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(54) **BAKED SMOKING SET**

(57) The invention relates to a baked smoking set, comprising a tubular sleeve and a sheet-shaped heating element detachably inserted into the sleeve. The heating element comprises a first side and a second side opposite to the first side in a width direction, the first side and the second side are respectively provided with a blade portion that allows a thickness of the heating element to gradually decrease towards an edge in the width direction, wherein a center line of the heating element is in the center of the sleeve, and distances from the two opposite edges in the width direction of the heating element to an inner wall surface of the sleeve respectively are equivalent.

lent. Since the two sides of the heating element become thinner gradually, when the heating element is inserted into a cigarette received in the sleeve, pressures of the two sides of the heating element on tobaccos can be reduced, and tobaccos proximal to the two sides corresponding to the blade portions may not be subjected to large extrusion or compression, thereby relieving the pressures on tobaccos proximal to the two sides, and improving atomizing efficiency of tobaccos. The blade portion also can represent a smooth transition, to prevent tobaccos from sticking on the two sides of the heating element.

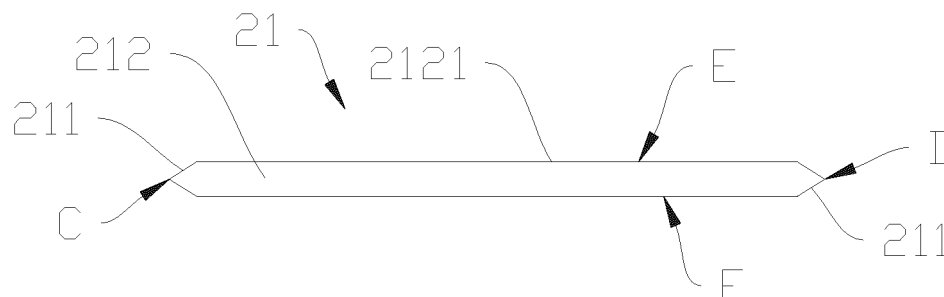


FIG. 3

Description

TECHNICAL FIELD

[0001] The invention relates to cigarette substitutes, and specifically to a baked smoking set.

BACKGROUND ART

[0002] When a flat sheet-shaped heating element is inserted into a substantial cylindrical sleeve of a baked smoking set, tobaccos at a central area of the heating sheet suffer from different pressures from tobaccos at two sides thereof, and tobaccos at the two sides can be extruded by a larger pressure force, causing that the edges of the two sides of the heating sheet are in tight contact with tobaccos to easily have residual soot.

SUMMARY OF THE INVENTION

[0003] The technical problem to be solved by the invention is to provide an improved baked smoking set.

[0004] The technical solution of the invention adopted for solving the technical problem is to construct a baked smoking set, comprising a tubular sleeve and a sheet-shaped heating element detachably inserted into the sleeve, wherein;

the heating element comprises a first side and a second side opposite to the first side in a width direction, the first side and the second side are respectively provided with a blade portion that allows a thickness of the heating element to gradually decrease towards an edge in the width direction,

wherein a central line of the heating element is coaxial with a center of the sleeve, and distances from two opposite sides in the width direction of the heating element to an inner wall surface of the sleeve respectively are equivalent.

[0005] Preferably, the heating element comprises a first surface and a second surface opposite to the first surface in a thickness direction;

the blade portion comprises a chamfer on an edge of the first surface and/or the second surface adjacent to the first side, and a chamfer on an edge of the first surface and/or the second surface adjacent to the second side; each chamfer is a bevel or a fillet.

[0006] Preferably, the chamfers are provided respectively on two opposite sides in a width direction of the first surface and the second surface, and the blade portions of the first side and the second side transform the first side and the second side of the heating element to round edges or sharp edges.

[0007] Preferably, the edge of the first surface or the second surface adjacent to the first side is provided with the chamfer, and the edge of the first surface or the second surface adjacent to the second side is provided with the chamfer, to transform the first side and the second side to sharp edges.

