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(72) Inventeurs/Inventors:
LIU, HUACHEN, CN;
CHEN, YIKUN, CN;
DONG, AIJUN, CN;
KE, WEICHANG, CN;
LIU, BING, CN;
LUO, CHENGHAO, CN;
DENG, TENGFEI, CN

(73) Propriétaire/Owner:

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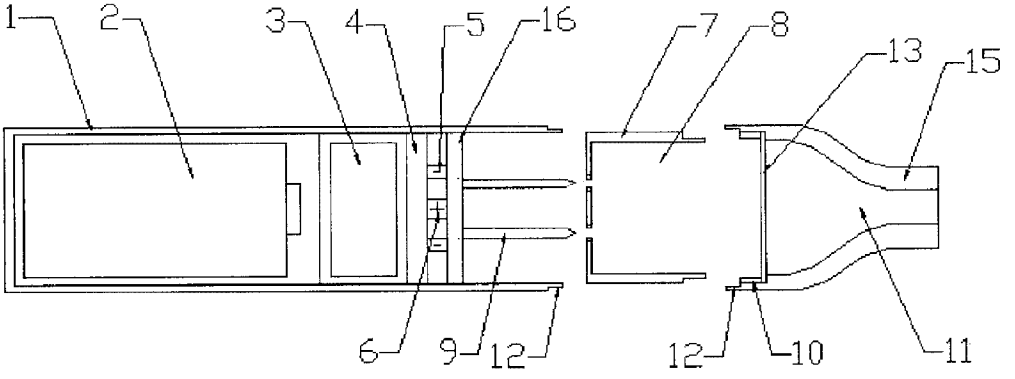
(54) Title: NEEDLE-TYPE HEATER AND PREPARATION METHOD THEREOF, AND ELECTRICALLY HEATED CIGARETTE HAVING SAME



(57) Abrégé/Abstract:
A needle-type heater (9) comprises a needle-shaped heating body and a heat generating element (20). The needle-shaped heating body includes a tapered cap (18) and a heater base (19) that is connected to the bottom portion of the tapered cap (18). The heat generating element (20) is attached to the heater base (19) by means of a print coating process. A preparation method of the needle-type heater (9) and an electrically heated cigarette having the needle-type heater (9) are also provided. The needle-type heater (9) can sufficiently heat a tobacco product. Furthermore, it is more convenient to insert a tobacco product into the heating chamber (8), such that tobacco product replacement can be easily conducted. Therefore, more convenient usage is achieved.

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(73) Propriétaires(suite)/Owners(continued):HUBEI CHINA TOBACCO INDUSTRY CO., LTD., CN
(74) Agent: BURRI, STEPHEN R.

ABSTRACT

A needle-type heater (9) comprises a needle-shaped heating body and a heat generating element (20). The needle-shaped heating body includes a tapered cap (18) and a heater base (19) that is connected to the bottom portion of the tapered cap (18). The heat generating element (20) is attached to the heater base (19) by means of a print coating process. A preparation method of the needle-type heater (9) and an electrically heated cigarette having the needle-type heater (9) are also provided. The needle-type heater (9) can sufficiently heat a tobacco product. Furthermore, it is more convenient to insert a tobacco product into the heating chamber (8), such that tobacco product replacement can be easily conducted. Therefore, more convenient usage is achieved.

DESCRIPTION

NEEDLE-TYPE HEATER AND PREPARATION METHOD THEREOF, AND ELECTRICALLY HEATED CIGARETTE HAVING SAME

TECHNICAL FIELD

[0001] The invention relates to the field of novel cigarette technology, in particular to a needle heater, a preparation method thereof and an electric heating cigarette with a needle heater.

BACKGROUND

[0002] Cigarette burning generally needs to reach above 800 ° C, and various gas products and distillates produced by combustion are released from the tobacco. During the burning process of cigarettes, the essence and fragrances added to the tobacco products are burned and decomposed as the cigarettes burn, destroying the original quality of the essence and fragrances. In order to reduce the smoking temperature of the cigarette, the tobacco is specially treated and then heated by means of a heater. At present, the heater of the electric heating product on the market adopts a chip heater, and the heated cigarettes are set in a longitudinally ordered manner, but the heater cannot be directly inserted into the traditional cigarette cigarettes.

[0003] In addition, the current technology of the new cigarette which

heats the cigarette by external heating instead of burning by the tobacco itself, to achieve the effect of generating smoke by heating the tobacco product to the atomization temperature, which reduce the harmfulness of the combustion of the cigarette substance to reduce the harm of secondhand smoke to non-smokers. However, the heater of the current technology heats the tobacco product (for example, the tobacco cartridge) can only heat one end or the outer wall, it is impossible to effectively heat the tobacco products as a whole, especially the internal tobacco, and because of insufficient heating, it will cause some tobacco residues to be heated and it is difficult to clean up.

SUMMARY

[0004] In order to solve the disadvantages in the prior art, the disclosure provides a novel of needle-type heater、preparation method and electrically heated cigarette having same, the needle heater can fully heat the end and the inside of the tobacco product, and the tobacco product can be inserted into the heating chamber more conveniently, and the tobacco product can be easily replaced, which is more convenient to use.

[0005] The technical solution adopted by the disclosure is as below:

[0006] A novel of needle-type heater, characterized by comprising a needle-shaped heating body and a heat generating element, The needle-shaped heating body includes a tapered cap and a heater base that is connected to the bottom portion of the tapered cap, The heat generating

element is attached to the heater base by means of a print coating process.

[0007] Further, the shape of the tapered cap is circular cone, quadrihedron or triangular pyramid, therefore the shape of the heater base correspond to cylinder, elliptic cylinder or triangular prism.

[0008] Further, there is electrode set on the tail of the heater base, which connected to the battery and the controller by the electrode wire.

[0009] A novel of preparation method of the needled-type heater, characterized by comprising below steps:

[0010] Dosing、material mixing: take alumina powder with D50<0.8μm and put into the ball mill, add a certain amount of ball grinding beads into the ball mill and make the make the ratio of alumina powder: ball mill mass is 1:2, then add binder that accounts for 3-15% of the total mass of the raw materials, keep ball milling to make the alumina powder and the binder mixing evenly;

[0011] Pugging: Take out the mixed powder, add lubricant that accounts for 3-10% of the total mass of the raw materials, then add water that accounts for 15-20% of the total mass of the raw materials, stirring well to make them mix evenly, take out the mixed pug, put it into the rough mud machine for roughly mudding, and repeatedly mudding for at least 3 times to get the alumina mud;

[0012] Staling: The alumina mud is wrapped in plastic wrap and aged for

at least 48 hours to obtain a 96-ceramic flexible ceramic body;

[0013]Ceramic body cutting: The alumina 96-ceramic flexible ceramic body is die-cut on a mechanical punch, and the required size of the heater base and the heater supporter is obtained after punching;

[0014] Printing: Resistive paste is printed on the stamped flexible ceramic body to form a heating element, and an electrode that connected to the heat generating elementis printed at the same time in a dust-free environment;

[0015]Wrapping: Another alumina ceramic rod core is used to wrap the flexible ceramic body with printed heating elements and electrodes on the alumina ceramic rod core;

[0016] Molding: Forming a needle-shaped ceramic body by warm isostatic pressing at a temperature of 95~100 °C by a warm isostatic press;

