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

(57) A heating assembly and an aerosol generating apparatus. The heating assembly (10) comprises a base body (11), an infrared layer (12), and a heating element (13); the base body (11) is used for accommodating an aerosol generating substrate; the infrared layer (12) is arranged on the surface of the base body (11) and/or the infrared layer (12), and is used for radiating infrared rays during heating, so as to heat and atomize the aerosol generating substrate; the heating element (13) is arranged on the base body (11) and is used for heating the infrared layer (12) in the process of being energized; and the heating element (13) has a resistance temperature coefficient characteristic and can be used as a temperature sensor. The heating assembly (10) is convenient to arrange, and is small in occupied space.

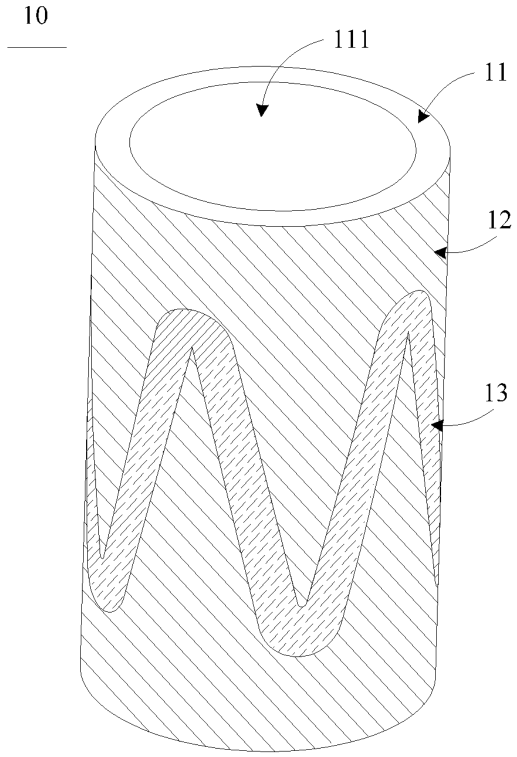

FIG. 1

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Description

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] The present application claims priority to Chinese Patent Application No. 202111421327.2, filed November 26, 2021, which is herein incorporated by reference in its entirety.

TECHNICAL FIELD

[0002] The present disclosure relates to the technical field of electronic atomizing devices, and in particular to a heating assembly and an aerosol generating device.

BACKGROUND

[0003] A heat-not-burning (HNB) aerosol generating device has been attracted more and more attention and favored by people, because the HNB aerosol generating device has advantages of safety, convenience, health, environmental protection, etc.

[0004] The existing HNB aerosol generating device generally includes a heating assembly and a power supply assembly. The heating assembly is configured to heat and atomize an aerosol generating substrate in response to electrifying the heating assembly. The power supply assembly is connected to the heating assembly and configured for supplying power to the heating assembly. In the heating process, it is often necessary to monitor the temperature of the heating assembly or the temperature of the aerosol generating substrate of the heating assembly in real time, so as to adjust a temperature field at any time to meet different temperature requirements. At present, an external temperature measuring element, such as a thermocouple temperature sensor or the like, is generally added to measure the temperature of the heating assembly in real time, so as to adjust a heating temperature at any time.

[0005] However, a separate temperature measuring sensor or a separate temperature measuring element is added to measure temperature, which may not only occupy a large space, but also be inconvenient to dispose.

SUMMARY OF THE DISCLOSURE

[0006] The present disclosure provides a heating assembly and an aerosol generating device. The heating assembly may solve an existing problem that adding a separate temperature measuring sensor or a separate temperature measuring element to measure temperature may occupy a large space and be inconvenient to dispose.

[0007] In a first aspect, the present disclosure provides a heating assembly. The heating assembly includes a base body, an infrared layer, and a heating element. The base body is configured for accommodating the aerosol generating substrate. The infrared layer is disposed on the surface of the base body, the infrared layer is configured to radiate infrared rays in response to heating the infrared layer, so as to heat and atomize the aerosol generating substrate. The heating element is disposed on the surface of the base body and/or the surface of the infrared layer, the heating element is configured to heat the infrared layer in response to electrifying the heating element, and the heating element has a temperature coefficient of resistance (TCR) characteristic and is configured as a temperature sensor.

[0008] In some embodiments, the heating element is a heating layer, and the heating layer is disposed on the surface of the infrared layer away from the base body.

[0009] In some embodiments, the heating element is disposed on the surface of the base body and spaced apart from the infrared layer.

[0010] In some embodiments, the heating element is a heating layer, and the heating layer is disposed on the surface of the base body and located between the base body and the infrared layer.

[0011] In a second aspect, the present disclosure provides a heating assembly including a base body, an infrared layer, a heating element, and a temperature measuring layer. The base body is configured for accommodating the aerosol generating substrate. The infrared layer is disposed on the surface of the base body, the infrared layer is configured to radiate infrared rays in response to heating the infrared layer, so as to heat and atomize the aerosol generating substrate. The heating element is disposed on the base body, and configured for heating the infrared layer in response to electrifying the heating element. The temperature measuring layer is disposed on the surface of the base body and/or the surface of the infrared layer, and spaced apart from the heating element. The temperature measuring layer has a TCR characteristic.

[0012] In some embodiments, the temperature measuring layer is disposed on the surface of the base body, and the temperature measuring layer and the infrared layer are located on the same surface of the base body and are spaced apart from each other.

[0013] In some embodiments, the temperature measuring layer is disposed on the surface of the infrared layer away from the base body, and the temperature measuring layer is spaced apart from the heating element.

[0014] In some embodiments, the temperature measuring layer is disposed around the base body along the circumferential direction of the base body.

[0015] In some embodiments, the temperature measuring layer is located on an end of the base body.

[0016] In some embodiments, the base body is a hollow column, the infrared layer is disposed on the outer surface of the hollow column, and the heating element is a heating layer disposed on the surface of the infrared layer away from the base body.

[0017] In some embodiments, the base body is a hollow column, the infrared layer is disposed on the inner surface of the hollow column, and the heating element is a heating layer disposed on the surface of the infrared layer away from the base body.

[0018] In some embodiments, the heating layer is located in the middle of the base body and is distributed in a wave shape along the circumferential direction of the base body.

[0019] In some embodiments, the base body is a quartz.

[0020] In some embodiments, the infrared layer, the heating element, and the temperature measuring layer are disposed on the outer surface of the base body by silk screen printing or coating, and an area of the temperature measuring layer is smaller than that of the infrared layer.

[0021] In a third aspect, the present disclosure provides an aerosol generating device including a heating assembly of any one of above embodiments, a power supply assembly, and a controller. The heating assembly is configured for heating and atomizing the aerosol generating substrate in response to electrifying the heating assembly. The power supply assembly is configured for being connected to the heating assembly, and configured for supplying power to the heating assembly. The controller is configured for controlling the power supply assembly to supply power to the heating assembly, detect the resistance value of the heating element or the resistance value of the temperature measuring layer in real time, and monitor the temperature of the heating assembly according to the resistance value.

[0022] In the heating assembly and the aerosol generating device provided by the present disclosure, the base body is provided to accommodate the aerosol generating substrate. The infrared layer is disposed on the surface of the base body to radiate the infrared rays in response to heating the infrared layer, so that the radiated infrared rays heat and atomize the aerosol generating substrate, thereby improving the heating efficiency. The heating uniformity is better. Furthermore, by disposing the heating element on the base body and/or the infrared layer, the infrared layer is heated in response to electrifying the heating element, so that the infrared layer radiates the infrared rays. Moreover, the heating element has the TCR characteristic and may be used as a temperature sensor, so that the heating assembly may monitor the temperature value of the heating assembly by detecting the resistance value of the heating element. Compared with the related art, in the present disclosure, the heating element is in the form of a film. The heating element may be directly deposited on the surface of the base body and/or the surface of the infrared layer, without the need to fix the heating element on the surface of the base body and/or the surface of the infrared layer by defining an installing groove or disposing a fixed element such as a screw or the like on the surface of the base body and/or the surface of the infrared layer. Thus, the heating element is not only convenient to dispose, but also occupies less space. In addition, according to actual needs, the heating element may cover some specific positions of the base body and/or some specific positions of the infrared layer, or cover a larger region of the surface of the base body and/or a larger region of the surface of the infrared layer. Thus, the temperature of a specific region on the surface of the base body and/or the surface of the infrared layer may be measured, and the accuracy of the temperature measurement is high. The temperature may be measured for most regions of the base body and/or most regions of the infrared layer, effectively expanding the temperature measurement range of the heating assembly.

