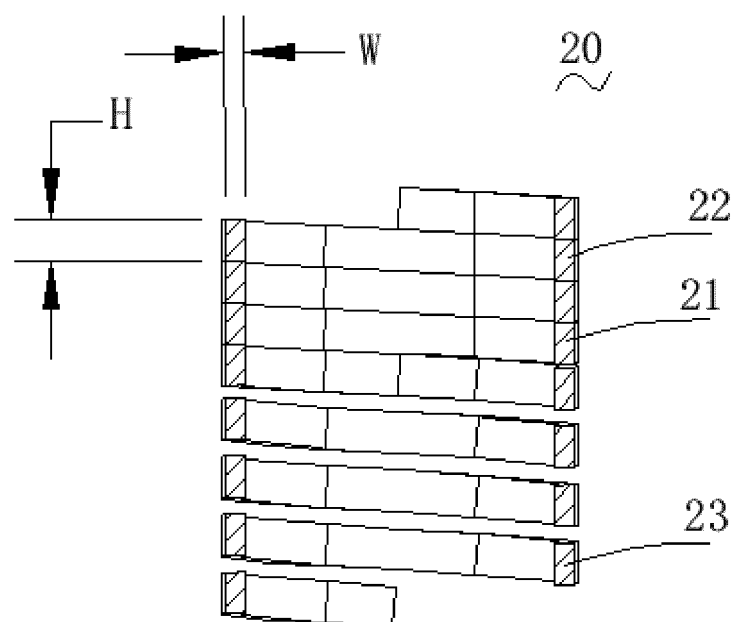


FIG. 6

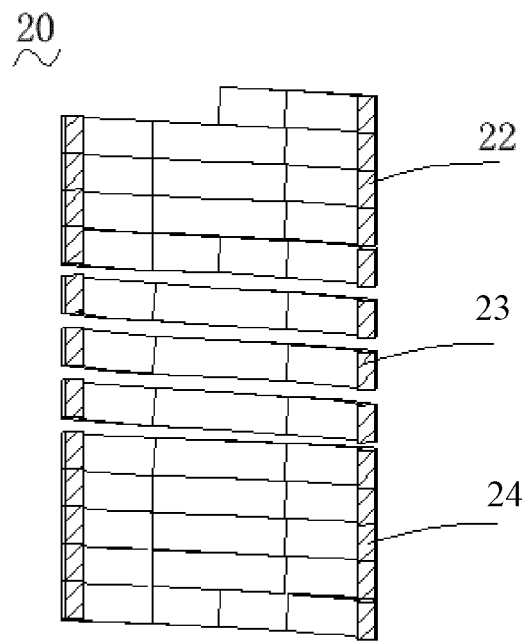


FIG. 7

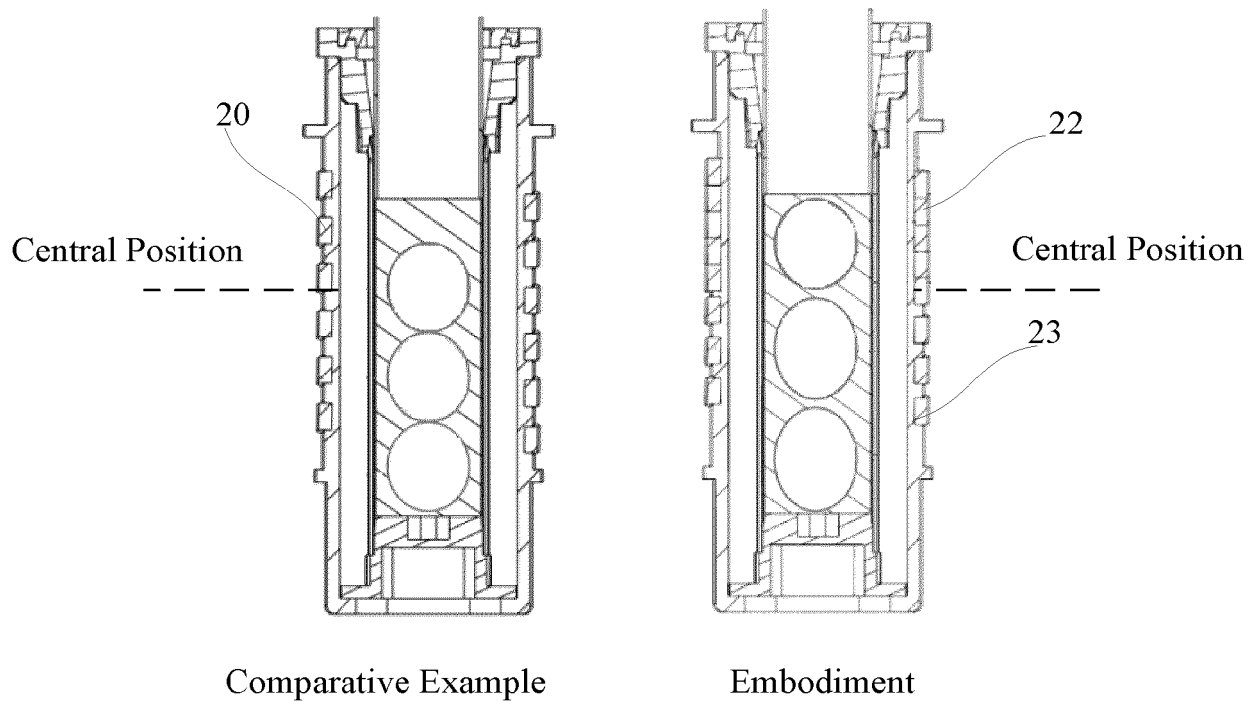


FIG. 8



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