[0017] Ceramic body repairing: The formed heated ceramic sleeve is stamped with a punch and a cone cap is formed at the same time, and the size is proofed and corrected;

[0018]Pre-firing of the ceramic body: The temperature of the repaired ceramic sleeve body increases from normal temperature to 500 °C at <5 °C /min in the disintegrated furnaces, the temperature holding times are: 100 °C, 200 °C, 300 °C, 400 °C, each temperature holding for 30 min. The highest discharge temperature is 500 ° C for 120 min, so that the

organic matter is fully drained;

[0019] The ceramic body is fired: The temperature is raised to 500 ° C at 10 ° C / min and is heated to 1650 ° C at a temperature of < 5 ° C / min to make the ceramic sleeve body to be fired to form a heated ceramic sleeve in a reducing atmosphere filled with hydrogen, the temperature holding times are: 700 ° C, 900 ° C, 1100 ° C, 1300 ° C, each temperature holding for 30min, the highest firing temperature 1500 ° C holding for 120min;

[0020] Welding: Soldering electrode wire to the heated ceramic sleeve at the electrode portion;

[0021] Tin immersion: The soldering point of the soldered heating ceramic sleeve is immersed in tin, and the tin immersion time is 2~3s.

[0022] Further, the alumina powder is mixed by one or more of alumina or alumina and aluminum nitride, vein quartz, sandstone, quartzite, quartz sand, vermiculite, diatomaceous earth, mullite, cordierite, wollastonite, andalusite, limestone, quartz, kaolin, potassium oxide, sodium oxide, calcium oxide, magnesium oxide, iron oxide, and titanium oxide.

[0023] Further, the lubricant is composed of soybean oil and tung oil, wherein the soybean oil accounts for 40% by mass and the tung oil accounts for 60% by mass.

[0024] Further, the binder is one or a mixture of carboxymethyl cellulose, agar, gelatin and xanthan gum.

[0025] A novel of preparation method of the needled-type heater,

characterized by comprising below steps:

[0026] Surface pretreatment: The flexible 1.8mm alumina 96-ceramic flexible ceramic rod treated by CNC premixed liquid is prepared for printing according to the printing pretreatment process;

[0027] Curved printing: W-Mn slurry is printed on an alumina rod using a curved printing machine to form a heat generating elementand an electrode connected to the heat generating elementin a dust-free environment;

[0028] Pre-firing: The alumina 96-ceramic flexible ceramic rod in 1.8mm diameter with printed heat generating elementand electrode is pre-fired at 500 °C, and is heated from normal temperature to 500 °C at <5 °C /min, the temperature holding time are: 100 °C, 200 °C, 300 °C, 400 °C, each temperature holding for 30 min. The highest discharge temperature is 500 ° C for 120 min, so that the organic matter is fully drained.

[0029] The temperature is raised to 500 ° C at 10 ° C / min and is heated to 1450 ° C at a temperature of < 5 ° C / min in a reducing atmosphere of wet H2/N2, the temperature holding times are: 700 ° C, 900 ° C, 1100 ° C, 1300 ° C, each temperature holding for 30min, the highest firing temperature 1450 ° C holding for 60 min.

[0030] Glass slurry immersion: Immersed in the glass slurry for 1~2 s to uniformly coat the glass paste on the treated alumina rod after cooling the

fired alumina rod to room temperature.

[0031] Drying: The immersed alumina rod is dried in a constant temperature blast drying oven at 40 ° C, 60 ° C, 80 ° C, 100 ° C, drying for 2 h for each temperature, and dried at 120 ° C for 4 h.

[0032] Firing: Glass-packed firing at a temperature rise rate of <5 ° C / min to 1000 ° C, the maximum temperature holding time is 30 min.

[0033] Nickel plating and welding: The fired ceramic needle is nickel plated at the electrode and fixed with a special mold, the circuit leads are soldered under a dry H2/N2 atmosphere at a temperature of 790 °C.

[0034] Tin immersion: The soldering point of the soldered heating ceramic sleeve is immersed in tin, and the tin immersion time is 2~3s.

[0035] A novel of an electric heated cigarette with a needle-type heater, which comprising a power pole and an auxiliary inserter, the power pole comprises an outer casing with an open end and a power supply device and a heat generating element set in the outer casing, the heat generating element comprises a heater base and a needle-type heater mounted on the heater base, the needle-type heater comprising a cone cap and a heater base connected to the bottom of the cone cap, the heat generating element attached to the heater base by coating printing, the auxiliary inserter is a cavity structure which is open at one end and can be inserted for the outer casing, and has a perforation at the bottom for insertion of the needle heater, the inner wall of the auxiliary inserter encloses a heating chamber

for loading the tobacco product, and the needle-type heater is perforated from the perforation so that it can be inserted into the heating chamber to penetrate into the tobacco product.

[0036] Further, it is further comprising a cigarette holder, the open end of the auxiliary inserter is detachably connected to the cigarette holder, and the open end of the outer casing is detachably connected to the cigarette holder.

[0037] Further, the heater base is fixedly connected to the outer casing, the needle-type heater is fixed on the heater base in the axial direction of the outer casing, and the tip end of the needle heater is close to the open end of the outer casing.

[0038] Further, the needle heater is one; or two or three, set in a straight line; or the needle heater has three, set in an equilateral triangle; or the needle heater has four, arranged in a square.

[0039] Further, the power supply device comprises a battery, a controller, an electrode, and an electrode base is further disposed in the outer casing, the electrode is mounted on the electrode base, the battery is coupled to the electrode through the controller, and the electrode is coupled to the heater base.

[0040] Further, the cigarette holder cavity is formed inside the cigarette holder, and a porous partition is arranged at one end of the cigarette holder cavity where near the outer casing.

[0041] Further, the length of the needle-type heater is 8mm-35mm while the diameter is 0.6mm-3.0mm.

[0042] Further, the length of the needle-type heater is 10mm-25mm while the diameter is 0.8mm-2.5mm.

[0043] Further, the tobacco products are prepared into cylinders, cubes or cuboids and wrapped in wrapping material.

[0044] Advantageous effects of using this disclosure are as below: （1）The diameter of the heater can be significantly reduced to better match the existing cigarette structure with using this coating form; （2）The external glaze seal for the heat generating element can improve the thermal efficiency, the heat transferring is faster, and improve the oxidation resistance for the heating element; （3）Several types of heaters can better match the existing cigarette structure, no major modifications to existing equipment are required, and reduce the cost of cigarettes; （4）The structure of the needle heater can be more easily inserted into the cigarette, reducing the change of the density of the tobacco in the cigarette during the insertion of the cigarette, and ensuring the uniformity of the suction and suction resistance; （5）This novel of heater has high strength, high temperature resistance, it is easy cleaning, and can work at high temperature for a long time; （6）Heating the ends and interior of the tobacco product simultaneously by designing the heater base and the pin heater in the power pole, compared with the prior art, the heating is more

sufficient, and the addition of the auxiliary inserter can insert the tobacco product conveniently to couple with the needle heater, which is convenient for the user to use.

