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(54) **HEATING ELEMENT AND ELECTROMAGNETIC HEATING BAKING DEVICE**

(57) The present application relates to a heating element and an electromagnetic heating baking device. The electromagnetic heating baking device comprises a fixing frame, an accommodating tube and a heating element. A magnetic induction coil is provided on the fixing frame, and an accommodating cavity is formed around the coil. The accommodating tube is located in the accommodating cavity, and the accommodating tube is used for accommodating baking material. The heating element comprises an insertion part, and the insertion part is a revolving body structure and is located in the accommodating tube. The insertion part is used for insertion into the baking material and heating the baking material by means of a magnetic field generated by the magnetic induction coil.

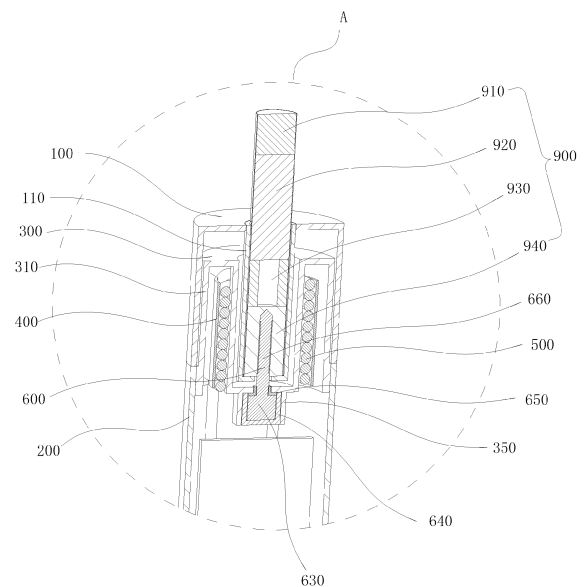


FIG. 4

Description

CROSS-REFERENCE TO RELATED DISCLOSURE

[0001] The application claims priority benefit of Chinese patent application No. 2020101188494 filed on February 26, 2020, entitled "HEATING ELEMENT AND ELECTROMAGNETIC HEATING BAKING DEVICE", the entire contents of both disclosures are incorporated herein for all purposes.

TECHNICAL FIELD

[0002] The present disclosure relates to a technical field of electromagnetic heating devices, in particular to a heating element and an electromagnetic heating baking device.

BACKGROUND

[0003] Conventional heat-not-burn cigarettes usually use resistance or electromagnetic heater. Regardless of resistance or electromagnetic heating, a heating structure is generally a structure in which a heating sheet is inserted into the cigarette or a heating tube is used to surround the cigarette. A heating sheet is usually inserted into a cigarette received in a receiving tube from one end of the receiving tube, and the heating sheet extends into the receiving tube from the other end and is inserted into the cigarette. After the cigarette is heated, it is easy to stick to the heating sheet, so it is necessary to design a pushing mechanism to push the movement of the receiving tube to separate the cigarette from the heating sheet. The pushing mechanism is complex in design and easily damaged after repeated use. The peripheral heating of the heating pipe usually does not bond because it is in contact with the cigarette at the periphery of the cigarette, but the heating effect is not good because it is far away from the center of the cigarette.

SUMMARY

[0004] According to embodiments of the disclosure, a heating element and an electromagnetic heating baking device are provided.

[0005] An electromagnetic heating baking device includes a fixing frame, an accommodating tube and a heating element. The fixing frame is provided with a magnetic induction coil, and the magnetic induction coil surrounds an accommodating cavity. The accommodating tube is located in the accommodating cavity. The accommodating tube is configured to receive a baking object. The heating element is configured to be inserted into the baking object. The heating element includes a non-magnetic conducting support column and a metal magnetic conducting tube sleeved over the non-magnetic conducting support column. The metal magnetic conducting tube is configured to heat the baking object through a magnetic

field generated by the magnetic induction coil.

[0006] In an embodiment, the heating element includes an inserting portion, the inserting portion is a rotating body structure and is located in the accommodating tube, the inserting portion includes the hollow tubular metal magnetic conducting tube and the non-magnetic conducting support column, and the outer diameter of the non-magnetic conducting support column matches the inner diameter of the metal magnetic conducting tube.

[0007] In an embodiment, the electromagnetic heating baking device further includes a mounting base, the heating element further includes a mounting portion, the mounting base is sleeved over the mounting portion, and the mounting base is connected to the fixing frame.

[0008] In an embodiment, a cylinder portion is formed at the bottom end of the fixing frame, the cylinder portion is in communication with the accommodating tube, the cylinder portion is configured to mount the mounting base and the mounting portion of the heating element, and the outer wall of the mounting base is fixedly connected or detachably connected to the inner wall of the cylinder portion.

[0009] In an embodiment, the inserting portion includes a top portion and a main body portion, the top portion and the mounting portion are respectively located at the opposite ends of the heating element, the main body portion is located between the top portion and the mounting portion, and the outer diameter of the top portion is gradually reduced in the direction away from the main body portion.

[0010] In an embodiment, the top portion, the main body portion and the mounting portion of the heating element are non-magnetic conducting support columns having the same diameter.

[0011] In an embodiment, the non-magnetic conducting support column is made of ceramic.

[0012] In an embodiment, the metal magnetic conducting tube and the mounting base are spaced by a main body portion in between.

[0013] In an embodiment, a silicone piece is provided among the mounting portion of the heating element and the fixing frame and the mounting base.

[0014] In an embodiment, the electromagnetic heating baking device further includes a metal tube, the metal tube is sleeved over the coil.

[0015] In an embodiment, the electromagnetic heating baking device further includes a main housing, a circuit board and a power supply electrically connected thereto are provided in the main housing, and the coil is electrically connected to the circuit board.

[0016] In an embodiment, the electromagnetic heating baking device further includes a top cover, the accommodating tube is fixedly located inside the top cover, the top cover is sleeved over the fixing frame, and a gap is formed between a top wall of the fixing frame and a top wall of the top cover.

[0017] In an embodiment, the top cover is detachably connected to the main housing.

[0018] In an embodiment, the bottom end of the outer wall of the fixing frame is fixedly connected to the inner wall of the main housing, and the top cover is detachably sleeved on the upper end of the outer wall of the fixing frame.

[0019] In an embodiment, the fixing frame includes a first cylinder and a second cylinder that are arranged coaxially, the first cylinder is sleeved over the second cylinder, a first cavity is formed between the first cylinder and the second cylinder, a second cavity is formed in the second cylinder, the coil is located in the first cavity and wound around the second cylinder, the accommodating tube is located in the second cavity.

[0020] The disclosure further provides a heating element, the heating element includes a non-magnetic conducting support column and a metal magnetic conducting tube sleeved over the non-magnetic conducting support column. A magnetic induction coil is provided outside the heating element. The metal magnetic conducting tube is configured to heat a baking object through a magnetic field generated by the magnetic induction coil.

[0021] In an embodiment, the heating element further includes an inserting portion of a rotating body structure, the inserting portion includes a hollow tubular metal magnetic conducting tube and the non-magnetic conducting support column, and the outer diameter of the non-magnetic conducting support column matches the inner diameter of the metal magnetic conducting tube.

[0022] The heating element and the electromagnetic heating baking device of the disclosure are provided with a magnetic induction coil outside the inserting portion. When the coil is powered on, the electromagnetic induction effect is generated between the coil and the inserting portion, causing the temperature of the heating element to rise. In addition, the disclosure also designs the shape of the inserting portion as a rotating body structure. The inserting portion can be inserted into the baking object to heat the baking object. After the baking object such as the cigarette is heated and baked, the baking object can be rotated to separate the baking object from the heating portion, so that there is no need to set a smoke returning mechanism. Thus, the electromagnetic heating baking device of the disclosure has high heating efficiency, simple structure and convenient use.

BRIEF DESCRIPTION OF THE DRAWINGS

[0023] The above and other objects, features and advantages of the disclosure become clearer through a more specific description of the preferred embodiments of the disclosure shown in the accompanying drawings. In all the drawings, the same reference numerals indicate the same parts, and the drawings are not deliberately scaled according to the actual size, with the focus on showing the main thrust of the disclosure.