BRIEF DESCRIPTION OF THE DRAWINGS

[0023]

FIG. 1 is a structural schematic view of a heating assembly in a first embodiment of the present disclosure.

FIG. 2 is a structural sketch of the heating assembly of FIG. 1.

FIG. 3 is a structural schematic view of the heating assembly in a second embodiment of the present disclosure.

FIG. 4 is a cross-sectional structural schematic view of the heating assembly of FIG. 3 in an A-A direction.

FIG. 5 is a structural schematic view of the heating assembly in a third embodiment of the present disclosure.

FIG. 6 is a structural sketch of the heating assembly of FIG. 5.

FIG. 7 is a structural schematic view of the heating assembly in a fourth embodiment of the present disclosure.

FIG. 8 is a structural sketch of the heating assembly of FIG. 7.

FIG. 9 is a structural schematic view of an aerosol generating device in an embodiment of the present disclosure.

DETAILED DESCRIPTION

[0024] The technical solutions in some embodiments of the present disclosure may be clearly and completely described in conjunction with accompanying drawings in some embodiments of the present disclosure. Obviously, the described embodiments are only a part of the embodiments of the present disclosure, and not all embodiments. Based on the embodiments in the present disclosure, all other embodiments obtained by those of ordinary skill in the art without creative effort are within the scope of the present disclosure.

[0025] The terms "first", "second", and "third" in the present disclosure are only configured to describe purposes and cannot be understood as indicating or implying relative importance or implicit indicating the quantity of technical features indicated. Therefore, features limited to "first", "second", and "third" may explicitly or implicitly include at least one of these features. In the description of the present disclosure, "multiple" means at least two, such as two, three, etc., unless otherwise expressly and specifically qualified. All directional indications (such as up, down, left, right, front, rear, or the like) in some embodiments of the present disclosure are only configured to explain a relative position relationship between components in a specific posture (as shown in the accompanying drawings), a motion situation between the components in the specific posture (as shown in the accompanying drawings), or the like. If the specific posture is changed, the directional indication is also changed accordingly. In addition, the terms "including", "comprising", and "having", as well as any variations of the terms "including", "comprising", and "having", are intended to cover non-exclusive inclusions. For example, a process, method, system, product, or device that includes a series of operations or units is not limited to the listed operations or units, but optionally includes operations or units that are not listed, or optionally includes other operations or units that are inherent to these processes, methods, products, or devices.

[0026] The reference to "embodiment" in the present disclosure means that, specific features, structures, or characteristics described in conjunction with some embodiments may be included in at least one embodiment of the present disclosure. The phrase appearing in various positions in the specification does not necessarily refer to the same embodiment, nor is it an independent or alternative embodiment that is mutually exclusive with other embodiments. Those of ordinary skill in the art explicitly and implicitly understand that the embodiments described in the present disclosure may be combined with other embodiments.

[0027] The present disclosure may be explained in detail by combining the accompanying drawings and some embodiments.

[0028] As illustrated in FIG. 1 and FIG. 2, FIG. 1 is a structural schematic view of a heating assembly in a first embodiment of the present disclosure, and FIG. 2 is a structural sketch of the heating assembly of FIG. 1. In the present embodiment, a heating assembly 10 is provided, and the heating assembly 10 is configured for heating and atomizing an aerosol generating substrate to form aerosol in response to electrifying the heating assembly 10. The heating assembly 10 may be used in different fields, such as an electronic atomizing field or other fields. The heating assembly 10 includes a base body 11, an infrared layer 12, and a heating element 13. The heating element 13 is configured to generate heat in response to electrifying the heating assembly 10.

[0029] The base body 11 may be in a shape of a hollow cylinder, and a hollow structure of the base body 11 forms an accommodating cavity 111, and the accommodating cavity 111 is configured for accommodating the aerosol generating substrate. The aerosol generating substrate may be a plant-grass-like substrate or a paste-like substrate, etc. The base body 11 is made of insulating material, and the base body 11 may be a high temperature resistant insulating material, such as a quartz glass, a ceramic, or mica, etc., so as to prevent short circuit between two electrodes. In an embodiment, the base body 11 may be a transparent quartz. In an embodiment, the base body 11 may also be made of a conductive material, and in this case an insulating layer may be coated on the surface of the base body 11. In an embodiment, the base body 11 is a cylindrical ceramic tube. In the following embodiments, the inner surface of the base body 11 refers to an inner wall surface of the accommodating cavity 111, and the outer surface of the base body 11 refers to an outer wall surface of the accommodating cavity 111.

[0030] The infrared layer 12 is disposed on the surface of the base body 11 and configured for radiating infrared rays in response to heating the infrared layer 12, so as to heat and atomize the aerosol generating substrate. In some embodiments, the infrared layer 12 may be formed on the inner surface or the outer surface of the base body 11 by means of silk screen printing, sputtering, coating, printing, or the like. The infrared rays radiated from the infrared layer 12 are configured to heat the aerosol generating substrate, so that the heating efficiency is high, and the aerosol generating substrate is heat more uniformly. In an embodiment, the infrared layer 12 may be an infrared heating film, such as an infrared ceramic coating. The thickness and the area of the infrared heating film are not limited, and may be selected according to needs.

[0031] The infrared layer 12 may be a metal layer, a conductive ceramic layer, or a conductive carbon layer. The shape of the infrared layer 12 may be a continuous film, a porous mesh, or a strip. The material, the shape, and the size of the infrared layer 12 may be set according to needs. In an embodiment, in response to electrifying the heating assembly 10, the infrared layer 12 radiates the infrared rays to heat the aerosol generating substrate in the accommodating cavity 111. The wavelength of infrared heating ranges from 2.5 μm to 20 μm. According to characteristics of heating the aerosol generating substrate, a heating temperature usually needs to be greater than or equal to 350 °C, and an energy radiation extreme value is mainly in a band that ranges from 3 μm to 5 μm.

[0032] In an embodiment, as illustrated in FIG. 1, the infrared layer 12 is disposed on the outer surface of the base body 11, and the infrared layer 12 is disposed on entire outer surface of the base body 11, so as to achieve uniform heating and avoid heat generated by the heating element 13 being conducted by the base body 11. Thus, it avoids heat loss, and avoids causing a large error in a temperature measurement result. Furthermore, it avoids scratching of the infrared layer 12 by the aerosol generating substrate. The following embodiments all take the infrared layer 12 being disposed on the outer surface of the base body 11 as an example. In other embodiments, as illustrated in FIG. 3 and FIG. 4, FIG. 3 is a structural schematic view of the heating assembly in a second embodiment of the present disclosure, and FIG. 4 is a cross-sectional structural schematic view of the heating assembly of FIG. 3 in an A-A direction. The infrared layer 12 may also be formed on the inner surface of the base body 11, which is not limited in the present disclosure.

[0033] The heating element 13 is disposed on the surface of the base body 11 and/or the surface of the infrared layer 12 and configured for heating the infrared layer 12 in response to electrifying the heating assembly 10. In the present embodiment, the infrared layer 12 itself does not generate heat. After the heating element 13 transfers heat to the infrared layer 12 in response to electrifying the heating assembly 10, the temperature of the infrared layer 12 itself changes. In some embodiments, the heating element 13 may also be formed by silk screen printing, sputtering, coating, printing, or the like. In an embodiment, the heating element 13 may be a heating film. In an embodiment, the heating element 13 may be a conductive film, such as a copper film or an aluminum film, etc.