BRIEF DESCRIPTION OF THE DRAWINGS

[0045] FIG. 1 is a decomposed structure diagram of the embodiment I of the electric heated cigarette with a needle-type heater in the disclosure;

[0046] FIG. 2（a） is a side section view of the embodiment I of the electric heated cigarette with needle-type heater after assembly in the disclosure, FIG 2（b） is the sectional view of FIG 2（a）;

[0047] FIG. 3（a） is a side section view of the embodiment II of the electric heated cigarette with needle-type heater after assembly in the disclosure, FIG 3（b） is the sectional view of FIG 3（a）;

[0048] FIG. 4（a）is a side section view of the embodiment III of the electric heated cigarette with needle-type heater after assembly in the disclosure, FIG 4（b） is the sectional view of FIG 4（a）;

[0049] FIG. 5（a） is a side section view of the embodiment II of the electric heated cigarette with needle-type heater after assembly in the disclosure, FIG 5（b） is the sectional view of FIG 5（a）;

[0050] FIG. 6 is a structure schematic drawing of one of the embodiment of the needle-type heater in the disclosure;

[0051] FIG. 7 is a unfolded side section view of one of the embodiment of the needle-type heater in the disclosure;

[0052] FIG. 8 is the structure schematic drawing of the layout of the electrode on the bottom of the heater base of one of another embodiment of the needle-type heater in the disclosure;

[0053] FIG. 9 is the preparation process flow chart of the needle-type heater of the electric heated cigarette in the disclosure;

[0054] In the figures, 1,outer casing, 2,battery, 3,controller, 4,electrode base, 5,negative electrode, 6,positive electrode, 7,auxiliary inserter, 8,heating chamber, 9,needle-type heater, 10,tobacco holder interface, 11,cigarette holder cavity, 12, housing interface, 13, porous partition, 14, positioning hole, 15,cigarette holder, 16,heater base, 17,heater supporter, 18,cone cap, 19,heater base , 20,heating element, 21,electrode wire.

DESCRIPTION OF THE EMBODIMENTS

[0055] In combination with the accompanying drawings, the technical scheme in the disclosure is described clearly and completely.

[0056] Embodiment I

[0057] FIG. 1 and FIG. 2 show an electric heating cigarette with a needle-type heater in the form of a two-needle structure according to the disclosure, and FIG. 1 is a three-part structural form of a split, the three parts are a power rod, an auxiliary inserter 7 and a mouthpiece 15 in turn.

[0058] Wherein the power rod comprising battery 2, controller 3, electrode（negative electrode 5, positive electrode 6）, there are electrode base and heater base set in the outer casing 1, negative electrode 5 and

positive electrode 6 mounted on the electrode base 4, needle-type heater 9 mounted on heater base 16 to form the heating element, battery 2 connected to the electrode（negative electrode 5, positive electrode 6）by the controller 3, electrode （negative electrode 5, positive electrode 6）connected to the heater base 16, the heater base 16 receives power from the battery 2 and is heated to the needle-type heater 9.

[0059] The battery 2 can be a rechargeable battery, the controller 3 is a component that controls the power supply device to supply power to the heating element, and controls the heat generating element according to a preset temperature, when the temperature is higher than the preset temperature, the controller 3 stops supplying power to the heating element, and when the temperature is lower than the preset temperature, the controller 3 supplies power to the heating element, one working cycle is controlled by the controller 3, generally no more than 7 minutes, usually preset 3mins-6mins. The heating temperature of the heat generating element from 150 ° C to 360 ° C, preferably from 180 ° C to 340 ° C, more preferably from 250 ° C to 320 ° C.

[0060] The needle-type heater 9 has a needle-like or rod-like structure, the heater base 16 is fixedly coupled to the outer casing 1, and the needle heater 9 is fixed to the heater base 16 in the axial direction of the outer casing 1, and the tip of the needle-type heater 9 is set near the open end of the outer casing. The length of needle-type heater 9 is from 8 mm to 35

mm, preferably from 10 mm to 25 mm, and the diameter is from 0.6 mm to 1.8 mm, preferably from 0.8 mm to 1.4 mm. The auxiliary inserter 7 is a cavity structure in which one end is open to insert the outer casing 1 to the inner cavity, and a perforation corresponding to the pin heater 9 is provided at the bottom thereof so that the needle heater 9 is inserted. The inner wall of the auxiliary inserter 7 encloses a heating chamber 8 for loading the tobacco product, the needle heater 9 is inserted into the heating chamber 8 after being inserted through the perforation, it will be understood that the length of the needle heater 9 is less than or equal to the heating chamber depth of heating chamber 8. T he open end of the auxiliary inserter 7 is closely connected with the cigarette holder 15 by means of a thread, a grinding ring, a rubber ring or a buckle.

[0061] One end of the outer casing 1 is open, the battery 2 is set at the bottom of the outer casing 1, and the open end is detachably connected to the cigarette holder 15, for example, the outer wall of the outer side of the outer casing 1 is provided with a casing interface 12, and one end of the cigarette holder 15 is also provided with a casing interface 12, both of which can be removable fixed connection by means of plug or screw connection. Cigarette holder cavity 11 is formed inside the cigarette holder 15 , and a porous partition 13 is arranged at one end of the cigarette holder cavity 11 near the outer casing 1, the porous partition 13 is arranged to prevent the tobacco product from entering the cigarette

holder cavity and affecting the suction feeling.

[0062] In another embodiment, the cigarette-type cigarette is directly inserted into the auxiliary inserter 7, and the cigarette is inserted into the needle heater 9 without the cigarette holder 15.

[0063] In this embodiment, there are two needle-type heaters 9, and two perforations are provided at the bottom of the corresponding auxiliary inserter 7, as shown in Fig. 2(b), which is symmetrically disposed at the bottom center of the auxiliary inserter 7.

[0064] In the process of using electric heated cigarette, the tobacco product to be heated is added to the heating chamber 8 of the auxiliary inserter 7 after the auxiliary inserter 7 and the mouthpiece 15 are first removed, then the auxiliary inserter 7 and the mouthpiece 15 are integrally formed by the tobacco holder interface 10, and then the positioning holes 14 are aligned and inserted together into the needle-type heater 9, the tip end of the needle-type heater 9 extends into the heating chamber 8 through the perforation at the bottom of the auxiliary inserter 7, thereby penetrating into the tobacco product loaded in the heating chamber 8. The battery 2 is controlled to input the current of the needle-type heater 9 by controlling the controller 3 to realize heating and temperature control of the tobacco product, and maintaining the atomization temperature at 250 ° C - 320 ° C.

[0065] In this embodiment, according to the structural form of the heating

needle inserted into the heating chamber 8, in this embodiment, there are only 2 needle heaters 9, since the needle-type heater changes the density of the tobacco product during insertion into the tobacco product, the total quality of the prepared tobacco product is maintained at 600 mg-700 mg.

[0066] The preparation process of the tobacco product in this embodiment is as follows: After the tobacco leaves are dried and pulverized, 1000 g of tobacco powder of less than 100 mesh is screened, 100 g of seaweed gum is weighed, dissolved in 500 g of water and stirred and mixed with the tobacco powder, prepared into tobacco sheets and dried, 150 g atomizing agent which the glycerin: propylene glycol = 4:1 was added after shredding the sheets, and then baked at 60 ° C for 30 mins for spare. At the same time, weigh 1000g of tobacco, spray 150g of glycerol: propylene glycol = 1:3 atomization agent, and then baked at 60 °C for 30mins for spare. The prepared tobacco sheet and cut tobacco are mixed according to the ratio of the weight of the tobacco sheet: cut tobacco = 1:2, then adding 4% tobacco extract of the total weight of the tobacco product to the and 1% essence and flavor of the total weight of the tobacco product, and then wrapping it with aluminum foil to prepare a form of tobacco cartridge.