[0008] Preferably, one end of the heating element is provided with a sharp head that facilitates inserting into a cigarette.

[0009] Preferably, the heating element comprises a sheet-shaped substrate, an insulating layer covered on the sheet-shaped substrate, and a conductive path disposed on the insulating layer, and the conductive path generates heat after being powered.

[0010] Preferably, the sheet-shaped substrate is made of a metallic or an alloy material, and the blade portion is formed by punching.

[0011] Preferably, the sheet-shaped substrate comprises a flat surface between the blade portions on the two opposite sides of the heating element, and the conductive path is printed in an area of the flat surface.

[0012] Preferably, the heating element further comprises an isolation layer covered outside the conductive path.

[0013] Preferably, the isolation layer is a glaze layer formed by sintering a glass glaze, and an outer surface of the heating element is covered by the isolation layer.

[0014] Implementing the baked smoking set of the invention has the following advantageous effects: since the two sides of the heating element become thinner gradually, when the heating element is inserted into a cigarette received in the sleeve, pressures of the two sides of the heating element on tobaccos can be reduced, and tobaccos proximal to the two sides corresponding to the blade portions may not be subjected to large extrusion or compression, thereby relieving the pressures on tobaccos proximal to the two sides, and improving atomizing efficiency of tobaccos. The blade portion also can represent a smooth transition, to prevent tobaccos from sticking on the two sides of the heating element.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] Hereinafter, the invention is further described with reference to accompanying drawings and embodiments. In the drawings:

FIG. 1 is a schematic diagram of a sectional structure of a heating element of a baked smoking set when inserted into a sleeve with a cigarette in one embodiment of the invention.

FIG. 2 is a structural diagram of the heating assembly according to the invention.

FIG. 3 is a schematic diagram of a sectional structure of the heating element in FIG. 1.

FIG. 4 is an exploded diagram of respective layers of the heating assembly according to the invention. FIG. 5 is a distribution diagram of a temperature field when heating the cigarette if a sheet-shaped substrate is made of a metal.

FIG. 6 is a schematic diagram when a width of the heating element in FIG. 2 gradually varies.

FIG. 7 is a distribution diagram of a temperature field when heating the cigarette if the heating element is

made of zirconium oxide.

DETAILED EMBODIMENT OF THE INVENTION

[0016] To clearly understand technical features, objects and effects of the invention, now detailed embodiments of the invention are explicitly explained with reference to the accompanying drawings.

[0017] As shown in FIGS. 1 and 2, a baked smoking set in one preferable embodiment of the invention comprises a tubular sleeve 1, and a heating assembly 2 comprising a heating element 21, a leading wire 22 and a mounting base 23.

[0018] Referring to FIGS. 1-3, the heating element 21 is in a sheet shape, and is detachably inserted into the sleeve 1. The heating element 21 comprises a first end A and a second end B opposite to the first end A in a length direction, and the first end A is configured to be inserted into the sleeve 1 of the baked smoking set.

[0019] The heating element 21 comprises a first side C and a second side D opposite to the first side C in a width direction, and the first side C and the second side D are provided with a blade portion 211 respectively that allows a thickness of the heating element 21 to gradually decrease towards an edge in the width direction. A central line of the heating element 21 is coaxial with a center of the sleeve 1, and distances from two opposite sides in the width direction of the heating element 21 to an inner wall surface of the sleeve 1 respectively are equivalent.

[0020] Since the two sides of the heating element 21 become thinner gradually, when the heating element 21 is inserted into a cigarette 3 received in the sleeve 1, pressures of the two sides of the heating element 21 on tobaccos can be reduced, and tobaccos proximal to the two sides corresponding to the blade portions 211 may not be subjected to extrusion or compression, thereby relieving the pressures on tobaccos proximal to the two sides, and improving atomizing efficiency of tobaccos. The blade portions 211 also can represent a smooth transition, to prevent tobaccos from sticking on the two sides of the heating element 21.