[0034] The heating element 13 has a TCR characteristic and may be used as a temperature sensor. That is, the resistance value of the heating element 13 has a monotonous one-to-one correspondence with the temperature value of the heating element 13. For example, the resistance value of the heating element 13 increases as the temperature value of the heating element 13 increases. Alternatively, the resistance value of the heating element 13 reduces as the temperature value of the heating element 13 increases. Thus, the heating assembly 10 may monitor the temperature value of the heating assembly 10 by detecting the resistance value of the heating element 13, thereby adjusting the temperature field of the heating assembly 10 to achieve the best effect of the taste of smoking. The additional temperature measuring element, such as the temperature measuring sensor, is required in a related art. Compared with the related art, in the present disclosure, the heating element 13 is in the form of a film. The heating element 13 may be directly deposited on the surface of the base body 11 and/or the surface of the infrared layer 12, without the need to fix the heating element 13 on the surface of the base body 11 and/or the surface of the infrared layer 12 by defining an installing groove or disposing a fixed element such as a screw or the like on the surface of the base body 11 and/or the surface of the infrared layer 12. Thus, the heating element 13 is not only convenient to dispose, but also occupies less space. In addition, according to actual needs, the heating element 13 may cover some specific positions of the base body 11 and/or some specific positions of the infrared layer 12, or cover a larger region of the surface of the base body 11 and/or a larger region of the surface of the infrared layer 12. Thus, the temperature of a specific region on the surface of the base body 11 and/or the surface of the infrared layer 12 may be measured, and the accuracy of the temperature measurement is high. The temperature may be measured for most regions of the base body 11 and/or most regions of the infrared layer 12, effectively expanding the temperature measurement range of the heating assembly 10.

[0035] In an embodiment, the heating element 13 may at least cover a region of the heating assembly 10 with the highest temperature, so as to avoid the problem that a local temperature is too high to affect the taste of heating the aerosol generating substrate. In an embodiment, in response to the region of the heating assembly 10 with the highest temperature corresponding to one region of the base body 11, the heating element 13 at least covers this region of the base body 11. In response to the region of the heating assembly 10 with the highest temperature corresponding to one position of the infrared layer 12, the heating element 13 at least covers this position of the infrared layer 12.

[0036] As illustrated in FIG. 1, the heating element 13 may be disposed in a circle along the circumferential direction of the base body 11. In the present embodiment, two electrodes may be respectively disposed at two preset positions of the heating element 13, and the two electrodes are respectively configured to connect to a positive electrode wire and a negative electrode wire, so as to detect the resistance value of the heating element 13. In other embodiments, the heating element 13 may also be in the shape of an arc with a notch along the circumferential direction of the base body 11. The two ends where the notch of the heating element 13 is located may be formed as two electrodes, to respectively connect to the positive electrode wire and the negative electrode wire, which is not limited in the present disclosure.

[0037] In an embodiment, the heating element 13 may be distributed in a wave shape manner along the circumferential direction of the base body 11, so as to cover different regions of the heating assembly 10 as much as possible, thereby sensing the temperatures of different positions of the heating assembly 10. Thus, the temperatures of the different regions of the heating assembly 10 may be monitored. In an embodiment, in response to the base body 11 being tubular, the heating element 13 is disposed in the middle of the base body 11 and undulates along a length direction of the base body 11, thereby covering different regions along the length direction of the base body 11. In other embodiments, the heating element 13 may also be distributed in a linear shape manner, a bent shape manner, a point shape manner or the like along the circumferential direction of the base body 11, which is not limited in the present disclosure. The specific distribution positions of the heating element 13 may be selected according to actual needs, as long as the temperature value of the heating assembly 10 may be detected in real time.

[0038] In an embodiment, the infrared layer 12 and the heating element 13 may be disposed on the same surface of the base body 11, or on different surfaces of the base body 11. For example, one of the infrared layer 12 and the heating element 13 is disposed on the inner surface of the base body 11, and the other of the infrared layer 12 and the heating element 13 is disposed on the outer surface of the base body 11. The heating element 13 may only be disposed on the surface of the infrared layer 12, may only be disposed on the surface of the base body 11, or may be simultaneously disposed on the surface of the infrared layer 12 and the surface of the base body 11. In an embodiment, a part of the heating element 13 is disposed on the surface of infrared layer 12, another part of the heating element 13 is disposed on the surface of the base body 11. The heating element 13 may be disposed on the surface of the infrared layer 12 away from the base body 11, or on the surface of the infrared layer 12 close to the base body 11.

[0039] In an embodiment, as illustrated in FIG. 1 and FIG. 4, the heating element 13 is only disposed on the surface of the infrared layer 12 away from the base body 11. The infrared layer 12 may cover the entire surface of the base body 11. In response to the infrared layer 12 being disposed on the outer surface of the base body 11, the specific structure of the heating assembly 10 is as shown in FIG. 1. In response to the infrared layer 12 being disposed on the inner surface of the base body 11, the specific structure of the heating assembly 10 is shown in FIG. 3 and FIG. 4. In the present embodiment, after the heating element 13 is electrified, the temperature of the heating element 13 increases continuously, and the resistance value of the heating element 13 changes as the change of the heating element 13 own temperature. Thus, the temperature value of the heating assembly 10 may be detected by detecting the resistance value of the heating element 13 itself, thereby adjusting the temperature field of the heating assembly 10 to achieve the best effect of the taste of smoking.

[0040] In the present embodiment, the infrared layer 12 itself has a heat conduction function, a part where the infrared layer 12 does not overlap with the heating element 13 may conduct heat. Therefore, an area of the heating element 13 may be close to or smaller than an area of the infrared layer 12.

[0041] In the present embodiment, the heating element 13 may be located in the middle of the base body 11 along its axial direction, and distributed in the wave shape manner around the outer surface of the base body 11.

[0042] In another embodiment, the heating element 13 is only disposed on the surface of the base body 11, and the heating element 13 and the infrared layer 12 are on the same plane, so that after the heating element 13 is electrified and generates heat, the heat is conducted or transferred to the base body 11, and then conducted or transferred to the infrared layer 12 through the base body 11. Thus, the infrared layer 12 is heated and radiates the infrared rays. In the present embodiment, the heating element 13 may be spaced apart from the infrared layer 12. Alternatively, the heating element 13 is located between the base body 11 and the infrared layer 12, which is not limited in the present disclosure.

[0043] In other embodiments, both the heating element 13 and the infrared layer 12 are disposed on the base body 11 and located on different surfaces of the base body 11. In an embodiment, the heating element 13 is disposed on the inner surface of the base body 11, and the infrared layer 12 is disposed on the outer surface of the base body 11. After the heating element 13 is electrified and generates heat, the heat is conducted or transferred to the base body 11, and the heat of the base body 11 is further conducted or transferred to the infrared layer 12, so that the infrared layer 12 is heated to radiate the infrared rays. Alternatively, the heating element 13 is disposed on the outer surface of the base body 11, and the infrared layer 12 is disposed on the inner surface of the base body 11.

[0044] In the heating assembly 10 provided in the present embodiment, the base body 11 is provided to accommodate the aerosol generating substrate. The infrared layer 12 is disposed on the surface of the base body 11 to radiate the infrared rays in response to heating the infrared layer 12, so that the radiated infrared rays heat and atomize the aerosol generating substrate, thereby improving the heating efficiency. The heating uniformity is better. Furthermore, by disposing the heating element 13 on the base body 11 and/or the infrared layer 12, the infrared layer 12 is heated in response to electrifying the heating element 13, so that the infrared layer 12 radiates the infrared rays. Moreover, the heating element 13 has the TCR characteristic, so that the heating assembly 10 may monitor the temperature value of the heating assembly 10 by detecting the resistance value of the heating element 13. Compared with the related arts, the heating element 13 is not only convenient to dispose, but also occupies less space. In addition, the heating element 13 may cover some specific positions of the base body 11 and/or some specific positions of the infrared layer 12, or cover the larger region of the surface of the base body 11 and/or the larger region of the surface of the infrared layer 12 according to actual needs. Thus, the temperature of the specific region on the surface of the base body 11 and/or the surface of the infrared layer 12 may be measured, and the accuracy of the temperature measurement is high. The temperature may be measured for most regions of the base body 11 and/or most regions of the infrared layer 12, effectively expanding the temperature measurement range of the heating assembly 10.