FIG. 1 is a structural view of an electromagnetic heating baking device provided by an embodiment of the

present disclosure.

FIG. 2 is an exploded view of the electromagnetic heating baking device provided by an embodiment of the present disclosure.

FIG. 3 is a longitudinal sectional view of the electromagnetic heating baking device provided by an embodiment of the present disclosure.

FIG. 4 is an enlarged structural view of portion A in FIG. 3.

FIG. 5 is a longitudinal sectional view of a fixing frame in the electromagnetic heating baking device provided by an embodiment of the present disclosure.

FIG. 6 is a longitudinal sectional view of a top cover of the electromagnetic heating baking device provided by an embodiment of the present disclosure connected to an accommodating tube.

FIG. 7 is a structural view of a heating element in an electromagnetic heating baking device provided by an embodiment of the present disclosure.

FIG. 8 is an exploded view of a split structure of the heating element in the electromagnetic heating baking device provided by an embodiment of the present disclosure.

FIG. 9 is a longitudinal sectional view of a heating element in an electromagnetic heating baking device provided by an embodiment of the present disclosure.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0024] In order to facilitate the understanding of the present disclosure, the present disclosure is described more comprehensively below with reference to the relevant accompanying drawings. Preferred embodiments of the present disclosure are shown in the accompanying drawings. However, the present disclosure may be implemented in many different forms and is not limited to the embodiments described herein. On the contrary, the purpose of providing these embodiments is to make the public content of the present disclosure more thoroughly and comprehensively understood.

[0025] It should be noted that when a component is called "fixed to" another component, it can be directly on another component or there can be a centered component. When a component is considered to be "connected" to another component, it can be directly connected to another component or there may be intermediate components at the same time. The terms "vertical", "horizontal", "left", "right" and similar expressions used herein are for illustrative purposes only and do not mean that they are the only embodiments.

[0026] Unless otherwise defined, all technical and scientific terms used herein have the same meanings as those commonly understood by those skilled in the technical field of the present disclosure. The terms used in the specification of the present disclosure herein are only for the purpose of describing specific embodiments, and are not intended to limit the present disclosure. As used

herein, the term "and / or" includes any and all combinations of one or more related listed items.

[0027] Referring to FIG. 1, in one embodiment, an overall structure of an electromagnetic heating baking device includes a top cover 100 and a main housing 200. The top cover 100 is provided with an opening, and an interior of the top cover 100 is hollow. A baking object 900 is inserted into the interior of the top cover 100. The explosion structure of the electromagnetic heating baking device is shown in FIG. 2. An interior of the electromagnetic heating baking device is also provided with an accommodating tube 110, a fixing frame 300, a metal tube 400, a magnetic induction coil 500, a heating element 600, a circuit board 700, and a power supply 800. The magnetic induction coil 500 and the power supply 800 are electrically connected to the circuit board 700.

[0028] Referring to FIGs. 3 to 5, a longitudinal sectional view of the electromagnetic heating baking device is shown in FIG. 3, an enlarged structure of portion A in FIG. 3 is shown in FIG. 4, and a longitudinal sectional view of the fixing frame 300 is shown in FIG. 5. The fixing frame 300 includes a first cylinder 310 and a second cylinder 320 that are coaxially arranged. The first cylinder 310 is sleeved over the second cylinder 320, and the first cylinder 310 and the second cylinder 320 are connected at a top. A first cavity 330 is formed between the first cylinder 310 and the second cylinder 320. The top of the first cavity 330 is closed and the bottom of the first cavity 330 is opened, so that the metal tube 400 and the coil 500 can be inserted into the first cavity 330 from the bottom of the first cavity 330. The coil 500 is located in the first cavity 330 and wound around the second cylinder 320, and the metal tube 400 is arranged in the first cavity 330 and sleeved over the coil 500. In a specific embodiment, the metal tube 400 is an iron tube, the metal tube 400 is tightly sleeved over the spiral coil 500 through an elastic preload, and the metal tube 400 is configured to prevent a leakage of the electromagnetic wave generated after the coil 500 is powered on. In addition, it should be noted that an insulating layer is provided outside the coil 500, and the metal tube 400 is tightly sleeved over the spiral coil 500, which does not cause a conduction between the metal tube 400 and the coil 500. In addition, the configuration of the metal tube 400 helps to protect the insulating layer outside the coil 500 from being scratched or damaged.

[0029] In addition, as shown in FIG. 4 and FIG. 5, a second cavity 340 is formed in the second cylinder 320, and a top of the second cavity 340 is open to facilitate the insertion of the accommodating tube 110 into the second cavity 340 from the top of the second cavity 340. In a specific embodiment, the accommodating tube 110 is fixed in the top cover 100. Alternatively, the accommodating tube 110 is integrally formed with the top cover 100. The longitudinal sectional view of the accommodating tube 110 fixed in the top cover 100 is shown in FIG. 6. In addition, because the coil 500 is wound on the outside of the second cylinder 320, an accommodating cavity

surrounded by the coil 500 is the second cavity 340 in the second cylinder 320. The accommodating tube 110 is located in the second cavity 340 and is configured to accommodate the baking object 900 and an inserting portion 660 of the heating element 600.

[0030] As shown in FIGS. 7 and 9, the heating element 600 includes the inserting portion 660 and a mounting portion 630. The inserting portion 660 has a rotating body structure and is located in the accommodating tube 110. The inserting portion 660 includes a top portion 610 and a main body portion 620, the mounting portion 630 and the top portion 610 are respectively located at opposite ends of the heating element 600, and the main body portion 620 is located between the top portion 610 and the mounting portion 630. the outer diameter of the top portion 610 is gradually reduced in the direction away from the main body portion 620, so as to facilitate the insertion of the inserting portion 660 into the interior of the baking object 900.

[0031] In addition, as shown in FIG. 9, the electromagnetic heating baking device further includes a mounting base 640, which is sleeved over the mounting portion 630 of the heating element 600 and is configured to mount the heating element 600 in the fixing frame 300.

As shown in FIG. 5, the bottom end of the second cylinder 320 of the fixing frame 300 forms a coaxial cylinder portion 350 with a diameter smaller than the second cylinder 320, and a bottom plate 360 between the second cylinder 320 and the cylinder portion 350 is provided with a first opening 370. As shown in FIG. 6, a bottom of the accommodating tube 110 is provided with a second opening 111, and positions of the first opening 370 and the second opening 111 correspond to each other, so as to facilitate the communication between the cylinder portion 350 and the accommodating tube 110. As shown in FIG. 4, the cylinder portion 350 is configured to mount the mounting portion 630 and the mounting base 640 of the heating element 600. The inserting portion 660 of the heating element 600 is inserted into the accommodating tube 110 through the cylinder portion 350, and the top portion 610 of the inserting portion 660 is in a sharp conical shape. When the baking object 900 such as a cigarette is inserted into the accommodating tube 110, the sharp top portion 610 facilitates the inserting portion 660 to be inserted into the baking object 900, thereby facilitating the heating of the baking object 900. In addition, because the inserting portion 660 of the heating element 600 has a rotating body structure, when the baking object 900 such as the cigarette is heated and baked, the baking object 900 can be rotated to separate the baking object 900 from the heating element 600, so that there is no need to set a cigarette removing mechanism.

[0032] Referring to FIGs. 7 to 9, the inserting portion 660 includes a hollow tubular metal magnetic conducting tube 621 and a non-magnetic conducting support column 622. the outer diameter of the non-magnetic conducting support column 622 matches an inner diameter of the metal magnetic conducting tube 621, and the metal mag-

netic conducting tube 621 is sleeved over the non-magnetic conducting support column 622. After the coil 500 is energized, an alternating magnetic field is formed inside the accommodating tube 110. The metal magnetic conducting tube 621 cuts the alternating magnetic field line to generate eddy current. The eddy current makes the electrons inside the metal magnetic conducting tube 621 move at a high speed and irregularly, collide and rub with each other to generate heat energy, thus playing a heating role. In a specific embodiment, a heating temperature of the heating element 600 can be controlled by controlling a current intensity and the power on time in the coil 500. In addition, in a specific embodiment, the non-magnetic conducting support column 622 can be a ceramic support column, a glass support column or a high-temperature resistant plastic support column. When the non-magnetic conducting support column is the ceramic support column, before the ceramic support column is sintered, the metal magnetic conducting tube 621 is sleeved over the ceramic support column, and then the metal magnetic conducting tube 621 and the ceramic support column are sintered together to improve the bonding force between the metal magnetic conducting tube 621 and the ceramic support column. In addition, the heat dissipation of the ceramic support column is slow, which can make full use of the heat generated by the metal magnetic conducting tube 621, and the ceramic support column also has the characteristics of easy forming and high strength.