[0067] The structure of the tobacco cartridge in the form of aluminum foil wrapped in the present example is put into the heating chamber 8 and smoothly inserted into the heater 9 along with the cigarette holder, and

the smoke is rapidly generated during the heating process, which satisfies the demand for smoking alkali.

[0068] Embodiment II

[0069] FIG.3 shows an electric heating cigarette with a needle heater in the form of a three-needle structure according to the disclosure, the other structural parts are basically the same as those in FIG. 2.

[0070] In this embodiment, there are three needle-type heaters 9, which are arranged in a straight line, since the needle-type heater changes the density of the tobacco product during insertion into the tobacco product, the total quality of the prepared tobacco product is maintained at 500 mg-600 mg to facilitate the insertion of tobacco products.

[0071] The preparation process of the tobacco product in this embodiment is as follows: After the tobacco leaves are dried and pulverized, 1000 g of tobacco powder of less than 100 mesh is screened, 50 g of carrageenan, 50 g of agar are weighed, dissolved in 500 g of water and stirred and mixed with the tobacco powder, prepared into tobacco sheets and dried, 150 g atomizing agent which the glycerin: propylene glycol = 3:1 was added after shredding the sheets, and then baked at 60 ° C for 30 mins for spare. At the same time, weigh 1000g of tobacco, spray 150g of glycerol: propylene glycol = 2:1 atomization agent, and then baked at 60 °C for 30mins for spare. The prepared tobacco sheet and cut tobacco are mixed according to the ratio of the weight of the

tobacco sheet: cut tobacco = 3:5, then adding 5% tobacco extract of the total weight of the tobacco product to the and 1% essence and flavor of the total weight of the tobacco product, and then wrapping it with aluminum foil to prepare a form of tobacco cartridge.

[0072] The structure of the tobacco cartridge in the form of aluminum foil wrapped in the present example is put into the heating chamber 8 and smoothly inserted into the heater 9 along with the cigarette holder, and the smoke is rapidly generated during the heating process, which satisfies the demand for smoking alkali.

[0073] Embodiment III

[0074] FIG.4 shows an electric heating cigarette with a needle heater in the form of a three-needle structure according to the disclosure, the difference from the structure in Embodiment 3 is that the three-needle structure is arranged in an equilateral triangle, and the other structural portions are basically the same as the structure in FIG.2.

[0075] In this embodiment, there are three needle heaters 9, since the needle-type heater changes the density of the tobacco product during insertion into the tobacco product, the total quality of the prepared tobacco product is maintained at 500 mg-600 mg.

[0076] The preparation process of the tobacco product in this embodiment is as follows: After the tobacco leaves are dried and pulverized, 1000 g of tobacco powder of less than 100 mesh is screened,

80g of carboxymethylcellulose and 25g of sodium alginate are weighed, dissolved in 500 g of water and stirred and mixed with the tobacco powder, prepared into tobacco sheets and dried, 140 g atomizing agent which the glycerin: propylene glycol = 3:1 was added after shredding the sheets, and then baked at 60 ° C for 30 mins for spare. At the same time, weigh 1000g of tobacco, spray 150g of glycerol: propylene glycol = 3:2 atomization agent, and then baked at 60 °C for 30mins for spare. The prepared tobacco sheet and cut tobacco are mixed according to the ratio of the weight of the tobacco sheet: cut tobacco = 2:3, then adding 5% tobacco extract of the total weight of the tobacco product to the and 1% essence and flavor of the total weight of the tobacco product, and a kind of tobacco mint of flavor precursors, such as menthol ester, is added to the essence and flavor of the tobacco used in this embodiment, and then wrapping it with aluminum foil to prepare a form of tobacco cartridge.

[0077] The structure of the tobacco cartridge in the form of aluminum foil wrapped in this embodiment is put into the heating chamber 8 and smoothly inserted into the heater 9 along with the cigarette holder, and the smoke is rapidly generated during the heating process, the addition of menthyl esters of flavor precursors, the tobacco cartridge has no obvious mint fragrance, during use, there is a clear cooling sensation of mint, this new type of heated cigarette can reach the temperature of decomposition of menthyl ester and improve the coolness of smoke.

[0078] Embodiment IV

[0079] FIG.5 shows an electric heated cigarette with a needle-type heater in the form of a four-needle structure according to the disclosure, in this embodiment, the four-needle structure is in a square arrangement, and the other structural portions are substantially the same as the structure in FIG.2.

[0080] In this embodiment, there are four needle heaters 9, since the needle-type heater changes the density of the tobacco product during insertion into the tobacco product, the total quality of the prepared tobacco product is maintained at 400 mg-500 mg.

[0081] The preparation process of the tobacco product in this embodiment is as follows: After the tobacco leaves are dried and pulverized, 1000 g of tobacco powder of less than 100 mesh is screened, 80g of carboxymethyl cellulose, agar 30g are weighed, dissolved in 500 g of water and stirred and mixed with the tobacco powder, prepared into tobacco sheets and dried, 150 g atomizing agent which the glycerin: propylene glycol = 3:1 was added after shredding the sheets, and then baked at 60 ° C for 30 mins for spare. At the same time, weigh 1000g of tobacco, spray 150g of glycerol: propylene glycol = 2:1 atomization agent, and then baked at 60 °C for 30mins for spare. The prepared tobacco sheet and cut tobacco are mixed according to the ratio of the weight of the tobacco sheet: cut tobacco = 1:1, then adding 4% tobacco extract of the

total weight of the tobacco product to the and 1.5% essence and flavor of the total weight of the tobacco product, and a kind of cigarette vanillin glycoside of flavor precursors, such as vanillin glucoside, is added to the essence and flavor to the tobacco used in this embodiment, and then wrapping it with aluminum foil to prepare a form of tobacco cartridge.

[0082] The structure of the tobacco cartridge in the form of aluminum foil wrapped in this embodiment is put into the heating chamber 8 and smoothly inserted into the heater 9 along with the cigarette holder, and the smoke is rapidly generated during the heating process, the addition of the vanillin glucoside, the tobacco cartridge has no obvious milk fragrance, during use, there is a clear fragrance of mint, this new type of heated cigarette can reach the temperature of decomposition of vanillin glucoside and improve the taste of suction.

[0083] Referring to FIG. 6 and FIG. 7, one embodiment of the needle heater 9 of the disclosure comprises a needle-shaped heating body and a heat generating element 20, the needle heating body comprising a cone cap 18 and a heater base 19 connected to the bottom of the cone cap 18, the cone cap 18 can be a conical structure such as a circular cone, a quadrihedron or a triangular pyramid, etc., and is connected with the heater base 19 to form a needle-type heater main body structure, and the connection manner can be welding or integral molding. The heater base 19 may be a cylindrical structure corresponding to the shape of the cone

cap 18, such as a cylinder, or a triangular prism, etc. The heat generating element 20 is attached to the heater base 19 by coating and printing. The heater base 19 can be fixed (eg, plugged) on the heater supporter 17, and the heater supporter 17 is fixed to the heater base 16. In another embodiment, the heater base 19 can be directly fixed to the heater base 16.