[0045] As illustrated in FIG. 5 and FIG. 6, FIG. 5 is a structural schematic view of the heating assembly in a third embodiment of the present disclosure, and FIG. 6 is a structural sketch of the heating assembly of FIG. 5. In the present embodiment, another heating assembly 10 is provided. The difference between the heating assembly 10 in the third embodiment and the heating assembly 10 in the first embodiment is that the heating assembly 10 in the third embodiment further includes a temperature measuring layer 14. The temperature measuring layer 14 has the TCR characteristic. That is, the resistance value of the temperature measuring layer 14 has a monotonous one-to-one correspondence with the temperature value of the temperature measuring layer

14. For example, the resistance value of the temperature measuring layer 14 increases as the temperature value of the temperature measuring layer 14 increases. Alternatively, the resistance value of the temperature measuring layer 14 reduces as the temperature value of the temperature measuring layer 14 increases. In the present embodiment, the heating assembly 10 may monitor the temperature value of the heating assembly 10 by detecting the resistance value of the temperature measuring layer 14, thereby adjusting the temperature field of the heating assembly 10 to achieve the best effect of the taste of smoking. The additional temperature measuring element, such as the temperature measuring sensor or the like, is required in the related art. Compared with the related art, in the present disclosure, the temperature measuring layer 14 is in the form of a film. The temperature measuring layer 14 may be directly deposited on the surface of the base body 11 and/or the surface of the infrared layer 12, without the need to fix the temperature measuring layer 14 on the surface of the base body 11 and/or the surface of the infrared layer 12 by defining the installing groove or disposing the fixed element such as the screw or the like on the surface of the base body 11 and/or the surface of the infrared layer 12. Thus, the temperature measuring layer 14 is not only convenient to dispose, but also occupies less space.

[0046] In an embodiment, the resistance value of the heating element 13 and the resistance value of the temperature measuring layer 14 may also be detected simultaneously to monitor the temperature value of the heating assembly 10, so as to improve the accuracy of the temperature monitoring result. In the present embodiment, the heating element 13 may not have the TCR characteristic, which is not limited in the present disclosure.

[0047] The temperature measuring layer 14 may be formed on the surface of the base body 11 and/or the surface of the infrared layer 12 by means of screen printing, sputtering, coating, printing, or the like. The temperature measuring layer 14 is spaced apart from the heating element 13. According to actual needs, the temperature measuring layer 14 may cover some specific positions of the base body 11 and/or some specific positions of the infrared layer 12, or cover the larger region of the surface of the base body 11 and/or the larger region of the surface of the infrared layer 12. Thus, the temperature of the specific region on the surface of the base body 11 and/or the surface of the infrared layer 12 may be measured, and the accuracy of the temperature measurement is high. The temperature may be measured for most regions of the base body 11 and/or most regions of the infrared layer 12, effectively expanding the temperature measurement range of the heating assembly 10.

[0048] In an embodiment, the temperature measuring layer 14 may at least cover the region of the heating assembly 10 with the highest temperature, so as to avoid the problem that the local temperature is too high to affect the taste of heating the aerosol generating substrate. In an embodiment, in response to the region of the heating assembly 10 with the highest temperature corresponding to one region of the base body 11, the temperature measuring layer 14 at least covers this region of the base body 11. In response to the region of the heating assembly 10 with the highest temperature corresponding to one position of the infrared layer 12, the temperature measuring layer 14 at least covers this position of the infrared layer 12.

[0049] In an embodiment, a square resistance of the temperature measuring layer 14 ranges from 1 Ω/□ to 5 Ω/□, and a resistance temperature coefficient of the temperature measuring layer 14 ranges from 300 ppm/°C to 3500 ppm/°C. In an embodiment, the square resistance of the temperature measuring layer 14 ranges from 2 Ω/□ to 4 Ω/□, and the resistance temperature coefficient of the temperature measuring layer 14 ranges from 700 ppm/°C to 2000 ppm/°C.

[0050] The resistance of the temperature measuring layer 14 is relatively large, and the temperature measuring layer 14 only achieves the temperature measuring function. Thus, in an embodiment, an area of the temperature measuring layer 14 may be smaller than the area of the infrared layer 12, which may not only reduce energy consumption, but also does not affect the heating effect of the infrared layer 12. Furthermore, the overall temperature field of the infrared layer 12 may be consistent. In an embodiment, a ratio of the area of the temperature measuring layer 14 to the area of the infrared layer 12 may range from 1:5 to 1:10.

[0051] In an embodiment, resistance paste for preparing the temperature measuring layer 14 includes an organic carrier, an inorganic binder, and a conductive agent. In terms of the number of mass parts, the number of parts of the organic carrier ranges from 10 parts to 20 parts, and the number of parts of the inorganic binder ranges from 30 parts to 45 parts, the number of parts of the conductive agent ranges from 30 parts to 50 parts. The inorganic binder includes glass powder, and the conductive agent is at least one selected from silver and palladium.

[0052] In an embodiment, the organic carrier is at least one selected from a terpineol, an ethyl cellulose, a butyl carbitol, a polyvinyl butyral, a tributyl citrate and a polyamide wax.

[0053] In an embodiment, the inorganic binder includes the glass powder with a melting point of 700 °C to 780 °C.

[0054] As illustrated in FIG. 5, the temperature measuring layer 14 may be disposed in a circle along the circumferential direction of the base body 11. In the present embodiment, two electrodes may be respectively disposed at two preset positions of the temperature measuring layer 14, and the two electrodes are respectively configured to connect to the positive electrode wire and the negative electrode wire, so as to detect the resistance value of the temperature measuring layer 14. In other embodiments, the temperature measuring layer 14 may also be in the shape of the arc with the notch along the circumferential direction of the base body 11. The two ends where the notch of the temperature measuring layer 14 is located may be formed as two electrodes, to respectively connect to the positive electrode wire and the negative electrode wire, which is not limited in the present disclosure.

[0055] In an embodiment, the temperature measuring layer 14 may be distributed in the linear shape manner along the circumferential direction of the base body 11, so as to detect the temperature of the specific region of the heating assembly 10. In other embodiments, the temperature measuring layer 14 may also be distributed in the linear shape manner, a connected "Z" shape manner, a U shape manner, the bent shape manner, the point shape manner, or the like along the circumferential direction of the base body 11.

[0056] In an embodiment, the materials of the temperature measuring layer 14 and the heating element 13 may be the same. A power of the temperature measuring layer 14 is greater than a power of the heating element 13.

[0057] In an embodiment, the temperature measuring layer 14 and the infrared layer 12 may be disposed on the same surface of the base body 11, or on different surfaces of the base body 11. In an embodiment, one of the temperature measuring layer 14 and the infrared layer 12 is disposed on the inner surface of the base body 11, and the other of the temperature measuring layer 14 and the infrared layer 12 is disposed on the outer surface of the base body 11. The temperature measuring layer 14 may only be disposed on the surface of the infrared layer 12, may only be disposed on the surface of the base body 11, or may be simultaneously disposed on the surface of the infrared layer 12 and the surface of the base body 11. In an embodiment, a part of the temperature measuring layer 14 is disposed on the surface of the infrared layer 12, and another part of the temperature measuring layer 14 is provided on the surface of the base body 11. The temperature measuring layer 14 may be disposed on the surface of the infrared layer 12 away from the base body 11, or on the surface of the infrared layer 12 close to the base body 11.

[0058] In a first embodiment, as illustrated in FIG. 5 and FIG. 6, the infrared layer 12 is disposed on the outer surface of the base body 11, and the temperature measuring layer 14 is only disposed on the surface of the infrared layer 12 away from the base body 11. After the heating element 13 is electrified, the temperature of the heating element 13 increases, and the heat generated by the heating element 13 is conducted or transferred to the infrared layer 12, and then conducted or transferred to the temperature measuring layer 14 through the infrared layer 12. Thus, the temperature of the temperature measuring layer 14 increases as the temperature of the heating element 12 increases, and the resistance value of the temperature measuring layer 14 changes as the temperature of the temperature measuring layer 14 changes, so that the temperature value of the heating assembly 10 may be monitored in real time by detecting the resistance value of the temperature measuring layer 14.