[0021] The heating element 21 comprises a first surface E and a second surface F opposite to the first surface E in a thickness direction, and the blade portions 211 comprises chamfers on edges of the first surface E and the second surface F adjacent to the first side C, and chamfers on the edges of the first surface E and the second surface F adjacent to the second side D.

[0022] Each chamfer can be a bevel or a fillet. The edges of the first surface E and the second surface F adjacent to the first side C are respectively provided with the chamfer, and the edges of the first surface E and the second surface F adjacent to the second side D are respectively provided with the chamfer, and the blade portions 211 of the first side C and the second side D transform the first side C and the second side D of the heating element 21 to round edges or sharp edges.

[0023] In other embodiments, the blade portions 211

may comprise a chamfer only on the edge of the first surface E or the second surface F adjacent to the first side C, and a chamfer only on the edge of the first surface E or the second surface F adjacent to the second side D, to transform the first side C and the second side D to sharp edges, so as to facilitate once punch forming.

[0024] Smooth transition, or smooth polishing, or coating a glaze layer of the blade portions 211 on two opposite sides can effectively prevent sticking of tobaccos on the sides, and relieve accumulation of tobaccos.

[0025] As shown in FIG. 4, the heating element 21 comprises a sheet-shaped substrate 212 made of a metallic material, an insulating layer 213 covered on the sheet-shaped substrate 212, and a conductive path 214 disposed outside the insulating layer 213. The leading wire 22 is connected to the conductive path 214, and the leading wire 22 is led outwardly. The conductive path 214 can be supplied with power through the leading wire 22, so that the conductive path 214 generates heat to atomize tobaccos.

[0026] Preferably, the heating element 21 is made of a metallic or an alloy material, and the sheet-shaped substrate 212 may use metallic materials, such as stainless steel or titanium alloy, preferably stainless steel, such as 430 and 304 stainless steel. A thickness of the sheet-shaped substrate 212 is generally 0.2 to 0.8 mm, and the sheet-shaped substrate 212 is formed by punch forming or wire cutting, which is low in cost. The blade portions 211 on the sheet-shaped substrate 212 made of a metallic material can be formed by punching to further save cost. Dimensions of length, width and the like of the heating element 21 are fitted with diameter and length of the cigarette, which facilitates sufficient heating of tobaccos.

[0027] The sheet-shaped substrate 212 made of a metallic material, as a main body of the heating element 21, has a high toughness, so that fracture of the heating element 21 can be effectively prevented under long-term high temperature and mechanical shock, such as, cigarette loading, and the like. Meanwhile, the sheet-shaped substrate 212 made of a metallic material has a good thermal conductive performance, which ensures uniformity of a surface temperature of the heating element 21, and facilitates heating the non-combustible cigarette to obtain an optimized taste.

[0028] Referring to FIGS. 5 and 7, according to steady state simulation experiments, in the same temperature fields, the area exceeding 215 degrees Celsius around the heating element 21 made of stainless steel is larger than that around the heating element 21 made of ceramic such as zirconium oxide and the like, so the atomizing efficiency of the heating element 21 made of stainless steel is higher, and taste is better.

[0029] Preferably, the first end A of the sheet-shaped substrate 212 is provided with a sharp head 215 that facilitates inserting into a cigarette 3. The sharp head 215 can guide insertion of the heating element 21, and reduce a resistant force when inserting.

[0030] In order to satisfy process requirements for

printing the conductive path 214 onto the sheet-shaped substrate 212, the sheet-shaped substrate 212 comprises a flat surface 2121 between the blade portions 211 on the two opposite sides of the heating element 21, and the conductive path 214 is printed in an area of the flat surface 2121. The blade portions 211 are disposed outwardly by two opposite sides in a width direction of the flat surface 2121.

[0031] The insulating layer 213 is formed by sintering at 400 to 1000 °C after a surface of the sheet-shaped substrate 212 is covered by a glass slurry containing silicon oxide, calcium oxide, and aluminum oxide, and since the sheet-shaped substrate 212 made of a metallic or an alloy material is conductive, the insulating layer 213 can prevent a short circuit between the sheet-shaped substrate 212 and the conductive path 214.