[0033] In a specific embodiment, as shown in FIGs. 7 to 9, the top portion 610, the main body portion 620, and the mounting portion 630 of the heating element 600 are an integrated ceramic support column structure. The top portion 610 and the main body portion 620 are both rotating body structures. More specifically, the top portion 610 is a conical structure, the main body portion 620 is a cylindrical structure. A diameter of an end of the top portion 610 adjacent to the main body portion 620 is the same as that of the main body portion 620, and the mounting portion 630 is a non-rotating body structure. It should be understood that, in other embodiments, the main body portion 620 and the mounting portion 630 may be cylindrical structures with different diameters, and the top portion 610 is a conical structure. Alternatively, the main body portion 620 and the mounting portion 630 are cylindrical structures having the same diameter, the top portion 610 has a pointed structure, and the diameter of the end of the top portion 610 adjacent to the main body portion 620 is the same as that of the main body portion 620.

[0034] In addition, as shown in FIG. 4, the top cover 100 is sleeved over the fixing frame 300, and a gap is formed between a top wall of the fixing frame 300 and a top wall of the top cover 100 for insulating heat, so as to prevent the top cover 100 from overheating. the outer diameter of the top cover 100 is the same as that of the main housing 200, the top cover 100 is abutted against the main housing 200. the bottom end of the outer wall

of the first cylinder 310 of the fixing frame 300 is fixedly connected to the inner wall of the main housing 200, and the top cover 100 is detachably sleeved on the upper end of the outer wall of the first cylinder 310 of the fixing frame 300. The detachable manner is not limited. In a specific embodiment, the top cover 100 can be detachably sleeved on the upper end of the outer wall of the first cylinder 310 of the fixing frame 300 through an up-down sliding structure, a snap structure or a threaded structure. In other embodiments, the top cover 100 may be sleeved on the outside of the main housing 200 or inserted into the inside of the main housing 200, and the top cover 100 is connected to the main housing 200 by a detachable means such as an up-down sliding structure, a buckle structure or a threaded structure. The detachable arrangement of the top cover 100 facilitates cleaning the accommodating tube 110 inside the top cover 100.

[0035] Further, when the baking object 900 such as the cigarette is inserted into the accommodating tube 110, a downward force is applied to the heating element 600. In order to prevent the heating element 600 from detaching from the fixing frame 300, the outer wall of the mounting base 640 and the inner wall of the cylinder portion 350 of the fixing frame 300 are fixedly or detachably connected. The way of fixed connection is not limited. In a specific embodiment, the outer wall of the mounting base 640 and the inner wall of the cylinder portion 350 of the fixing frame 300 can be fixedly connected by adhesive, or the outer wall of the mounting base 640 and the inner wall of the cylinder portion 350 of the fixing frame 300 may be fixedly connected by interference fit. The detachable connection way is not limited. In a specific embodiment, the outer wall of the mounting base 640 and the inner wall of the cylinder portion 350 of the fixing frame 300 are connected by a buckle or thread way.

[0036] In the electromagnetic heating baking device of the present disclosure, the heating element 600 generates heat by cutting alternating magnetic field lines, and the heating element 600 is not provided with a heating circuit. Compared with conventional heating elements of resistance heating, the heating element 600 in the electromagnetic heating baking device of the present disclosure has simpler structure and longer service life, and does not need to be replaced frequently. Therefore, the outer wall of the mounting base 640 and the inner wall of the cylinder portion 350 of the fixing frame 300 can be fixedly connected, so that the heating element 600 and the fixing frame 300 can be fixedly connected. When the baking object 900 such as the cigarette is inserted into the accommodating tube 110, the heating element 600 can be prevented from detaching from the fixing frame 300. It should be understood that in some embodiments, the outer wall of the mounting base 640 and the inner wall of the cylinder portion 350 of the fixing frame 300 can be detachably connected, so that the heating element 600 can be detachably connected to the fixing frame 300. This arrangement can not only prevent the heating element 600 from detaching from the fixing frame 300,

but also facilitate the replacement of the heating element 600.

[0037] As shown in FIG. 9, a gap is formed between the metal magnetic conducting tube 621 and the mounting base 640, which can effectively insulate the heat, that is, the heat can be prevented from being transferred to the mounting base 640. The mounting base 640 is adjacent to electronic components, so as to avoid the heat from being transferred to the electronic components. In addition, as shown in FIG. 4 and FIG. 9, a silicone piece 650 is provided between the mounting portion 630 of the heating element 600 and the fixing frame 300. The silicone piece 650 can withstand a high temperature of more than 200°C. The configuration of the silicone piece 650 makes a connection between the heating element 600 and the fixing frame 300 more stable and reliable. The silicone piece 650 can prevent the liquid formed after the baking object 900 such as the cigarette is heated from flowing into the inside of the baking device.

[0038] In one embodiment, an assembly process of the electromagnetic heating baking device is as follows: first, the metal tube 400 is sleeved over the coil 500, then the metal tube 400 and the coil 500 are inserted into the first cavity 330 of the fixing frame 300 from the bottom end of the fixing frame 300, and the heating element 600 is inserted into the second cavity 340 inside the fixing frame 300 through the cylinder portion 350 at the bottom end of the fixing frame 300. Then, the circuit board 700 and the power supply 800 electrically connected to the coil 500 are both located in the main housing 200, and the bottom end of the outer wall of the first cylinder 310 of the fixing frame 300 is fixedly connected to the inner wall of the main housing 200 through a buckle or other connection. Finally, the top cover 100 is detachably sleeved on the upper end of the outer wall of the first cylinder 310 of the fixing frame 300, and the bottom surface of the top cover 100 is butted with the upper end surface of the main housing 200. At the same time, the accommodating tube 110 inside the top cover 100 is inserted into the second cavity 340 of the fixing frame 300 (the top cover and the accommodating tube may be connected by a buckle way), and the inserting portion 660 of the heating element 600 is located in the accommodating tube 110. When the baking object 900 such as cigarettes are inserted into the accommodating tube 110, the inserting portion 660 of the heating element 600 can be inserted into the baking object to facilitate the heating of the baking object 900. In other embodiments, the accommodating tube and the top cover can be integrally formed.

[0039] In the embodiment shown in FIG. 4, the baking object 900 is a cigarette, which successively includes a filter 910, a fiber tube 920, a support tube 930, and a tobacco portion 940 from top to bottom. The tobacco portion 940 includes folded deciduous tobacco bundles. When the cigarette is inserted into the accommodating tube 110, the heating element 600 can be inserted into the tobacco portion 940, so as to heat the tobacco portion

940. The hollow support tube 930 is used to separate the tobacco portion 940 from the fiber tube 920. When the heating element 600 is inserted into the tobacco portion 940, the hollow support tube 930 can prevent the tobacco portion 940 from being pushed towards the fiber tube 920. The fiber tube 920 includes a plurality of channels extending along a length direction of the fiber tube 920. The filter 910 is a conventional filter 910 formed of cellulose acetate.

[0040] According to the heating element and the electromagnetic heating baking device of the present disclosure, by providing the magnetic induction coil 500 outside the inserting portion 660, when the coil 500 is powered on, the electromagnetic induction effect is generated between the coil 500 and the inserting portion 660, thus causing the temperature of the heating element 600 to rise. In addition, the present disclosure also designs the shape of the inserting portion 660 as a rotating body structure. The inserting portion 660 can be inserted into the baking object to heat the baking object 900. After the baking object 900 such as the cigarette is heated and baked, the baking object 900 can be rotated to be separated from the heating portion 600, so that there is no need to set a cigarette removing mechanism. Thus, the electromagnetic heating baking device of the present disclosure has high heating efficiency, simple structure and convenient use.