[0084] In order to insert better into the cigarette, the diameter of the cylinder is generally not more than 2.5mm, and the length is controlled between 10mm-25mm. An electrode is provided at the tail of the heater base 19, and the electrode is connected to the battery and the control board through the electrode wire 21.

[0085] FIG. 8 is a schematic view showing the structure of a heater of another embodiment of the electric heated cigarette needle-type heater of the disclosure. The heater base 19 has an elliptical cylinder structure. For better insertion into the cigarette branch, the short diameter of the elliptical cylinder generally does not exceed 2.5 mm, and the long diameter does not exceed 6.5 mm, the length is controlled between 10mm-25mm, and the eccentricity of the ellipse is controlled between 0.05-0.9, this is adjusted according to the heater. The electrode at the end of the heater base 19 is connected to the battery and the control board through the electrode wire. In this embodiment, the electrode of the heater base 19 includes an electrode A and an electrode B, and each electrode

comprising for two, that means the electrode A has a curved resistive element A1 and a curved resistive element A2, and the electrode B has a curved resistive element B1 and a curved resistive element B2. A1 and B1 are connected to form an electrode, and A2 and B2 are connected to form an electrode. Connect the two curved resistive elements in parallel and connect them to the battery and control circuit electrodes. The structural resistive paste is uniform on both sides, and the electrodes are arranged on both sides, and can be connected as a support through the electrode, and connected to the circuit board, thereby reducing the ineffective length of the heater and reducing the heat loss.

[0086] Referring to FIG. 9, the disclosure also provides a method for preparing needle-type heater of electrically heated cigarette, wherein an embodiment includes the following steps:

[0087] 1. Dosing 、 material mixing: take alumina powder with D50<0.8μm and put into the ball mill, add a certain amount of ball grinding beads into the ball mill and make the make the ratio of alumina powder: ball mill mass is 1:2, then add binder carboxymethyl cellulose that accounts for 12% of the total mass of the raw materials, keep ball milling to make the alumina powder and the binder mixing evenly;

[0088] Alumina powder formulations can be made according to the following components and ratios:

formula	component（quality%）							
	Alumina	Wollastonite	quartz	Kaolin	Limestone	Calcium Silicate	Mullite	Cordierite
1	96	0	0	0	0	4	0	0
2	96	3	1	0	0	0	0	0
3	99	1	0	0	0	0	0	0
4	90	3	2	1	2	1	0	1
5	93	1	2	1	1	1	1	1
6	85	1	2	4	2	3	1	2

[0089] 2. Pugging: Take out the mixed powder, add lubricant(wherein 40% of soybean oil and 60% of tung oil) that accounts for 8% of the total mass of the raw materials, then add water that accounts for 15% of the total mass of the raw materials, stirring well to make them mix evenly, take out the mixed pug, put it into the rough mud machine for roughly mudding, and repeatedly mudding for at least 3 times.

[0090] 3. Staling: Since the alumina powder is a non-hydrophilic non-plastic material, the liquid phase components such as moisture in the mud cannot be uniformly distributed in the mud after repeated practice of the mud, and must be stale for a certain period of time. In this experiment, the alumina mud is wrapped in plastic wrap and aged for at least 48 hours to obtain a 96-ceramic(96%) flexible ceramic body.

[0091] 4. Ceramic body cutting: The alumina 96-ceramic(96%) flexible ceramic body with 0.1 mm thick is die-cut on a mechanical punch,

Rectangular length*width*height 25mm×7mm×0.1mm cuboid is obtained after punching.

[0092] 5. Printing: In a dust-free environment, resistive paste (such as resistance wire) is printed on the stamped flexible ceramic body to form a heating element, and an electrode that connected to the heat generating element printed at the same time.

[0093] 6. Wrapping: Another alumina ceramic rod core with a diameter of about 1.6mm and a length is 25mm is used to wrap the flexible ceramic body with printed heating elements and electrodes on the alumina ceramic rod core of 25mm.

[0094] 7. Molding: Forming a needle-shaped ceramic body by warm isostatic pressing at a temperature of 95~100 °C by a warm isostatic press.

[0095] 8. Ceramic body repairing: The formed heated ceramic sleeve is stamped with a punch and a cone cap is formed at the same time, and the size is proofed and corrected.

[0096] 9. Pre-firing of the ceramic body: The temperature of the repaired ceramic sleeve body increases from normal temperature to 500 °C at <5 °C /min in the disintegrated furnaces, the temperature holding times are: 100 °C, 200 °C, 300 °C, 400 °C, each temperature holding for 30 min, the highest discharge temperature is 500 ° C for 120 min, so that the organic matter is fully drained.

[0097] 10. The ceramic body is fired: The temperature is raised to 500 ° C at 10 ° C / min and is heated to 1650 ° C at a temperature of < 5 ° C / min to make the ceramic sleeve body to be fired to form a heated ceramic sleeve in a reducing atmosphere filled with hydrogen, the temperature holding times are: 700 ° C, 900 ° C, 1100 ° C, 1300 ° C, each temperature holding for 30min, the highest firing temperature 1500 ° C holding for 120min.

[0098] 11. Welding: Soldering electrode wire to the heated ceramic sleeve at the electrode portion.

[0099] 12. Tin immersion: The soldering point of the soldered heating ceramic sleeve is immersed in tin, and the tin immersion time is 2~3s.

[0100] The foregoing descriptions are merely specific embodiments of the disclosure, but are not intended to limit the protection scope of the disclosure. Any variation or replacement readily figured out by a person skilled in the art within the technical scope disclosed in the disclosure shall fall within the protection scope of the disclosure. Therefore, the protection scope of the disclosure shall be subject to the protection scope of the claims.

CLAIMS

WHAT IS CLAIMED IS:

1. A needle-type heater, characterized by comprising a needle-shaped heating body and a heat generating element, the needle-shaped heating body includes a tapered cap and a heater base that is connected to the bottom portion of the tapered cap, the heat generating element is attached to the heater base by means of a print coating process;

The heater base has an elliptical cylinder structure, the short diameter of the elliptical cylinder does not exceed 2.5 mm, and the long diameter does not exceed 6.5 mm, the length is controlled between 10mm-25mm, and the eccentricity of the ellipse is controlled between 0.05-0.9, the electrode at the end of the heater base is connected to the battery and the control board through the electrode wire, in this embodiment, the electrode of the heater base includes an electrode A and an electrode B, and each electrode comprising for two, that means the electrode A has a curved resistive element A1 and a curved resistive element A2, and the electrode B has a curved resistive element B1 and a curved resistive element B2, A1 and B1 are connected to form an electrode, and A2 and B2 are connected to form an electrode.

2. The novel of needle-type heater of claim 1, characterized in that the shape of the tapered cap is circular cone, quadrihedron or triangular pyramid, therefore the shape of the heater base correspond to cylinder,

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elliptic cylinder or triangular prism.

3. The novel of needle-type heater of claim 2, characterized in that there is electrode set on the tail of the heater base, which connected to battery and controller by the electrode wire.