[0032] The insulating layer 213 is covered on the sheet-shaped substrate 212 by the way of spraying or printing, and a thickness of the insulating layer 213 can be designed according to pressure resistance requirements between the conductive path 214 and the sheet-shaped substrate 212. Generally, the insulating layer 213 has a thickness less than 0.1 mm.

[0033] In order to prevent oxidation of the sheet-shaped substrate 212 made of a metallic material during use in a high temperature, preferably, two sides of the sheet-shaped substrate 212 are covered with the insulating layer 213. The conductive path 214 is located on one side of the insulating layer 213. The insulating layer 213 also can be provided only on one side of the sheet-shaped substrate 212 which the conductive path 214 is disposed, and when the heating element 21 is made of a non-metallic and non-conductive material, the insulating layer 213 also can be removed.

[0034] The conductive path 214, as a resistance heater, can be a conductive layer formed on the insulating layer 213 in a manner of such as physical vapor deposition, or electroplating, or printing.

[0035] Preferably, the conductive path 214 comprises a heating resistor 2141, and an electrical connection portion electrically connected to the heating resistor 2141. The heating resistor 2141 and the electrical connection portion are arranged along a length direction of the sheet-shaped substrate 212, and conductive electrodes 2142 are connected to an external circuit. Preferably, the electrical connection portion comprises two conductive electrodes 2142 electrically connected to the heating resistor 2141.

[0036] The leading wires 22 are connected to the conductive electrodes 2142, and are led out from one end away from the heating resistor 2141 along a length direction of the heating element 21, i.e., the heating resistor 2141 and the conductive electrodes 2142 are arranged in a direction from the first end A to the second end B, and the leading wires 22 are led outwardly from the second end B.

[0037] The heating resistor 2141 can be formed by sintering after printing with any one of silver-palladium re-

sistance slurry, ruthenium-palladium resistance slurry, platinum slurry and nickel-based slurry. The heating resistor 2141 can be flexibly patterned, and an appropriate resistance value desired for the heating element 21 is obtained in cooperation with the slurry properties and a thickness of the heating resistor 2141. The resistance value of the heating element 21 is usually between 0.3 to 2.0 Ω , and the thickness of the heating resistor 2141 is usually less than 0.1mm, preferably, less than 20 μm . The conductive electrode 2142 is formed by sintering after printing with silver-based slurry having a relatively low resistivity.

[0038] When the leading wire 22 is connected to an external power supply, the heating resistor 2141 can be powered to generate heat, and the leading wire 22 can be connected to the conductive electrodes 2142 by the way of high temperature brazing with silver-copper solder, or pure silver solder, or nickel solder under a protective atmosphere of 600 to 1100 °C. The leading wire 22 is connected to the conductive electrode 2142 by the way of tin welding with a high-temperature welding paste, and a use temperature is greater than 300 °C.

[0039] Since the sheet-shaped substrate 212 made of a metallic material has a good conductivity, in order to prevent energy loss, through holes 2122 are provided in a section of a length direction of the sheet-shaped substrate 212 where the conductive electrode 2142 is located. The through holes 2122 can isolate heat, and reduce heat delivered to the second end B.

[0040] Since the section corresponding to the conductive electrode 2142 has a relatively low temperature, tobaccos cannot be sufficiently atomized, and tobacco shreds can store and absorb a certain amount of tobacco tar, so the tobacco tar can be prevented or reduced from leakage.

[0041] A great temperature gradient exists between the section of the heating element 21 corresponding to the heating resistor 2141 for inserting into tobaccos and that corresponding to the conductive electrodes 2142, and the section corresponding to the conductive electrode 2142 has a relatively low temperature and small heat dissipation, which facilitates effective use of energy.

[0042] In order to isolate the heating resistor 2141 from outside air, and further extend service life and stability thereof, the heating element 21 further comprises an isolation layer 216 covered outside the conductive path 214.