[0041] Although the respective embodiments have been described one by one, it shall be appreciated that the respective embodiments will not be isolated. Those skilled in the art can apparently appreciate upon reading the present disclosure of this application that the respective technical features involved in the respective embodiments can be combined arbitrarily between the respective embodiments as long as they have no collision with each other. Of course, the respective technical features mentioned in the same embodiment can also be combined arbitrarily as long as they have no collision with each other.

[0042] The foregoing descriptions are merely specific embodiments of the present invention, but are not intended to limit the protection scope of the present invention. Any variation or replacement readily figured out by a person skilled in the art within the technical scope disclosed in the present invention shall all fall within the protection scope of the present invention. Therefore, the protection scope of the present invention shall be subject to the protection scope of the appended claims.

Claims

1. An electromagnetic heating baking device, comprising:

a fixing frame, wherein the fixing frame is provided with a magnetic induction coil, and the magnetic induction coil surrounds an accommo-

- dating cavity;
 an accommodating tube located in the accommodating cavity and configured to receive a baking object; and
 a heating element configured to be inserted into the baking object, wherein the heating element comprises a non-magnetic conducting support column and a metal magnetic conducting tube sleeved over the non-magnetic conducting support column, and the metal magnetic conducting tube is configured to heat the baking object through a magnetic field generated by the magnetic induction coil.
2. The electromagnetic heating baking device according to claim 1, wherein the heating element comprises an inserting portion, the inserting portion is a rotating body structure and is located in the accommodating tube, the inserting portion comprises the hollow tubular metal magnetic conducting tube and the non-magnetic conducting support column, and the outer diameter of the non-magnetic conducting support column matches the inner diameter of the metal magnetic conducting tube.
 3. The electromagnetic heating baking device according to claim 1, further comprising a mounting base, wherein the heating element further comprises a mounting portion, the mounting base is sleeved over the mounting portion, and the mounting base is connected to the fixing frame.
 4. The electromagnetic heating baking device according to claim 3, wherein a cylinder portion is formed at the bottom end of the fixing frame, the cylinder portion is in communication with the accommodating tube, the cylinder portion is configured to mount the mounting base and the mounting portion of the heating element, and the outer wall of the mounting base is fixedly connected or detachably connected to the inner wall of the cylinder portion.
 5. The electromagnetic heating baking device according to claim 3, wherein the inserting portion comprises a top portion and a main body portion, the top portion and the mounting portion are respectively located at the opposite ends of the heating element, the main body portion is located between the top portion and the mounting portion, and the outer diameter of the top portion is gradually reduced in the direction away from the main body portion.
 6. The electromagnetic heating baking device according to claim 5, wherein the top portion, the main body portion, and the mounting portion of the heating element are non-magnetic conducting support columns having the same diameter.
 7. The electromagnetic heating baking device according to claim 2 or 6, wherein the non-magnetic conducting support column is made of ceramic.
 8. The electromagnetic heating baking device according to claim 3, wherein the metal magnetic conducting tube and the mounting base are spaced by a main body portion in between.
 9. The electromagnetic heating baking device according to claim 3, wherein a silicone piece is provided among the mounting portion of the heating element and the fixing frame and the mounting base.
 10. The electromagnetic heating baking device according to claim 1, further comprising a metal tube sleeved over the coil.
 11. The electromagnetic heating baking device according to claim 1, further comprising a main housing, wherein a circuit board and a power supply electrically connected thereto are provided in the main housing, and the coil is electrically connected to the circuit board.
 12. The electromagnetic heating baking device according to claim 11, further comprising a top cover, wherein the accommodating tube is fixedly located inside the top cover, the top cover is sleeved over the fixing frame, and a gap is formed between a top wall of the fixing frame and a top wall of the top cover.
 13. The electromagnetic heating baking device according to claim 12, wherein the top cover is detachably connected to the main housing.
 14. The electromagnetic heating baking device according to claim 12, wherein the bottom end of the outer wall of the fixing frame is fixedly connected to the inner wall of the main housing, and the top cover is detachably sleeved on the upper end of the outer wall of the fixing frame.
 15. The electromagnetic heating baking device according to claim 1, wherein the fixing frame comprises a first cylinder and a second cylinder that are arranged coaxially, the first cylinder is sleeved over the second cylinder, a first cavity is formed between the first cylinder and the second cylinder, a second cavity is formed in the second cylinder, the coil is located in the first cavity and wound around the second cylinder, the accommodating tube is located in the second cavity.
 16. A heating element comprising a non-magnetic conducting support column and a metal magnetic conducting tube sleeved over the non-magnetic conducting support column, wherein a magnetic induc-

tion coil is provided outside the heating element, and the metal magnetic conducting tube is configured to heat a baking object through a magnetic field generated by the magnetic induction coil.

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17. The heating element according to claim 16, further comprising an inserting portion of a rotating body structure, wherein the inserting portion comprises a hollow tubular metal magnetic conducting tube and the non-magnetic conducting support column, and the outer diameter of the non-magnetic conducting support column matches the inner diameter of the metal magnetic conducting tube. 10
18. The heating element according to claim 16, wherein the heating element further comprises a mounting portion, the inserting portion comprises a top portion and a main body portion, the top portion and the mounting portion are respectively located at opposite ends of the heating element, and the main body portion is located between the top portion and the mounting portion, the top portion, the main body portion and the mounting portion of the heating element are non-magnetic conducting support columns with the same diameter. 15 20 25

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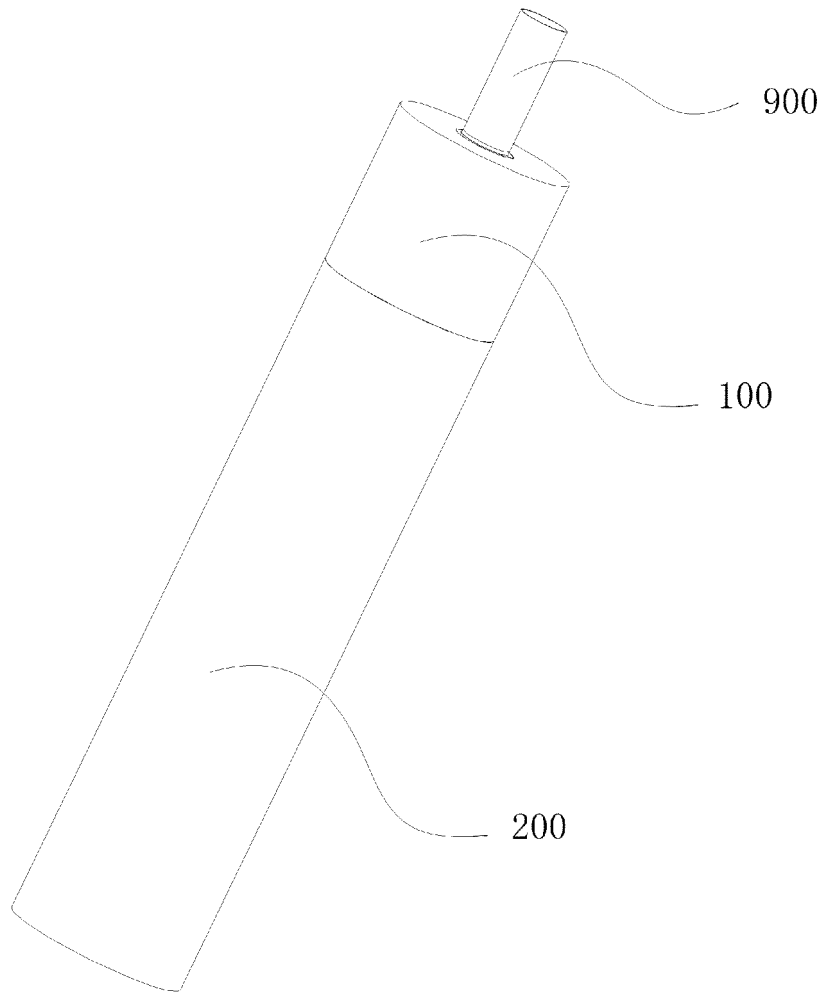