4. A preparation method of needle-type heater, characterized by comprising below steps:

（1）dosing、material mixing: take alumina powder with D50<0.8μm and put into ball mill, add a certain amount of ball grinding beads into the ball mill and make the make the ratio of alumina powder: ball mill mass is 1:2, then add binder that accounts for 3-15% of the total mass of the raw materials, keep ball milling to make the alumina powder and the binder mixing evenly;

（2）pugging: take out the mixed powder, add lubricant that accounts for 3-10% of the total mass of the raw materials, then add water that accounts for 15-20% of the total mass of the raw materials, stirring fully to make them mix evenly, take out the mixed pug, put it into rough mud machine for roughly mudding, and repeatedly mudding for at least 3 times to get the alumina mud;

（3）staling: the alumina mud is wrapped in plastic wrap and aged for at least 48 hours to obtain a 96-ceramic flexible ceramic body;

（4）ceramic body cutting: the alumina 96-ceramic flexible ceramic body is die-cut on a mechanical punch, and the required size of the heater

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base and the heater supporter is obtained after punching;

（5）printing: Resistive paste is printed on stamped flexible ceramic body to form a heating element, and an electrode that connected to the heat generating element printed at the same time in a dust-free environment;

（6）wrapping: Another alumina ceramic rod core is used to wrap the flexible ceramic body with printed heating elements and electrodes on the alumina ceramic rod core;

（7）molding: Forming a needle-shaped ceramic body by warm isostatic pressing at a temperature of 95~100 °C by a warm isostatic press;

（8）ceramic body repairing: The formed heated ceramic sleeve is stamped with a punch and a cone cap is formed at the same time, and the size is proofed and corrected;

（9）pre-firing of the ceramic body: the temperature of the repaired ceramic sleeve body increases from normal temperature to 500 °C at <5 °C /min in the disintegrated furnaces, the temperature holding times are: 100 °C, 200 °C, 300 °C, 400 °C, each temperature holding for 30 min, the highest discharge temperature is 500 ° C for 120 min, so that the organic matter is fully drained;

（10）the ceramic body is fired: the temperature is raised to 500 ° C at 10 ° C / min and is heated to 1650 ° C at a temperature of < 5 ° C / min

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to make the ceramic sleeve body to be fired to form a heated ceramic sleeve in a reducing atmosphere filled with hydrogen, the temperature holding times are: 700 ° C, 900 ° C, 1100 ° C, 1300 ° C, each temperature holding for 30min, the highest firing temperature 1500 ° C holding for 120min;

（11）welding: soldering electrode wire to the heated ceramic sleeve at the electrode portion;

（12）tin immersion: the soldering point of the soldered heating ceramic sleeve is immersed in tin, and the tin immersion time is 2~3s;

the heater base has an elliptical cylinder structure, the short diameter of the elliptical cylinder does not exceed 2.5 mm, and the long diameter does not exceed 6.5 mm, the length is controlled between 10mm-25mm, and the eccentricity of the ellipse is controlled between 0.05-0.9, the electrode at the end of the heater base is connected to the battery and the control board through the electrode wire, in this embodiment, the electrode of the heater base includes an electrode A and an electrode B, and each electrode comprising for two, that means the electrode A has a curved resistive element A1 and a curved resistive element A2, and the electrode B has a curved resistive element B1 and a curved resistive element B2, A1 and B1 are connected to form an electrode, and A2 and B2 are connected to form an electrode.

5. A preparation method of the needle-type heater of claim 4,

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characterized in that the alumina powder is mixed by one or more of alumina or alumina and aluminum nitride, vein quartz, sandstone, quartzite, quartz sand, vermiculite, diatomaceous earth, mullite, cordierite, wollastonite, andalusite, limestone, quartz, kaolin, potassium oxide, sodium oxide, calcium oxide, magnesium oxide, iron oxide, and titanium oxide.

6. A preparation method of the needled-type heater of claim 4, characterized in that the lubricant is composed of soybean oil and tung oil, wherein the soybean oil accounts for 40% by mass and the tung oil accounts for 60% by mass.

7. An electric heated cigarette with a needle-type heater, which comprising a power pole and an auxiliary inserter, the power pole comprises an outer casing with an open end and a power supply device and a heat generating element set in the outer casing, it is characterized in that the heat generating element comprises a heater base and a needle-type heater mounted on the heater base, the needle-type heater comprising a cone cap and a heater base connected to the bottom of the cone cap, the heat generating element attached to the heater base by coating printing, the auxiliary inserter is a cavity structure which is open at one end and can be inserted for the outer casing, and has a perforation at the bottom for insertion of the needle heater, the inner wall of the auxiliary inserter encloses a heating chamber for loading tobacco product,

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and the needle-type heater is perforated from the perforation so that it can be inserted into the heating chamber to penetrate into the tobacco product;

The heater base has an elliptical cylinder structure, the short diameter of the elliptical cylinder does not exceed 2.5 mm, and the long diameter does not exceed 6.5 mm, the length is controlled between 10mm-25mm, and the eccentricity of the ellipse is controlled between 0.05-0.9, the electrode at the end of the heater baseis connected to the battery and the control board through the electrode wire, in this embodiment, the electrode of the heater base includes an electrode A and an electrode B, and each electrode comprising for two, that means the electrode A has a curved resistive element A1 and a curved resistive element A2, and the electrode B has a curved resistive element B1 and a curved resistive element B2, A1 and B1 are connected to form an electrode, and A2 and B2 are connected to form an electrode.

8. An electric heated cigarette with a needle-type heater of claim 7, it is characterized in further comprising a cigarette holder, the open end of the auxiliary inserter is detachably connected to the cigarette holder, and the open end of the outer casing is detachably connected to the cigarette holder.

9. An electric heated cigarette with a needle-type heater of claim 7, it is characterized in that the heater base is fixedly connected to the outer

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casing, the needle-type heater is fixed on the heater base in the axial direction of the outer casing, and the tip end of the needle heater is close to the open end of the outer casing.

10. An electric heated cigarette with a needle-type heater of claim 7, it is characterized in that the needle heater is one; or two or three, set in a straight line; or the needle heater has three, set in an equilateral triangle; or the needle heater has four, arranged in a square.

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APPENDED DRAWINGS OF DESCRIPTION