[0043] The isolation layer 216 is a glaze layer formed by sintering a glass glaze, and a thickness is usually less than 0.1 mm thereof. Two sides of the sheet-shaped substrate 212 are covered by the isolation layer 216 respectively. The glaze layer allows a surface of the heating element 21 to be smooth, and has a small roughness to reduce adhesion of smoke stains and smoke tar after baking of tobaccos, and facilitate scrubbing. In other embodiments, the isolation layer 216 also can be covered only on one side where the conductive path 214 is located.

[0044] Preferably, as shown in FIG. 6, in order to facil-

itate inserting the heating element 21 into the cigarette 3, a width of the heating element 21 from the first end A to the second end B gradually increases, so the heating element 21 is in a sword shape; the first end A is narrow, combining with a thinning structure of the blade portion 211, so that a resistant force is relatively small when the heating element 21 is inserted, to facilitate insertion, and accumulation of tobaccos on sides of the heating element 21 also can be effectively reduced. A bottom of the heating element becomes wider to facilitate increasing strength of the heating element 21, and prevent fracture of the heating element due to inserting and pulling the cigarette several times.

[0045] Generally, an angle between the two opposite sides in a width direction of the sharp head 215 is greater than an angle between the two opposite sides in a width direction of the second end B of the heating element 21. In other embodiments, the heating element 21 also can be a triangle.

[0046] Referring to FIG. 2 again, the mounting base 23 is sleeved on the second end B of the heating element 21, i.e., sleeved on the end led out of the leading wires 22 of the heating element 21, and sleeved onto the electrical connection portion. In other embodiments, the mounting base 23 also can be an individual component, which is separately mounted on the heating element 21.

[0047] The sharp head 215 is located on one end of the heating element 21 away from the mounting base 23, and the mounting base 23 and the sharp head 215 are respectively located on two opposite ends of the heating element 21. After one end of the sharp head 215 of the heating element 21 is inserted into the sleeve 1, the mounting base 23 abuts against an outer end of the sleeve 1, to define an insertion depth of the heating element 21.

[0048] Since through holes 2122 are provided in the section of a length direction of the sheet-shaped substrate 212 where the conductive electrode 2142 is located, transmission of heat to the second end B is reduced, and excess temperature of the mounting base 23 also can be prevented.

[0049] Since a heating zone is not disposed between an end portion of the second end B where the mounting base 23 is located and the conductive electrodes 2142, possibility of producing noxious gas is reduced, and a range of selecting materials of the mounting base 23 is extensive to reduce cost. Generally, the mounting base is formed by injection molding using high-molecular polymer, and the commonly used material is polyetheretherketone, high-temperature nylon and the like.

[0050] It shall be understood that the above respective technical features can be combined optionally for use without limitation.

[0051] The disclosures are only embodiments of the invention, rather than limiting the extent of the invention. Any equivalent structures or equivalent flow changes using the specification and the drawings of the invention, or directly or indirectly application in other relevant tech-

nical fields shall also be included in the extent of protection of the invention.