[0059] As illustrated in FIG. 5, the base body 11 is a hollow cylinder, and the infrared layer 12 covers entire outer surface of the base body 11, which may avoid heat generated by the heating element 13 being conducted by the base body 11. Thus, it avoids heat loss, and avoids causing the large error in the temperature measurement result. Furthermore, it avoids scratching of the infrared layer 12 by the aerosol generating substrate. In this embodiment, the heating element 13 may be located in the middle of the base body 11 along its axial direction, and distributed in the wave shape manner around the outer surface of the base body 11, so as to improve heating uniformity. The temperature measuring layer 14 is disposed on a part of the infrared layer 12 that is close to an end of the base body 11, so that the temperature of the specific region of the heating assembly 10 may be detected. In other embodiments, the infrared layer 12 may also be disposed on the inner surface of the base body 11, which is not limited in the present disclosure.

[0060] In a second embodiment, as illustrated in FIG. 7 and FIG. 8, FIG. 7 is a structural schematic view of the heating assembly in a fourth embodiment of the present disclosure, and FIG. 8 is a structural sketch of the heating assembly of FIG. 7. The temperature measuring layer 14 is disposed on the surface of the base body 11. The temperature measuring layer 14 and the infrared layer 12 are located on the same surface of the base body 11 and spaced apart from each other. In the present embodiment, the heating element 13 generates heat after the heating element 13 is electrified, and the heat of the heating element 13 is conducted or transferred to the infrared layer 12, and then conducted or transferred to the surface of the base body 11 through the infrared layer 12. Thus, the temperature of the temperature measuring layer 14 disposed on the surface of the base body 11 changes as the temperature of the base body 11 changes, and the resistance value of the temperature-measuring layer 14 changes as the temperature of the temperature-measuring layer 14 changes. Thus, the temperature value of the heating assembly 10 may be monitored in real time by detecting the resistance value of the temperature-measuring layer 14.

[0061] In the present embodiment, the temperature measuring layer 14 is disposed on any position of the base body 11 or covers any position of the base body 11 according to actual needs. For example, in response to monitoring the temperature of a first end of the base body 11, the temperature measuring layer 14 may be disposed on the first end. In response to monitoring the temperature of the middle of the base body 11, the temperature measuring layer 14 may be disposed on the middle of the base body 11, as illustrated in FIG. 1. In response to monitoring the temperature of the first end and the temperature of a second end of the base body 11 simultaneously, multiple temperature measuring layers 14 may be disposed, so that one temperature measuring layer

14 covers the first end, and another temperature measuring layer 14 covers the second end, so as to monitor the temperature of the corresponding position of the base body 11. In an embodiment, the infrared layer 12 may be disposed on the first end of the outer surface of the base body 11, the temperature measuring layer 14 may be disposed on the second end of the base body 11, and the temperature measuring layer 14 is spaced apart from the infrared layer 12. Thus, the temperature value of the second end of the base body 11 is detected by detecting the resistance value of the temperature measuring layer 14.

[0062] As illustrated in FIG. 7, the base body 11 is the hollow cylinder, and the infrared layer 12 is disposed on the outer surface of the base body 11 and only one end of the base body 11 is exposed. The temperature measuring layer 14 is disposed on an exposed region of the outer surface of the base body 11, and spaced apart from the infrared layer 12. The temperature measuring layer 14 is disposed around the base body 11 along the circumferential direction of the base body 11. The temperature measuring layer 14 may be disposed in a circle along the circumferential direction of the base body 11. That is, the temperature measuring layer 14 is in a closed ring shape. In an embodiment, the temperature measuring layer 14 may also be disposed in an open ring shape along the circumferential direction of the base body 11. That is, a radian corresponding to the temperature measuring layer 14 is less than 360 degrees.

[0063] In a third embodiment, the temperature measuring layer 14 is disposed on the surface of the base body 11, and the temperature measuring layer 14 is located between the base body 11 and the infrared layer 12. In the present embodiment, the temperature measuring layer 14 and the infrared layer 12 are located on the same surface of the base body 11.

[0064] In a fourth embodiment, the temperature measuring layer 14 is located on the surface of the base body 11, and the temperature measuring layer 14, the infrared layer 12, and the heating element 13 are disposed on different surfaces of the base body 11. For example, the infrared layer 12 and the heating element 13 are disposed on the inner surface of the base body 11, and the temperature measuring layer 14 is disposed on the outer surface of the base body 11. The temperature or the heat of the heating element 13 is sequentially conducted or transferred to the infrared layer 12 and the base body 11 after the heating element 13 is electrified and heated, and the temperature or the heat of the base body 11 is further conducted or transferred to the temperature measuring layer 14, so that the resistance of the temperature measuring layer 14 changes as the temperature of the temperature measuring layer 14 changes. Alternatively, the infrared layer 12 and the heating element 13 are disposed on the outer surface of the base body 11, and the temperature measuring layer 14 is disposed on the inner surface of the base body 11.

[0065] In a fifth embodiment, the temperature measuring layer 14 and the heating element 13 are located on the same surface of the base body 11, and the surface of the base body 11 and the infrared layer 12 away from the base body 11 may be provided with the temperature measuring layer 14. The temperature measuring layer 14 disposed on the surface of the base body 11 and the infrared layer 12 away from the base body 11 may be spaced apart from the heating element 13, and may be disposed in a circle along the circumferential direction of the base body 11 and distributed in the linear shape. The temperature measuring layer 14 disposed on the base body 11 and the temperature measuring layer 14 disposed on the surface of the infrared layer 12 away from the base body 11 may be spaced apart from each other or integrally formed.

[0066] By disposing the temperature measuring layer 14 on the infrared layer 12 and the base body 11, the temperature measuring layer 14 may simultaneously sense the temperature of the base body 11 and the heating element 13, so as to ensure that the temperature measuring layer 14 at least covers the region of the heating assembly 10 with the highest temperature. It avoids the large error of the temperature measurement results that is caused by the region of the heating assembly 10 with the highest temperature appearing in other regions not covered by the temperature measurement layer 14.

[0067] In the heating assembly 10 provided in the present embodiment, the base body 11 is provided to accommodate the aerosol generating substrate. The infrared layer 12 is disposed on the surface of the base body 11 to radiate the infrared rays in response to heating the infrared layer 12, so that the radiated infrared rays heat and atomize the aerosol generating substrate, thereby improving the heating efficiency. The heating uniformity is better. Furthermore, by disposing the heating element 13 on the base body 11, the infrared layer 12 is heated in response to electrifying the heating element 13, so that the infrared layer 12 radiates the infrared rays. Moreover, the temperature measuring layer 14 is disposed on the surface of the base body 11 and/or the surface of the infrared layer 12, and the temperature measuring layer 14 has the TCR characteristic. Thus, the heating assembly 10 may monitor the temperature value of the heating assembly 10 by detecting the resistance value of the temperature measuring layer 14. Compared with the related arts, the temperature measuring layer 14 is not only convenient to dispose, but also occupies less space. In addition, the temperature measuring layer 14 may cover some specific positions of the base body 11 and/or some specific positions of the infrared layer 12, or cover the larger region of the surface of the base body 11 and/or the surface of the infrared layer 12 according to actual needs. Thus, the temperature of the specific region on the surface of the base body 11 and/or the surface of the infrared layer 12 may be measured, and the accuracy of the temperature measurement is high. The temperature may be measured for most regions of the base body 11 and/or most regions of the infrared layer 12, effectively expanding the temperature measurement range of the heating assembly 10.

[0068] As illustrated in FIG. 9, FIG. 9 is a structural schematic view of an aerosol generating device in an embodiment of the present disclosure. In the present embodiment, an aerosol generating device 100 is provided. The aerosol generating device 100 includes the heating assembly 10, a power supply assembly 20, and a controller 30.

[0069] The heating assembly 10 is configured for heating and atomizing the aerosol generating substrate to form the aerosol in response to electrifying the heating assembly 10. The heating assembly 10 may be the heating assembly 10 in any one of the above embodiments, and the specific structure and function may refer to the description of the specific structure and function of the heating assembly 10 in any one of the above embodiments, and may achieve the same or similar technology effects as follows.

[0070] The power supply assembly 20 is connected to the heating assembly 10 and configured for supplying power to the heating assembly 10. The heating assembly 10 and the power supply assembly 20 may be detachably connected, so as to facilitate the replacement of the heating assembly 10 and improve a utilization rate of the power supply assembly 20. In other embodiments, the power supply assembly 20 and the heating assembly 10 may also be integrally disposed, which is not limited in the present disclosure.