FIG. 1

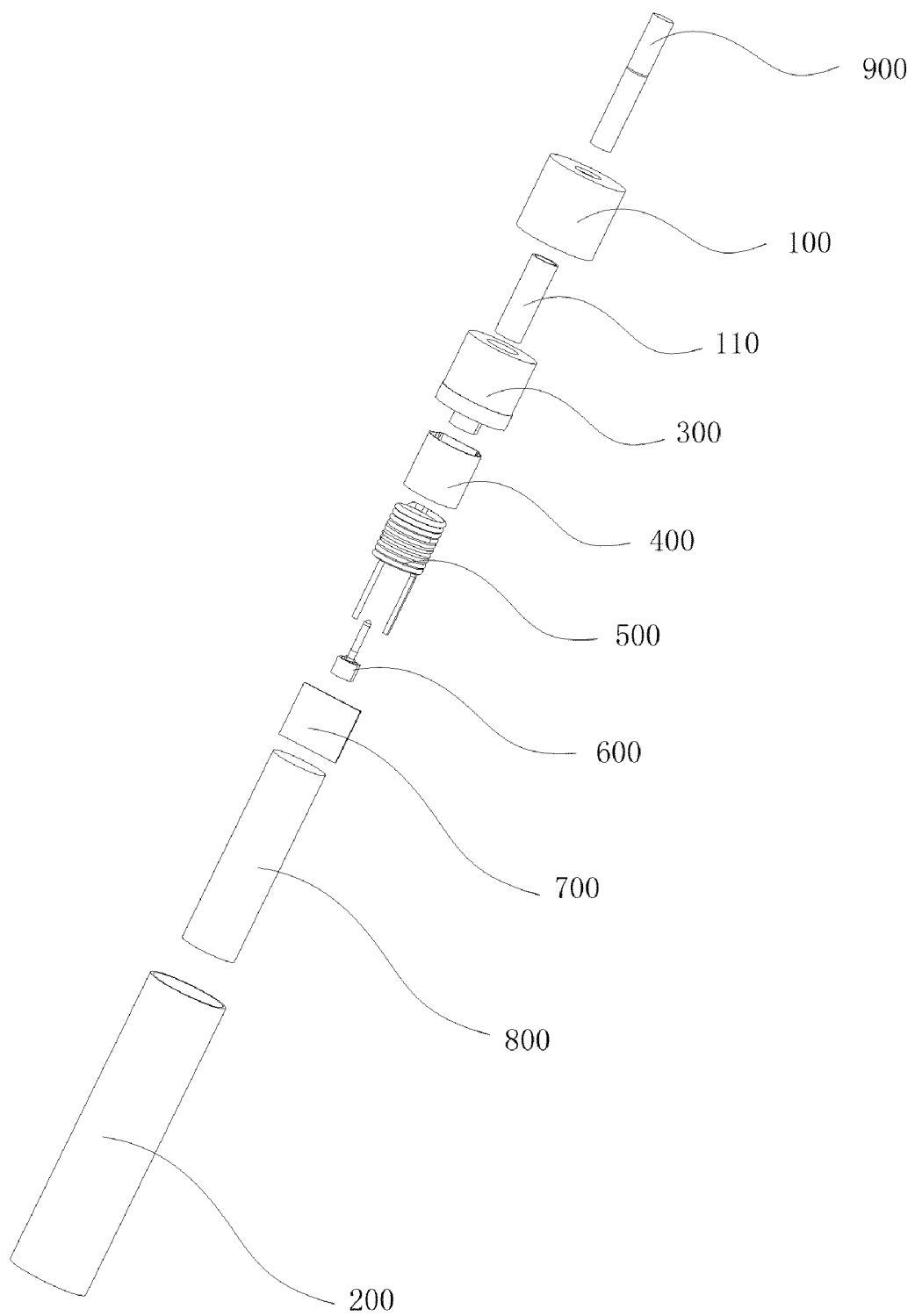


FIG. 2

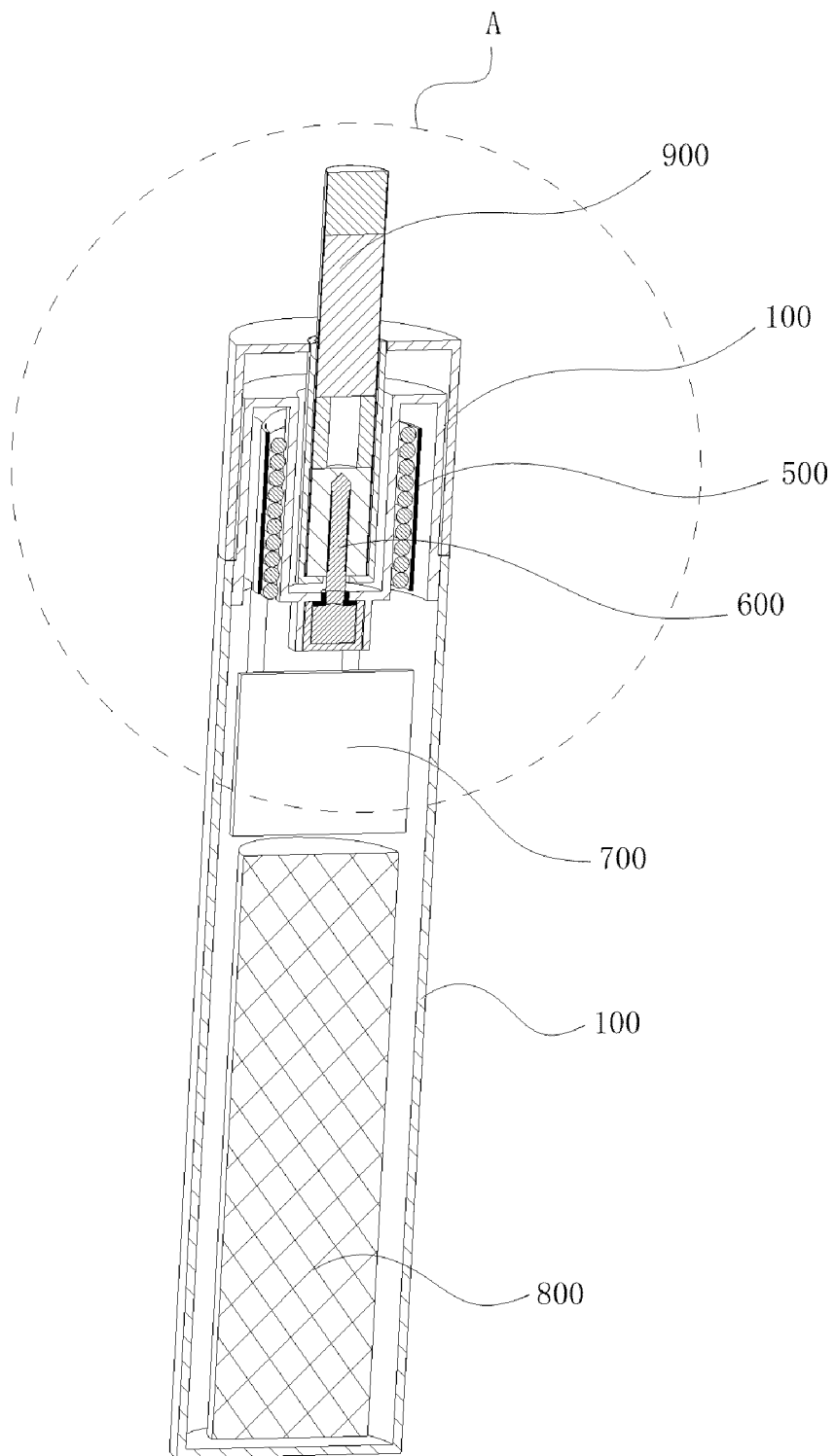


FIG. 3

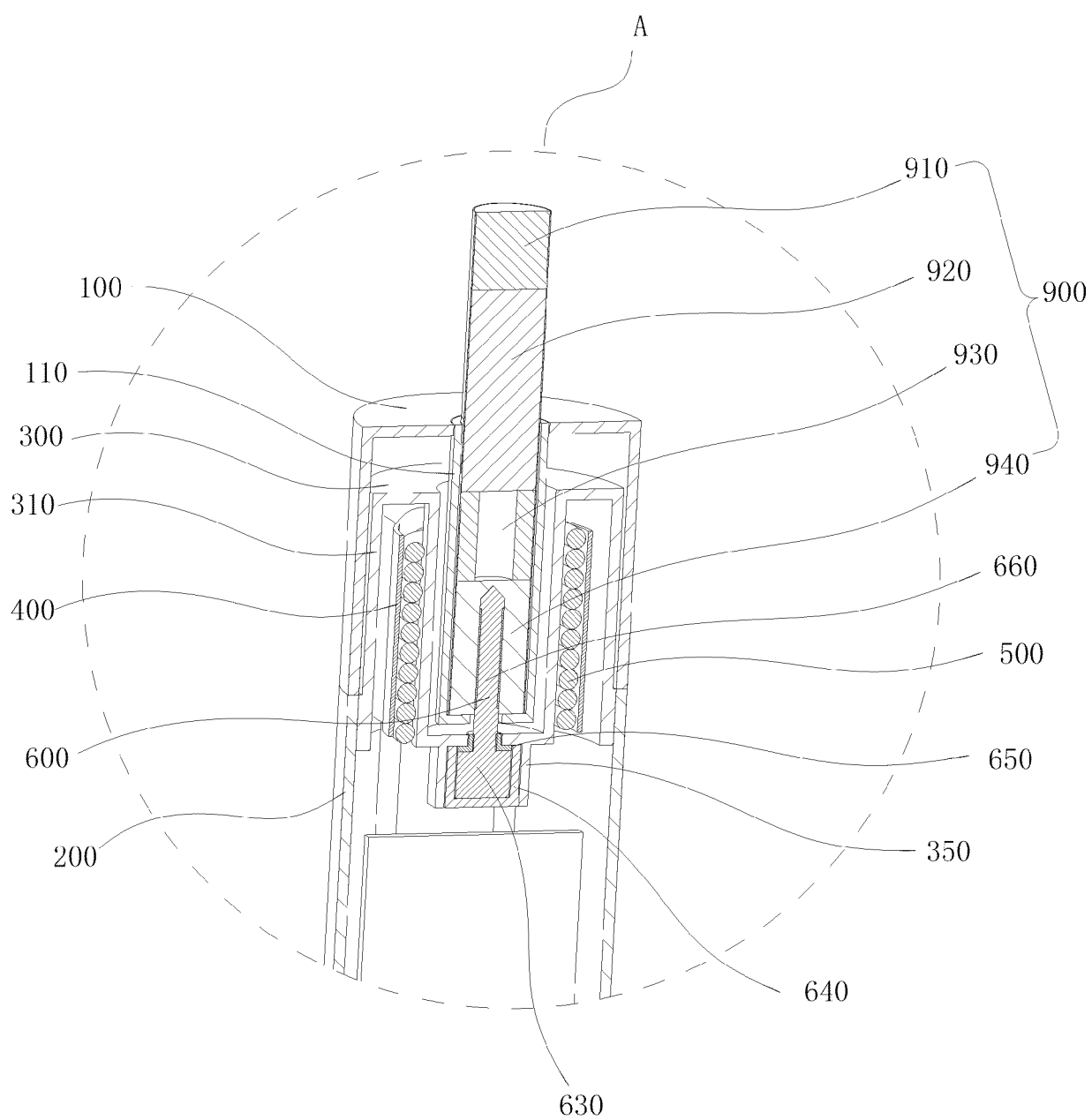


FIG. 4

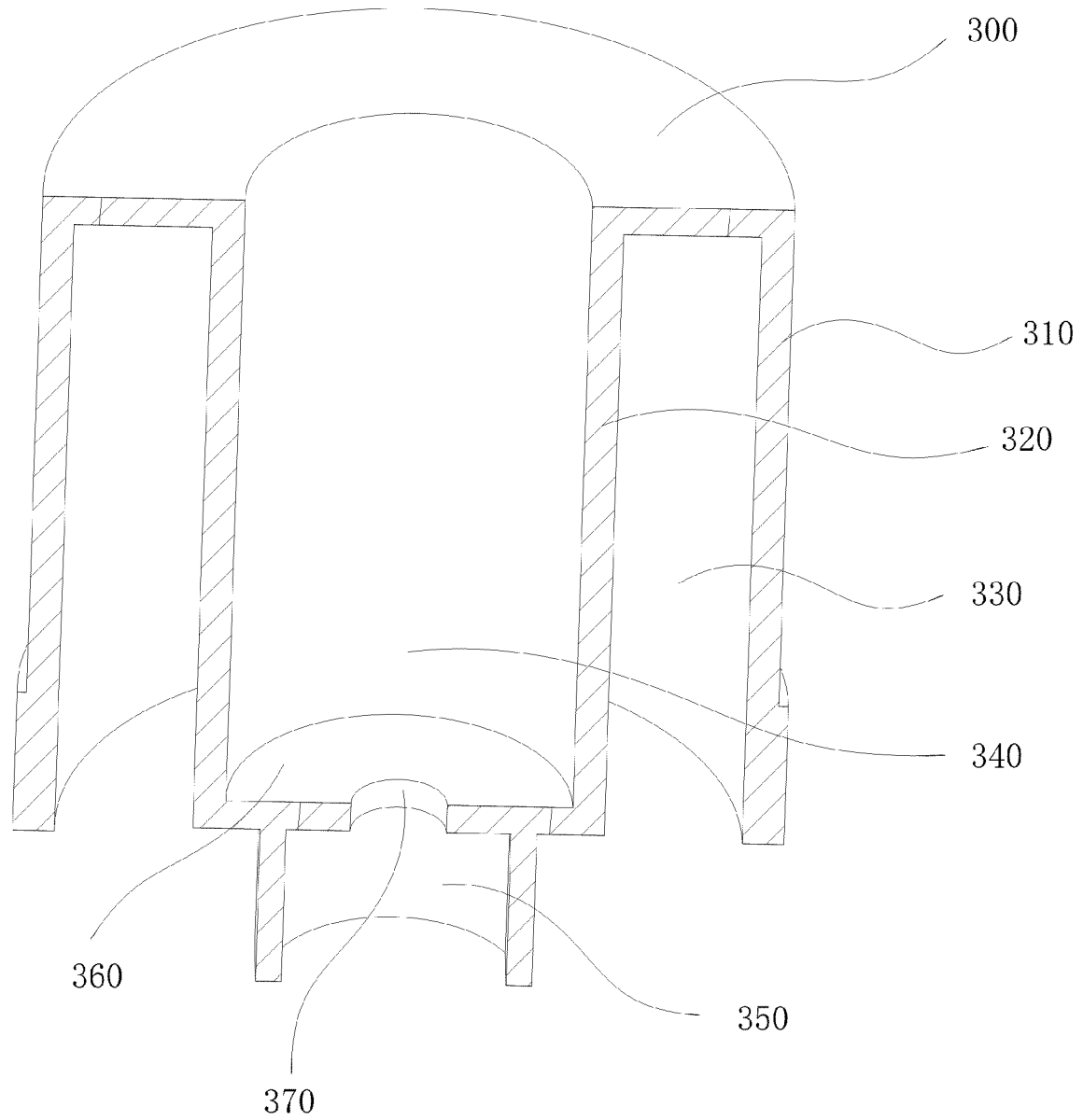


FIG. 5

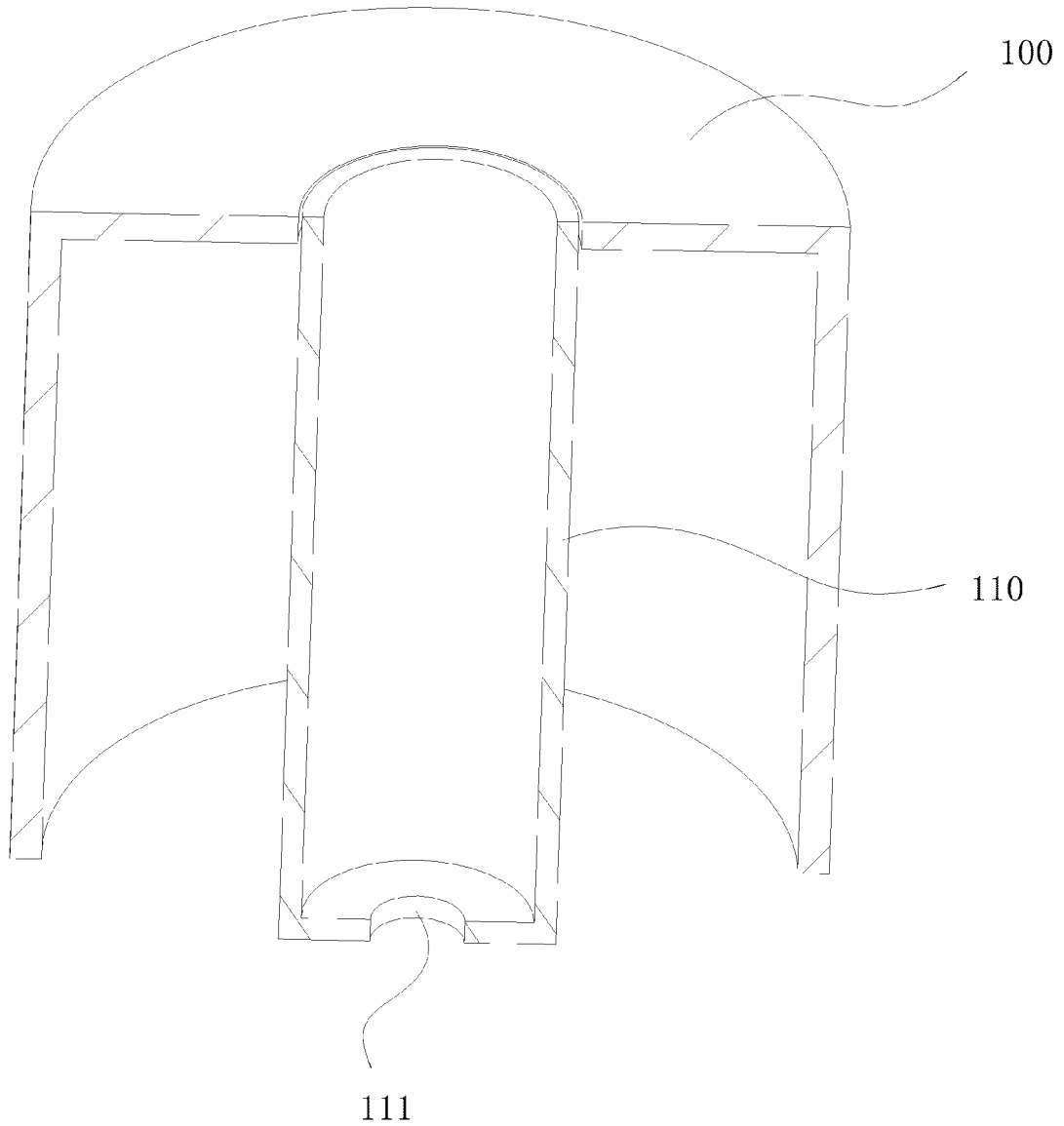


FIG. 6

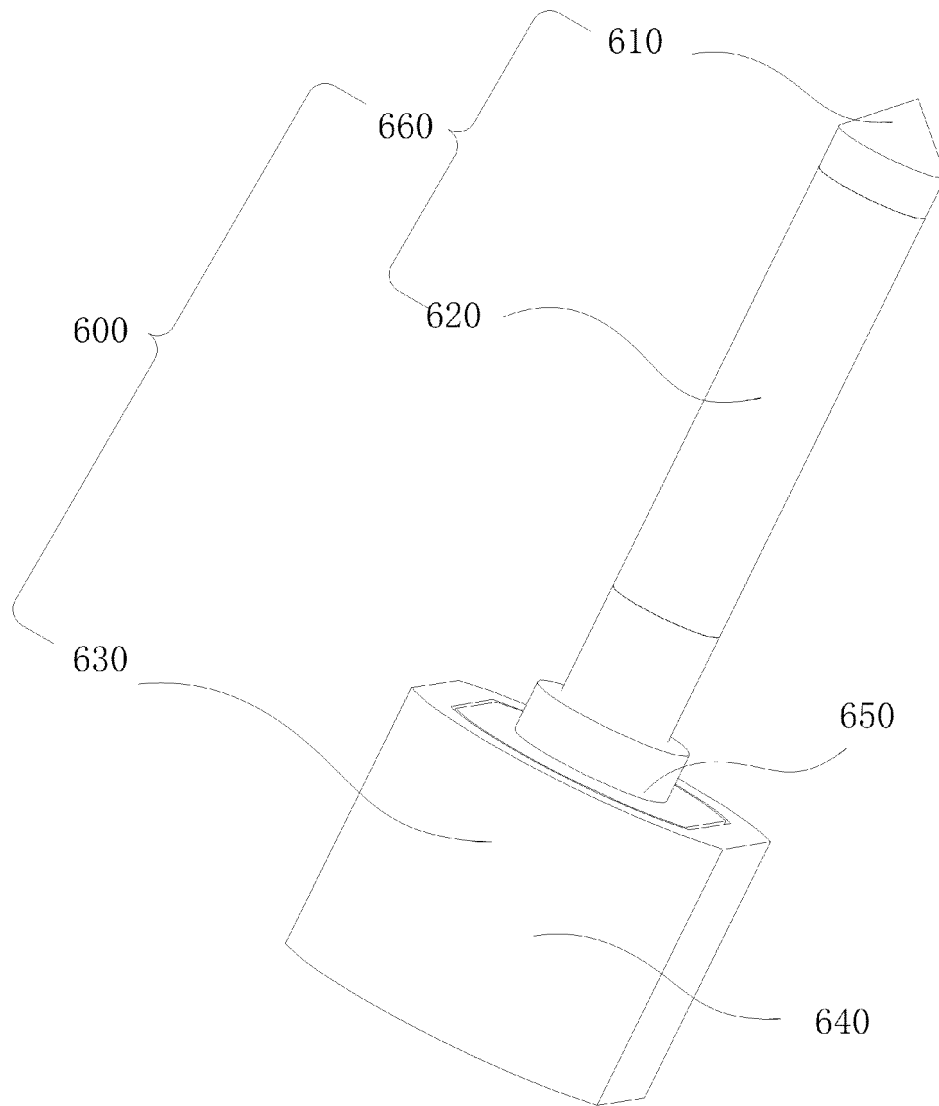


FIG. 7

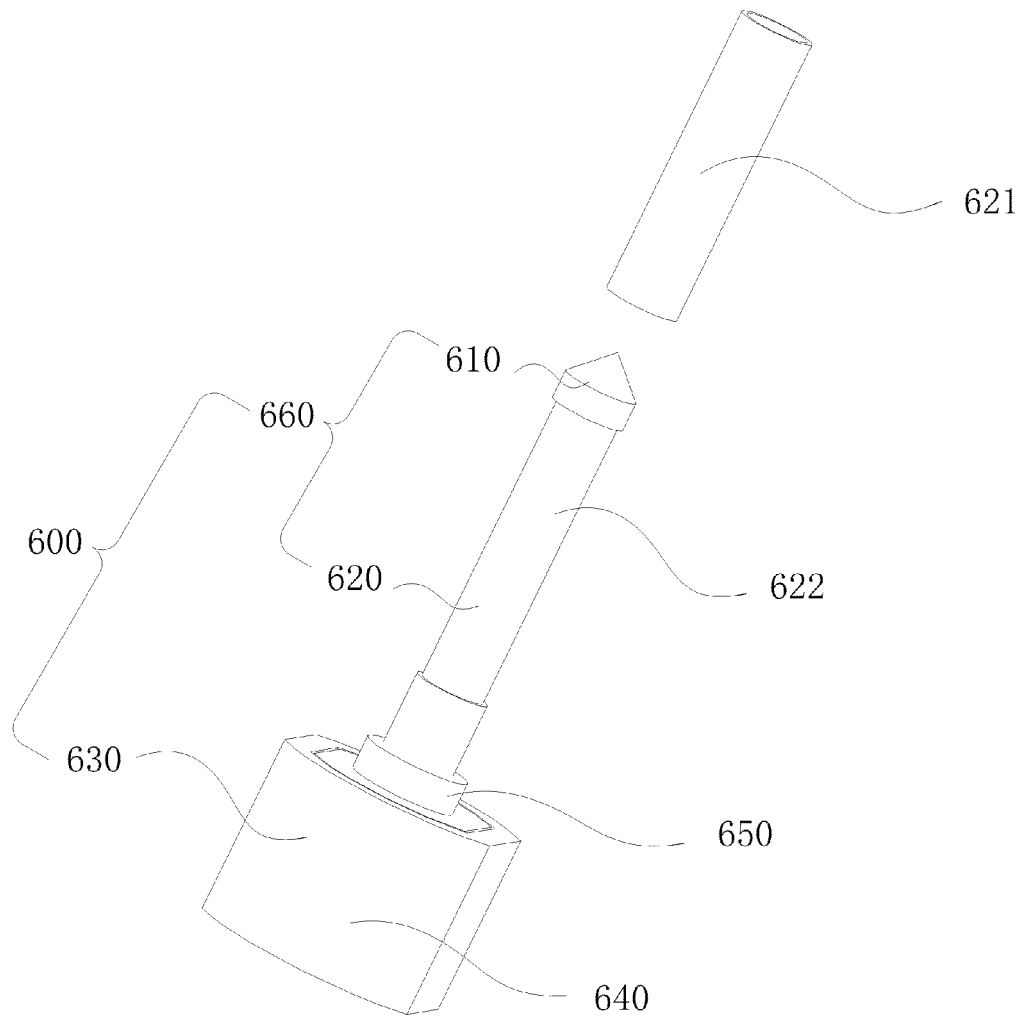


FIG. 8

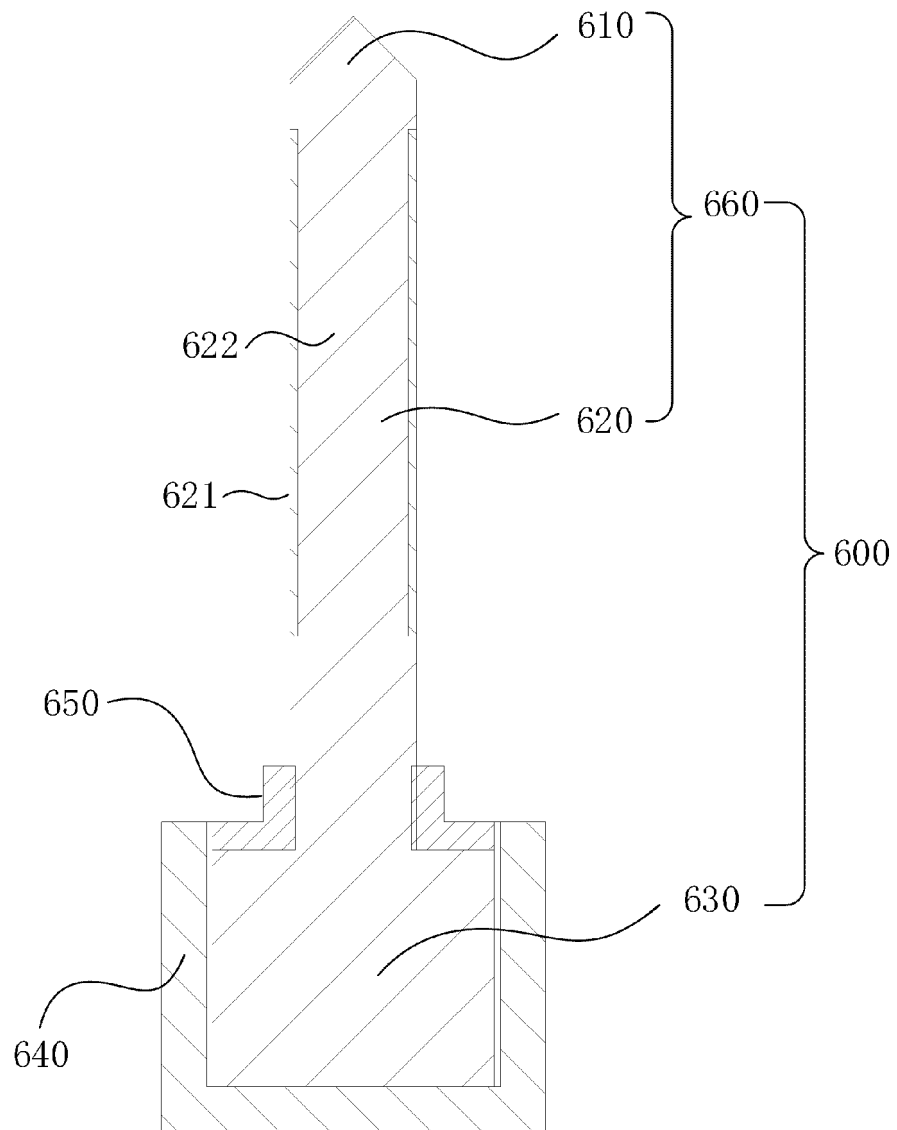


FIG. 9

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2021/072966

5	A. CLASSIFICATION OF SUBJECT MATTER	
	H05B 6/36(2006.01)i	
	According to International Patent Classification (IPC) or to both national classification and IPC	
	B. FIELDS SEARCHED	
10	Minimum documentation searched (classification system followed by classification symbols)	
	H05B	
	Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched	