5 Claims

1. A baked smoking set, comprising a tubular sleeve (1) and a sheet-shaped heating element (21) detachably inserted into the sleeve (1), wherein; the heating element (21) comprises a first side (C) and a second side (D) opposite to the first side (C) in a width direction, the first side (C) and the second side (D) are respectively provided with a blade portion (211) that allows a thickness of the heating element (21) to gradually decrease towards an edge in the width direction, wherein a central line of the heating element (21) is coaxial with a center of the sleeve (1), and distances from two opposite sides in the width direction of the heating element (21) to an inner wall surface of the sleeve (1) respectively are equivalent.
2. The baked smoking set according to claim 1, **characterized in that** the heating element (21) comprises a first surface (E) and a second surface (F) opposite to the first surface (E) in a thickness direction; the blade portions (211) comprises a chamfer on an edge of the first surface (E) and/or the second surface (F) adjacent to the first side (C), and a chamfer on an edge of the first surface (E) and/or the second surface (F) adjacent to the second side (D); each chamfer is a bevel or a fillet.
3. The baked smoking set according to claim 2, **characterized in that** the chamfers are provided respectively on two opposite sides in a width direction of the first surface (E) and the second surface (F), and the blade portions (211) of the first side (C) and the second side (D) transform the first side (C) and the second side (D) of the heating element (21) to round edges or sharp edges.
4. The baked smoking set according to claim 2, **characterized in that** the edge of the first surface (E) or the second surface (F) adjacent to the first side (C) is provided with the chamfer, and the edge of the first surface (E) or the second surface (F) adjacent to the second side (D) is provided with the chamfer, to transform the first side (C) and the second side (D) to sharp edges.
5. The baked smoking set according to claim 1, **characterized in that** one end of the heating element (21) is provided with a sharp head (215) that facilitates inserting into a cigarette (3).
6. The baked smoking set according to any one of claims 1 to 5, **characterized in that** the heating el-

ement (21) comprises a sheet-shaped substrate (212), an insulating layer (213) covered on the sheet-shaped substrate (212), and a conductive path (214) disposed on the insulating layer (213), and the conductive path (214) generates heat after being powered. 5

7. The baked smoking set according to claim 6, **characterized in that** the sheet-shaped substrate (212) is made of a metallic or an alloy material, and the blade portion (211) is formed by punching. 10

8. The baked smoking set according to claim 6, **characterized in that** the sheet-shaped substrate (212) comprises a flat surface (2121) between the blade portions (211) on the two opposite sides of the heating element (21), and the conductive path (214) is printed in an area of the flat surface (2121). 15

9. The baked smoking set according to claim 6, **characterized in that** the heating element (21) further comprises an isolation layer (216) covered outside the conductive path (214). 20

10. The baked smoking set according to claim 9, **characterized in that** the isolation layer (216) is a glaze layer formed by sintering a glass glaze, and an outer surface of the heating element (21) is covered by the isolation layer (216). 25

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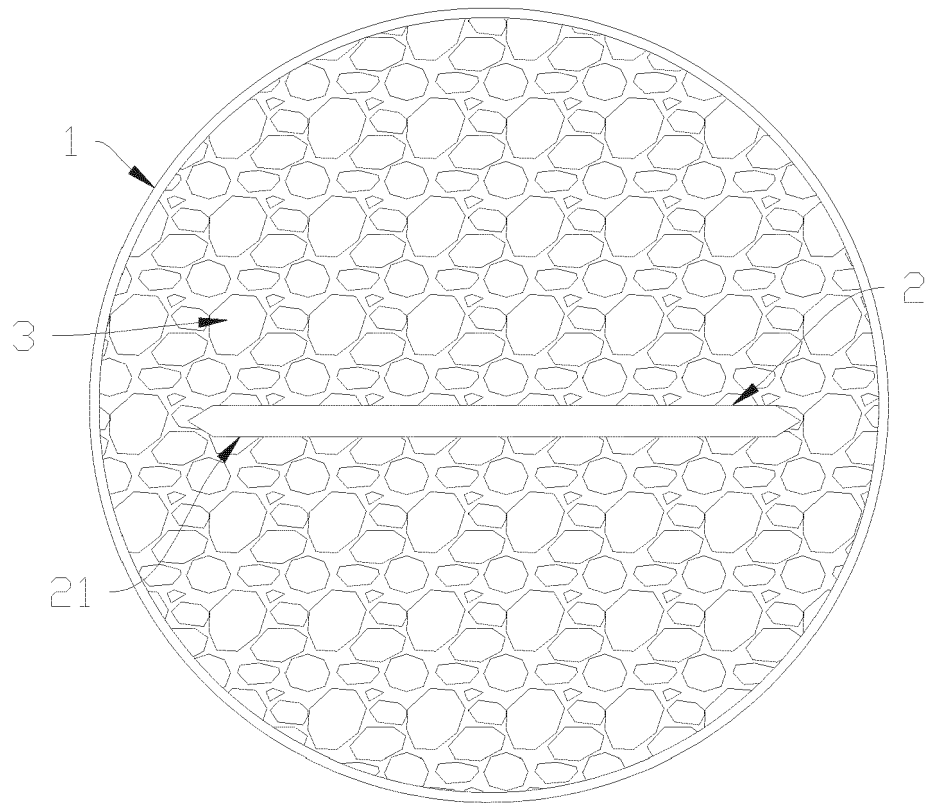