[0071] The controller 30 is configured to control the power supply assembly 20 to supply power to the heating assembly 10, detect the resistance value of the temperature measuring layer 14 on the heating assembly 10 in real time, and monitor the temperature of the heating assembly 10 according to the resistance value, thereby adjusting the temperature field of the heating assembly 10, so as to achieve the best effect of the taste of smoking.

[0072] In an embodiment, the aerosol generating device 100 further includes a casing 40, and the heating assembly 10 is disposed in the casing 40 and connected to the power supply assembly 20.

[0073] In the aerosol generating device 100 provided in the present embodiment, the heating assembly 10 in any one of the above embodiments is disposed. Thus, the aerosol generating device 100 may heat and atomize the aerosol generating substrate by using radiated infrared rays, to improve the heating efficiency and the heating uniformity. The temperature value of the heating assembly 10 may be detected by detecting the resistance value of the heating element 13 or the resistance value of the temperature measuring layer 14, so as to adjust the temperature field of the heating assembly 10 to achieve the best effect of the taste of smoking. Compared with the related art, the heating element 13 or the temperature measuring layer 14 is in the form of a film, and may be directly deposited on the surface of the base body 11 and/or the surface of the infrared layer 12, without the need to fix the heating element 13 or the temperature measuring layer 14 on the surface of the base body 11 and/or the surface of the infrared layer 12 by defining the installing groove or disposing the fixed element such as the screw or the like on the surface of the base body 11 and/or the surface of the infrared layer 12. Thus, the heating element 13 or temperature measuring layer 14 is not only convenient to dispose, but also occupies less space. In addition, the heating element 13 or the temperature measuring layer 14 may cover some specific positions of the base body 11 or the infrared layer 12 or cover the larger region of the base body 11 and/or the larger region of the surface of the infrared layer 12 according to actual needs. Thus, the temperature of the specific region on the surface of the base body 11 and/or the surface of the infrared layer 12 may be measured, and the accuracy of the temperature measurement is high. The temperature may be measured for most regions of the base body 11 and/or most regions of the infrared layer 12, effectively expanding the temperature measurement range of the heating assembly 10.

[0074] The above description is only some embodiments of the present disclosure, and are not intended to limit the scope of the present disclosure. Any equivalent structure or equivalent flow transformation made by using the contents of the specification and accompanying drawings of the present disclosure, or directly or indirectly applied to other related technical fields, is included in the scope of the patent protection of the present disclosure.

Claims

1. A heating assembly, comprising:

   a base body, configured for accommodating an aerosol generating substrate;
   an infrared layer, disposed on the surface of the base body, wherein the infrared layer is configured to radiate infrared rays in response to heating the infrared layer, so as to heat and atomize the aerosol generating substrate; and
   a heating element, disposed on the surface of the base body and/or the surface of the infrared layer, wherein the heating element is configured to heat the infrared layer in response to electrifying the heating element, and the heating element has a temperature coefficient of resistance characteristic and is configured as a temperature sensor.

2. The heating assembly according to claim 1, wherein the heating element is a heating layer, and the heating layer is disposed on the surface of the infrared layer away from the base body.

3. The heating assembly according to claim 1, wherein the heating element is disposed on the surface of the base body and spaced apart from the infrared

layer.

4. The heating assembly according to claim 1, wherein the heating element is a heating layer, and the heating layer is disposed on the surface of the base body and located between the base body and the infrared layer.

5. A heating assembly, comprising:

   a base body, configured for accommodating an aerosol generating substrate;
   an infrared layer, disposed on the surface of the base body, wherein the infrared layer is configured to radiate infrared rays in response to heating the infrared layer, so as to heat and atomize the aerosol generating substrate;
   a heating element, disposed on the base body, and configured for heating the infrared layer in response to electrifying the heating element; and
   a temperature measuring layer, disposed on the surface of the base body and/or the surface of the infrared layer, and spaced apart from the heating element, wherein the temperature measuring layer has a temperature coefficient of resistance, TCR, characteristic.

6. The heating assembly according to claim 5, wherein the temperature measuring layer is disposed on the surface of the base body, and the temperature measuring layer and the infrared layer are located on the same surface of the base body and are spaced apart from each other.

7. The heating assembly according to claim 5, wherein the temperature measuring layer is disposed on the surface of the infrared layer away from the base body, and the temperature measuring layer is spaced apart from the heating element.

8. The heating assembly according to claim 5, wherein the temperature measuring layer is disposed around the base body along the circumferential direction of the base body.

9. The heating assembly according to claim 5, wherein the temperature measuring layer is located on an end of the base body.

10. The heating assembly according to claim 5, wherein the base body is a hollow column, the infrared layer is disposed on the outer surface of the hollow column, and the heating element is a heating layer disposed on the surface of the infrared layer away from the base body.

11. The heating assembly according to claim 5, wherein the base body is a hollow column, the infrared layer is disposed on the inner surface of the hollow column, and the heating element is a heating layer disposed on the surface of the infrared layer away from the base body.

12. The heating assembly according to claim 10, wherein the heating layer is located in the middle of the base body and is distributed in a wave shape along the circumferential direction of the base body.

13. The heating assembly according to claim 5, wherein the base body is a quartz.

14. The heating assembly according to claim 5, wherein the infrared layer, the heating element, and the temperature measuring layer are disposed on the outer surface of the base body by silk screen printing or coating, and an area of the temperature measuring layer is smaller than that of the infrared layer.

15. An aerosol generating device, comprising:

   a heating assembly according to claim 1, configured for heating and atomizing the aerosol generating substrate in response to electrifying the heating assembly;
   a power supply assembly, configured for being connected to the heating assembly, and configured for supplying power to the heating assembly; and
   a controller, configured for controlling the power supply assembly to supply power to the heating assembly, detect the resistance value of the heating element or the resistance value of the temperature measuring layer in real time, and monitor the temperature of the heating assembly according to the resistance value.