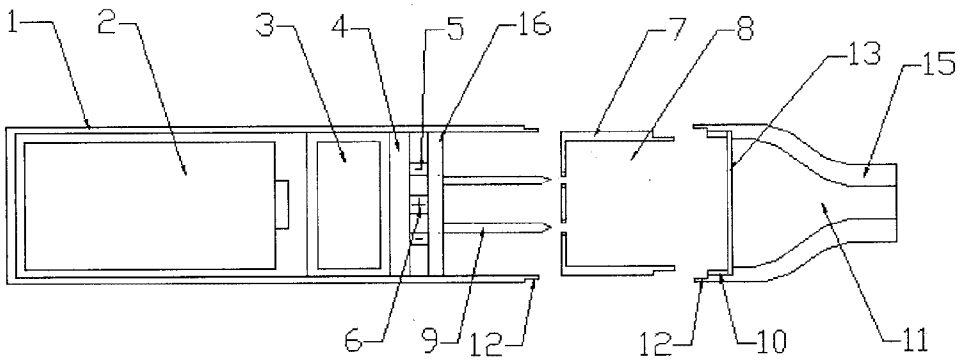

FIG.1

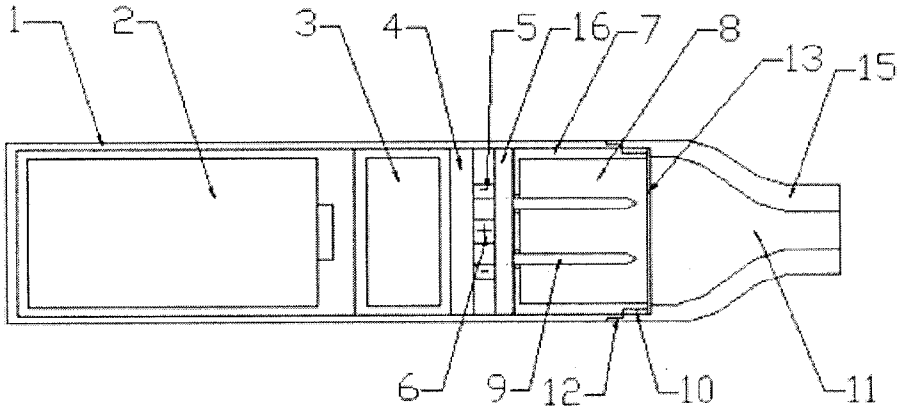

FIG.2(a)

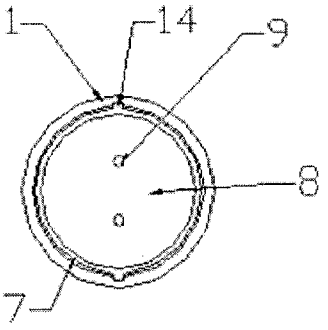

FIG.2(b)

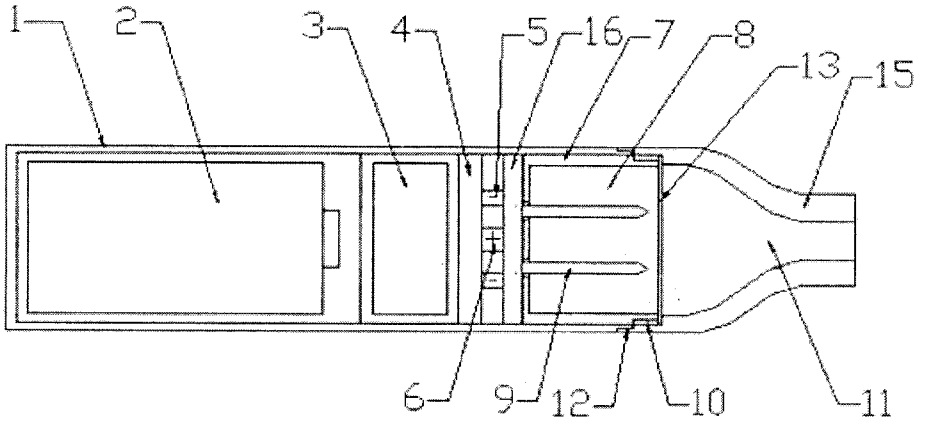

FIG.3(a)

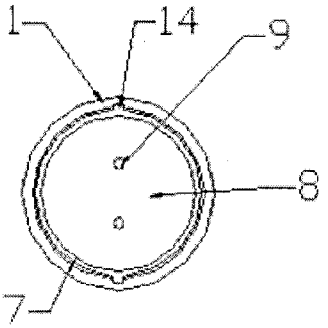

FIG.3(b)

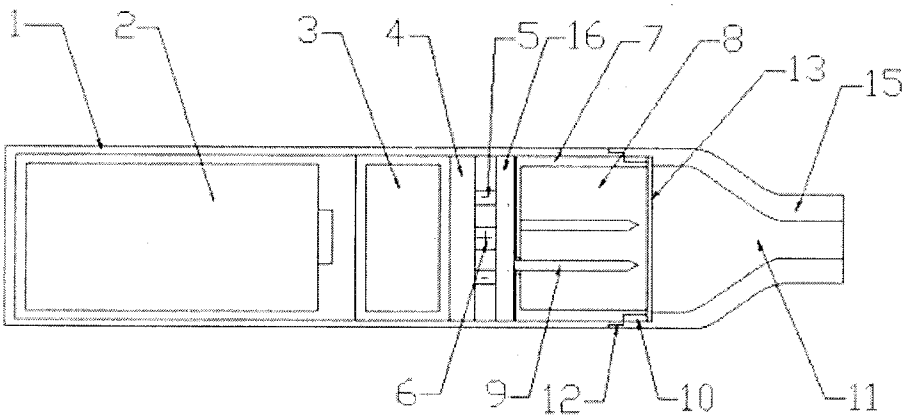

FIG.4(a)

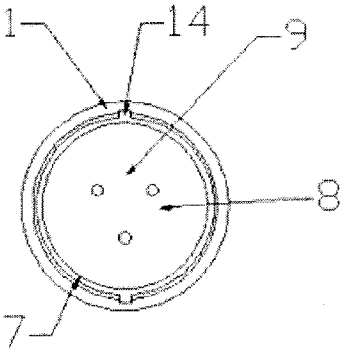

FIG.4(b)

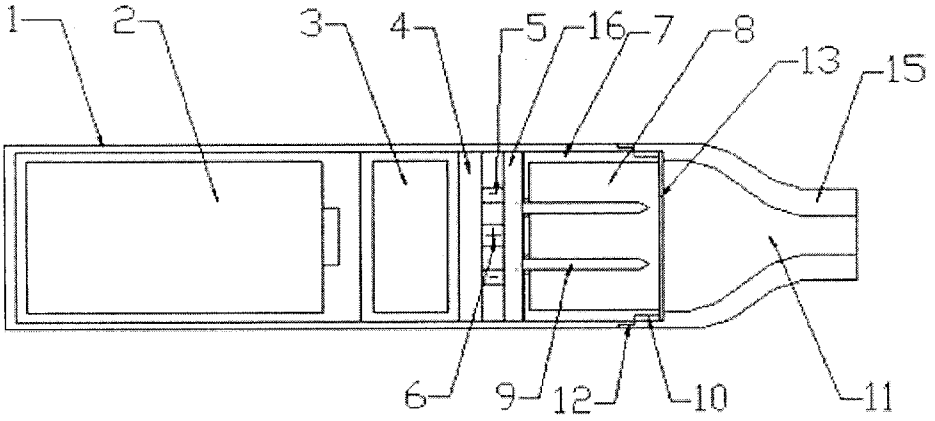

FIG.5(a)

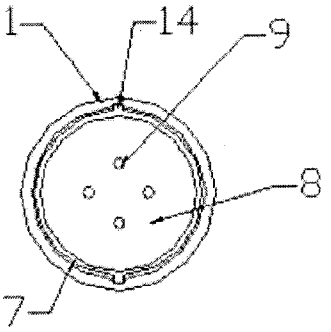

FIG.5(b)