FIG. 1

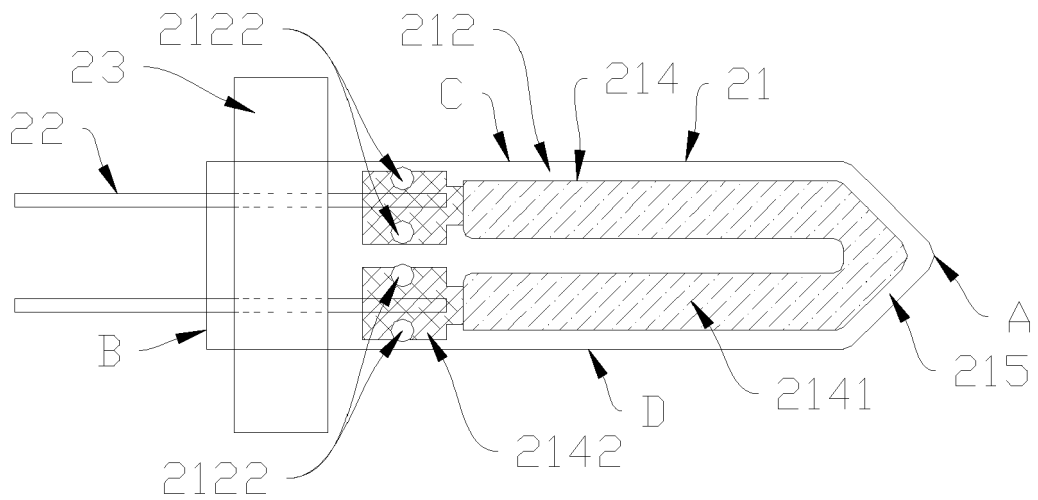


FIG. 2

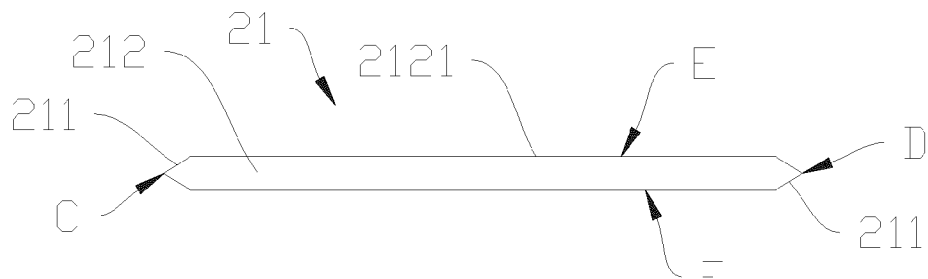


FIG. 3

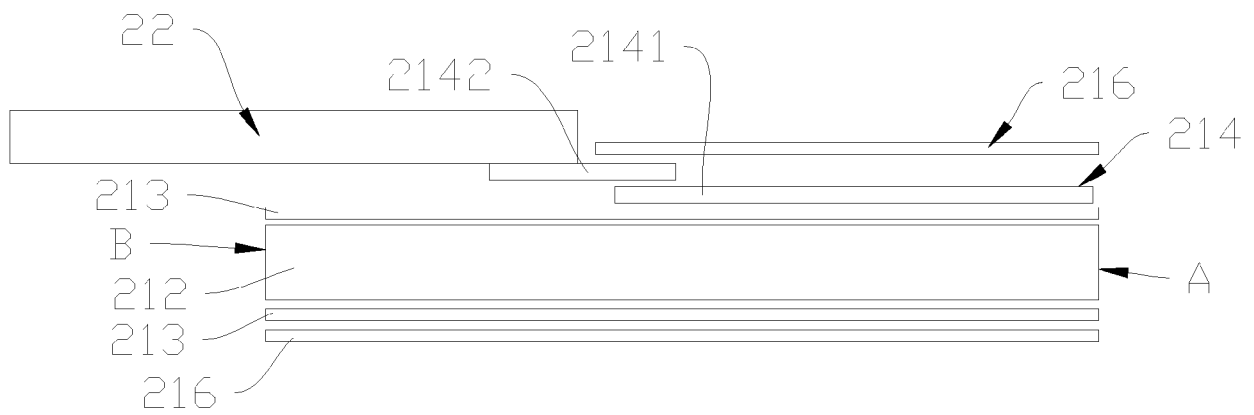