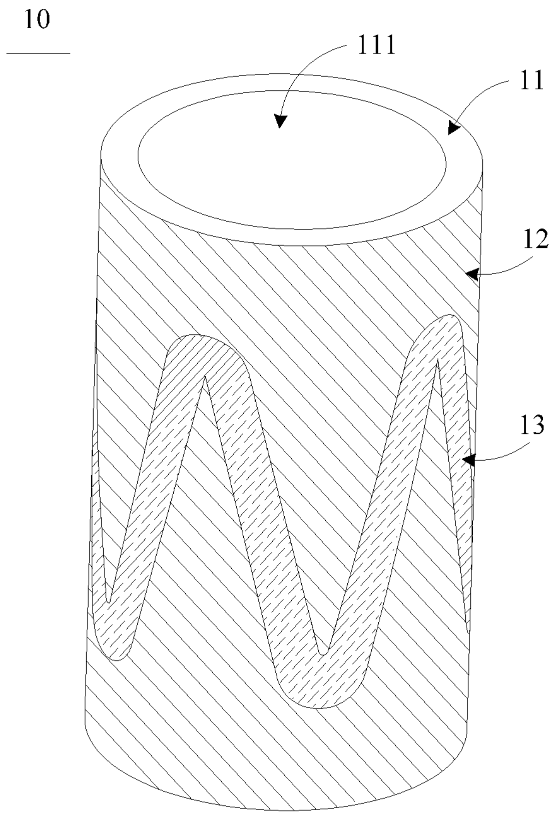

FIG. 1

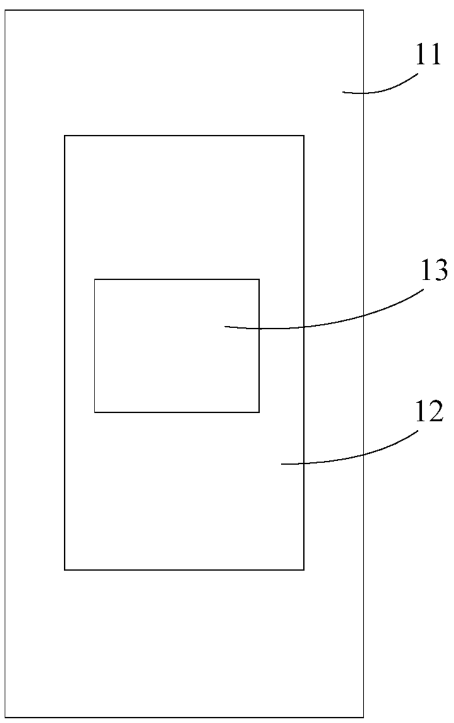

FIG. 2

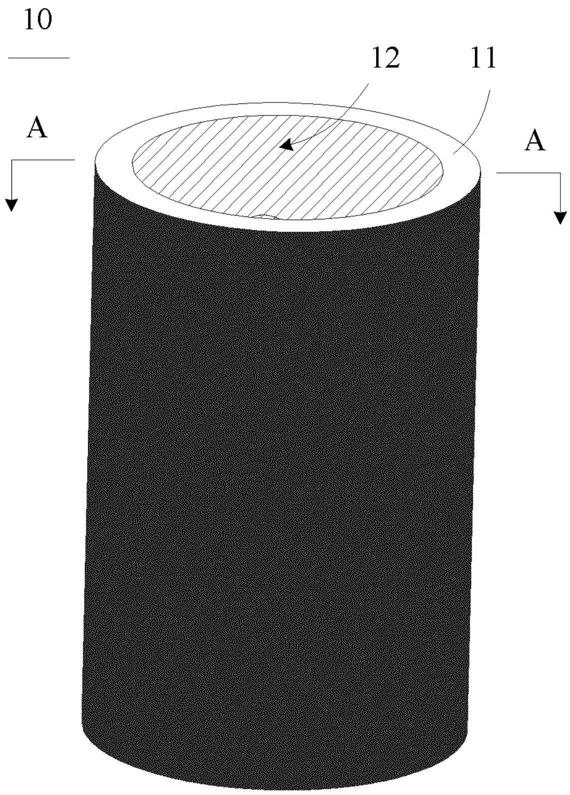

FIG. 3

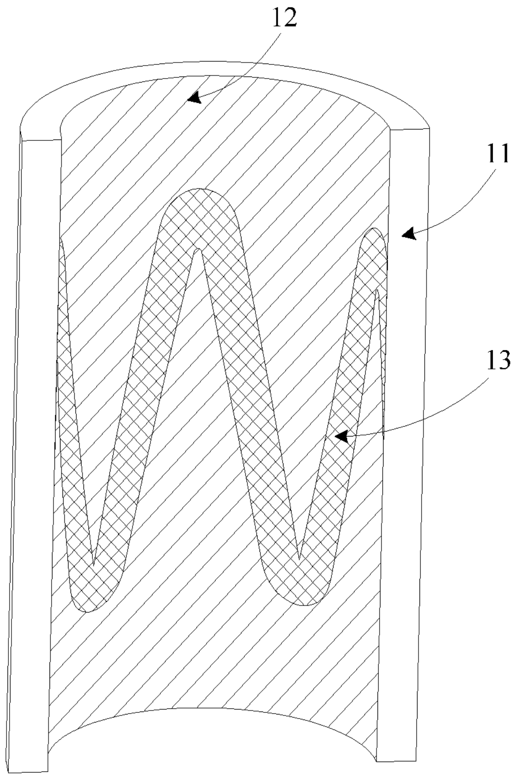

FIG. 4

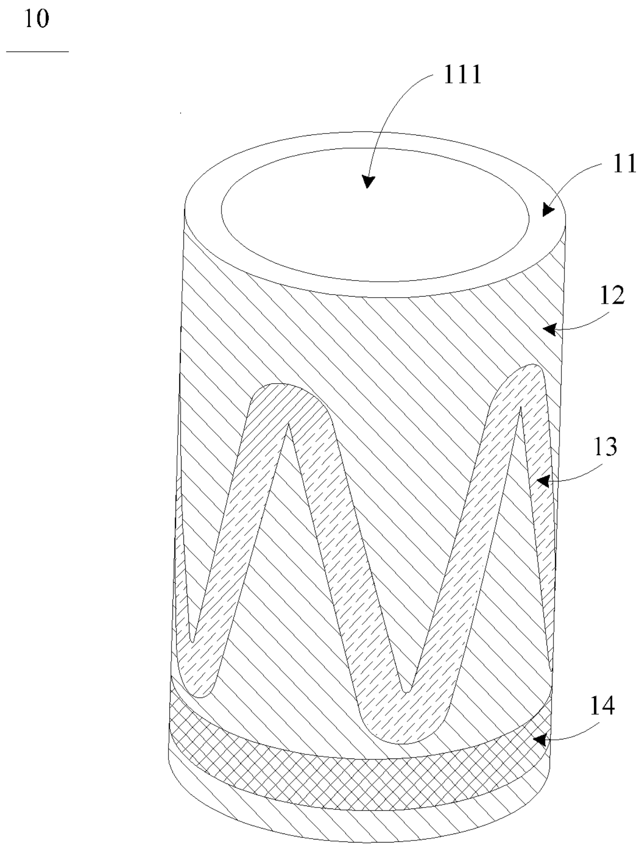

FIG. 5

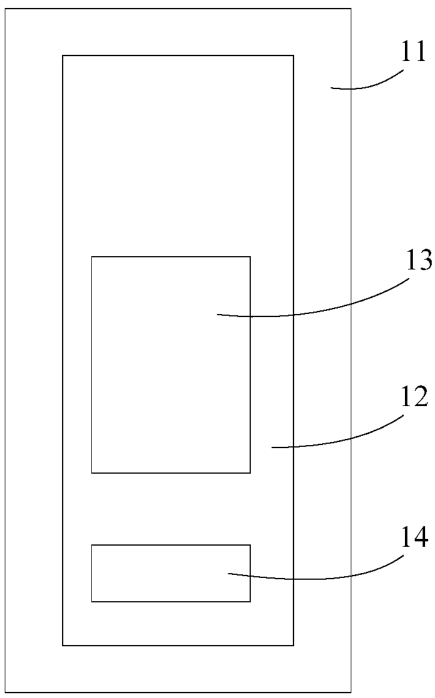

FIG. 6

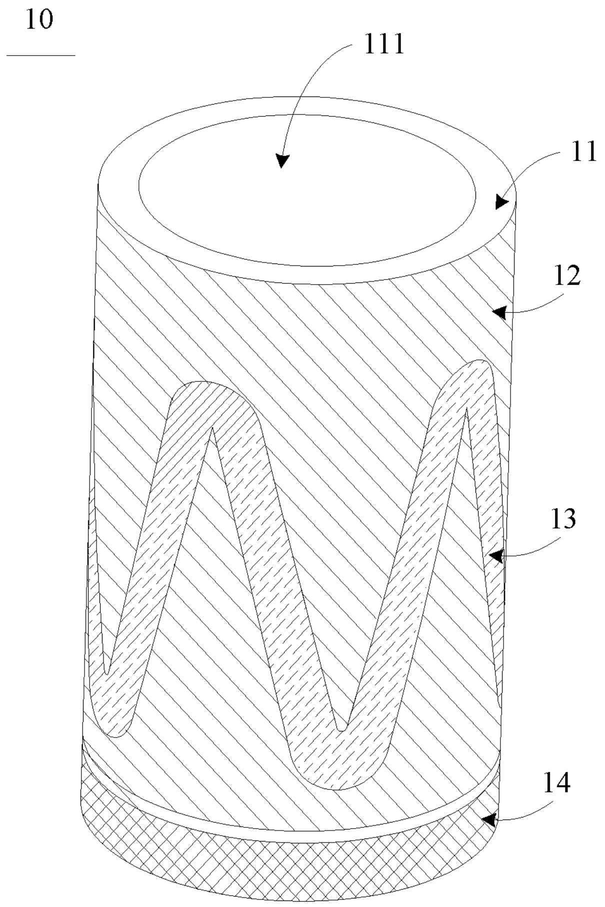

FIG. 7

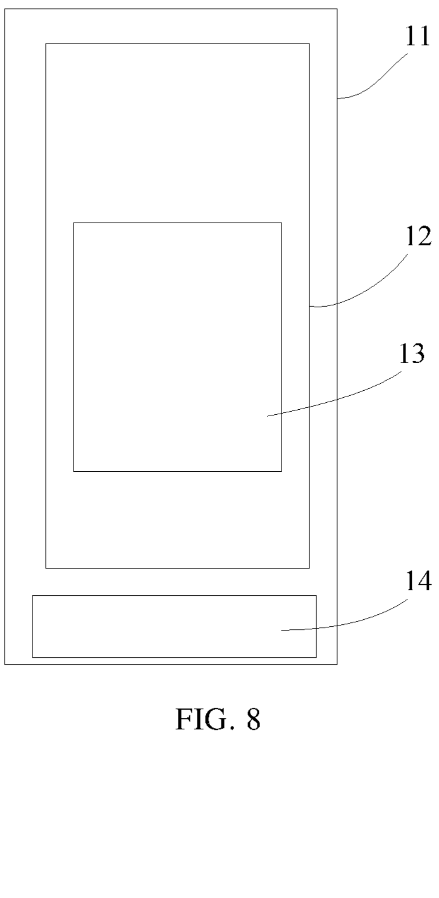

FIG. 8

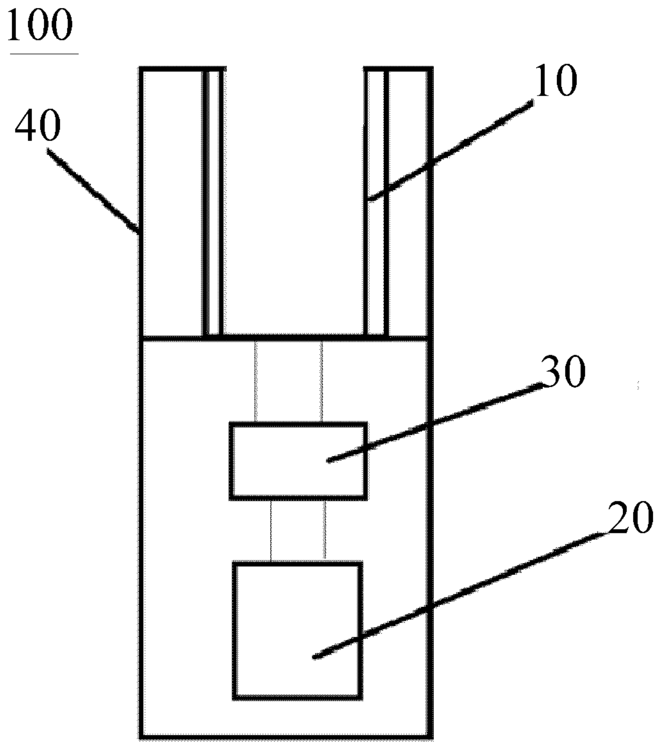

FIG. 9

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2022/128026

A. CLASSIFICATION OF SUBJECT MATTER

A24F 40/40(2020.01)i；A24F 40/46(2020.01)i；A24F 40/53(2020.01)i；A24F 40/57(2020.01)i；A24F 40/50(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 40；A24F 47

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

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

WPABSC; CNTXT; WPABS; ENTXT; CJFD; DWPI; ENTXTC; VEN: TCR, 红外, infrared, 雾化, 加热, 电阻, 电热, 发热, 温度, 测温, heat+, atomiz+, temperature, nebulizat+, pulverizat+

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CN 114052297 A (SHENZHEN MAISHI TECHNOLOGY CO., LTD.) 18 February 2022 (2022-02-18) claims 1-15	1-15
Y	CN 113080521 A (SHENZHEN FIRST UNION TECHNOLOGY CO., LTD.) 09 July 2021 (2021-07-09) description, paragraphs [0028], [0032]-[0034], [0058], [0095], and [0097]-[0099], and figures 1-8	1-15
Y	CN 102595943 A (PHILIP MORRIS PRODUCTS S.A.) 18 July 2012 (2012-07-18) description, paragraphs [0004], [0007], and [0083]-[0087]	1-15
Y	CN 213604404 U (SHENZHEN FIRST UNION TECHNOLOGY CO., LTD.) 06 July 2021 (2021-07-06) description, paragraphs [0055]-[0060] and [0085]-[0101], and figures 4-9	1-15
Y	CN 212117075 U (SHENZHEN FIRST UNION TECHNOLOGY CO., LTD.) 11 December 2020 (2020-12-11) description, paragraphs [0031]-[0037] and [0039]-[0041], figures 1-15	1-15

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

* Special categories of cited documents:
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Date of the actual completion of the international search	Date of mailing of the international search report
21 December 2022	**17 January 2023**

Name and mailing address of the ISA/CN	Authorized officer
China National Intellectual Property Administration (ISA/CN) **No. 6, Xitucheng Road, Jimenqiao, Haidian District, Beijing 100088, China**	
Facsimile No. **(86-10)62019451**	Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2022/128026

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	CN 213604400 U (SHENZHEN FIRST UNION TECHNOLOGY CO., LTD.) 06 July 2021 (2021-07-06) description, paragraphs [0028]-[0029] and [0032]-[0044], and figures 3-5	1-15