15	Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)	
	CNABS; CNTXT; CNKI; DWPI; SIPOABS; WOTXT; EPTXT; USTXT: 电磁, 线圈, 导磁, 磁性, 非导磁, 非磁性, 烟, 炊具, 加热, winding?, coil?, heat+, electromagnetic, non-magnetic	
	C. DOCUMENTS CONSIDERED TO BE RELEVANT	
20	Category*	Citation of document, with indication, where appropriate, of the relevant passages
	PX	CN 111278183 A (SHENZHEN MAISHI TECHNOLOGY CO., LTD.) 12 June 2020 (2020-06-12) description, paragraphs [0037]-[0046], and figures 1-9
25	Y	CN 209121868 U (ZHEJIANG SUPOR ELECTRICAL APPLIANCES MANUFACTURING CO., LTD.) 19 July 2019 (2019-07-19) description, paragraphs [0028]-[0046], and figures 1-3
	Y	CN 207766584 U (SHENZHEN FIRST UNION TECHNOLOGY CO., LTD.) 24 August 2018 (2018-08-24) description, paragraphs [0042]-[0062], and figures 1-12
30	A	CN 209807127 U (BOJIE (SHANGHAI) MANAGEMENT CONSULTING CO., LTD.) 20 December 2019 (2019-12-20) entire document