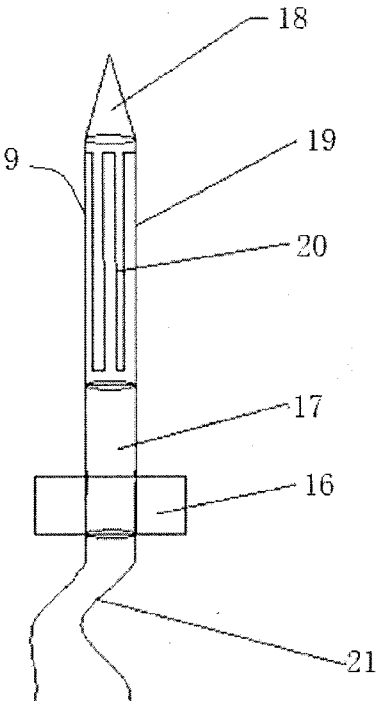

FIG.6

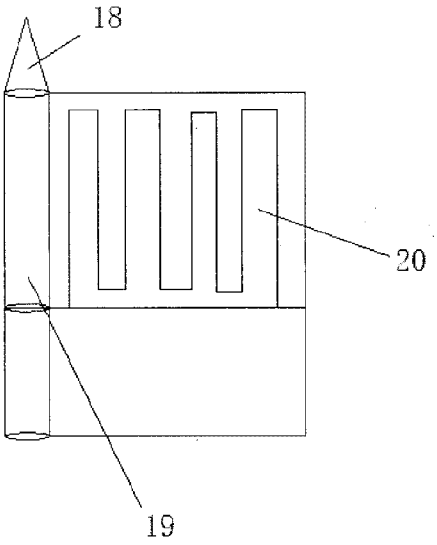

FIG.7

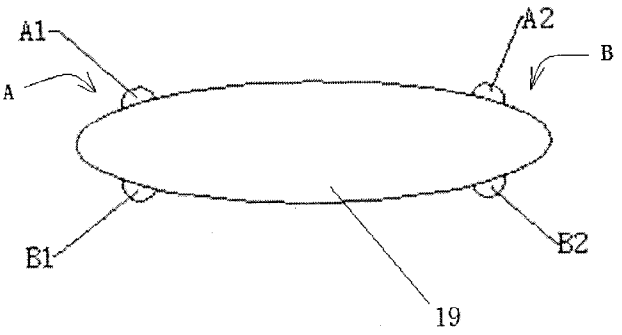

FIG.8

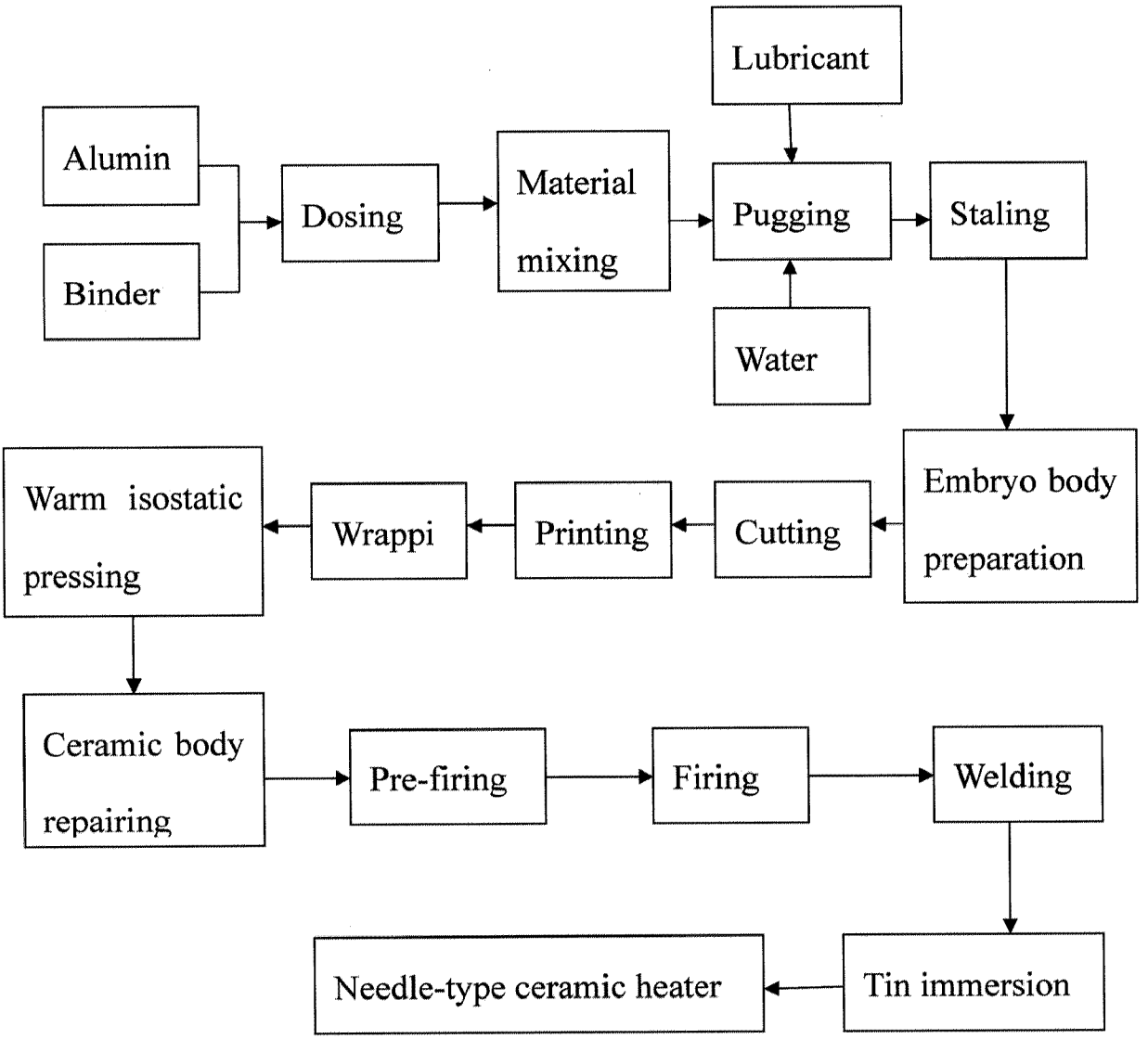

FIG.9

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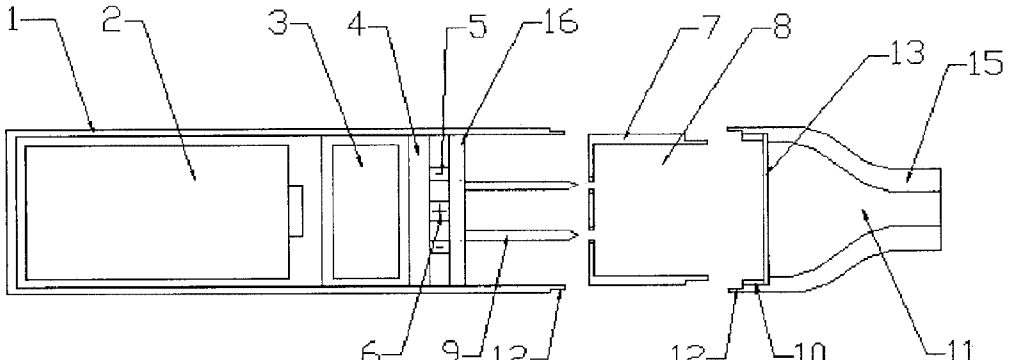
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