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

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2022/128026

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
CN 114052297 A	18 February 2022	CN 216776103 U	21 June 2022
CN 113080521 A	09 July 2021	WO 2021129677 A1	01 July 2021
		EP 4082366 A1	02 November 2022
CN 102595943 A	18 July 2012	CA 2778903 A1	05 May 2011
		RS 58861 B1	31 July 2019
		EP 4070675 A1	12 October 2022
		IL 219251 D0	28 June 2012
		JP 2017127322 A	27 July 2017
		HK 1203775 A1	06 November 2015
		CA 3046426 A1	05 May 2011
		HU E043821 T2	30 September 2019
		JP 2017127320 A	27 July 2017
		KR 20170021361 A	27 February 2017
		KR 20200013805 A	07 February 2020
		HU E045118 T2	30 December 2019
		PL 3248487 T3	20 June 2022
		PL 2850956 T3	29 November 2019
		DK 2850956 T3	22 July 2019
		ES 2730552 T3	11 November 2019
		MY 159829 A	15 February 2017
		IN 3374DEN2012 A	23 October 2015
		PL 3248485 T3	02 November 2020
		JP 2022010275 A	14 January 2022
		TR 201910286 T4	21 August 2019
		KR 20170116240 A	18 October 2017
		EP 3248484 A1	29 November 2017
		PL 3248483 T3	18 May 2020
		ES 2748657 T3	17 March 2020
		CN 104886775 A	09 September 2015
		AU 2010311913 A1	07 June 2012
		UA 106394 C2	26 August 2014
		EP 2493342 A1	05 September 2012
		EP 3248486 A1	29 November 2017
		ZA 201202839 B	27 December 2012
		KR 20210135622 A	15 November 2021
		EP 2850956 A1	25 March 2015
		ES 2734491 T3	10 December 2019
		NZ 599364 A	26 July 2013
		JP 2017201987 A	16 November 2017
		SI 2850956 T1	30 August 2019
		PT 2850956 T	30 September 2019
		HR P20191008 T1	23 August 2019
		RS 53840 B1	30 June 2015
		CA 3046423 A1	05 May 2011
		JP 2017127323 A	27 July 2017
		JP 2017127321 A	27 July 2017
		HU E046703 T2	30 March 2020
		RS 59028 B1	30 August 2019
		HU E044831 T2	28 November 2019
		JP 2013509160 A	14 March 2013

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

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2022/128026

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
		HK 1173347 A1	16 May 2013
		JP 2020000243 A	09 January 2020
		EP 2316286 A1	04 May 2011
		CA 3046420 A1	05 May 2011
		CA 3046422 A1	05 May 2011
		CA 3046422 C	15 June 2021
		CA 3046420 C	15 June 2021
		WO 2011050964 A1	05 May 2011
CN 213604404 U	06 July 2021	WO 2022002267 A1	06 January 2022
CN 212117075 U	11 December 2020	WO 2021143872 A1	22 July 2021
		EP 4091472 A1	23 November 2022
		KR 20220127906 A	20 September 2022
CN 213604400 U	06 July 2021	WO 2022063131 A1	31 March 2022

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 202111421327 **[0001]**