	A	CN 108634375 A (CHINA TOBACCO CHONGQING INDUSTRIAL CO., LTD.) 12 October 2018 (2018-10-12) entire document
35		
	☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.	
40	* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed	
45	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family	
	Date of the actual completion of the international search	Date of mailing of the international search report
	09 March 2021	08 April 2021
50	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	
55	Facsimile No. (86-10)62019451	Telephone No.

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INTERNATIONAL SEARCH REPORT

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C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	CN 207220152 U (CHINA TOBACCO HUNAN INDUSTRIAL CO., LTD.) 13 April 2018 (2018-04-13) entire document	1-18

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

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Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
CN 111278183 A	12 June 2020	CN 211860585 U	03 November 2020
CN 209121868 U	19 July 2019	None	
CN 207766584 U	24 August 2018	EP 3469936 A3	24 July 2019
		JP 6766192 B2	07 October 2020
		EP 3469936 A2	17 April 2019
		JP 2019134701 A	15 August 2019
		KR 20190093147 A	08 August 2019
		US 2019230987 A1	01 August 2019
CN 209807127 U	20 December 2019	None	
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CN 208175984 U	04 December 2018	WO 2019104576 A1	06 June 2019
CN 207220152 U	13 April 2018	CN 109259310 A	25 January 2019

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REFERENCES CITED IN THE DESCRIPTION

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