FIG. 4

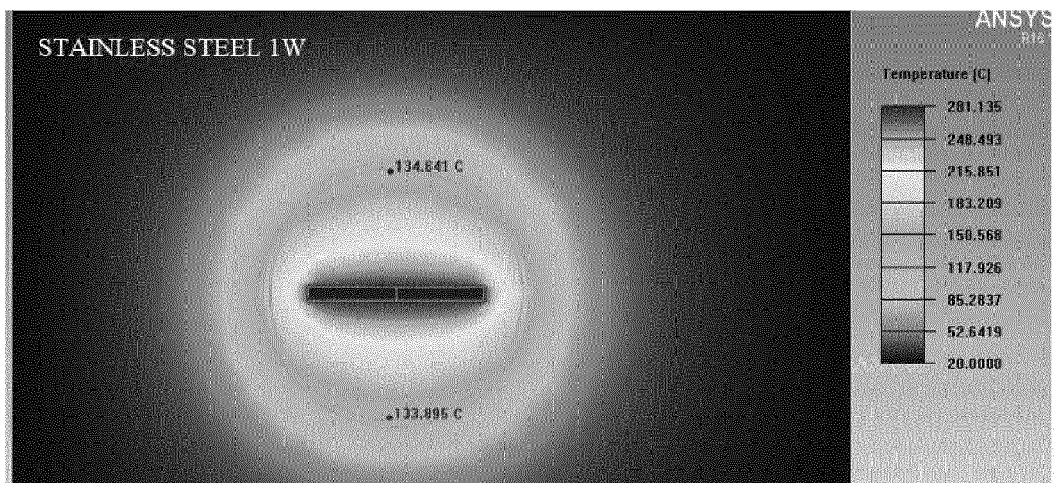


FIG. 5

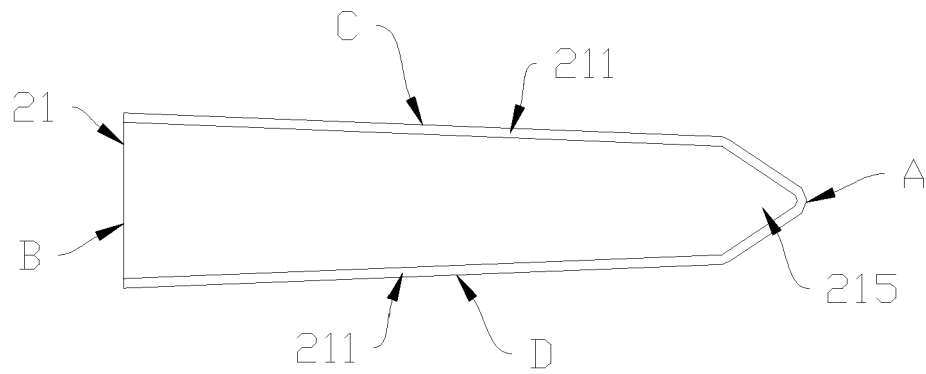


FIG. 6

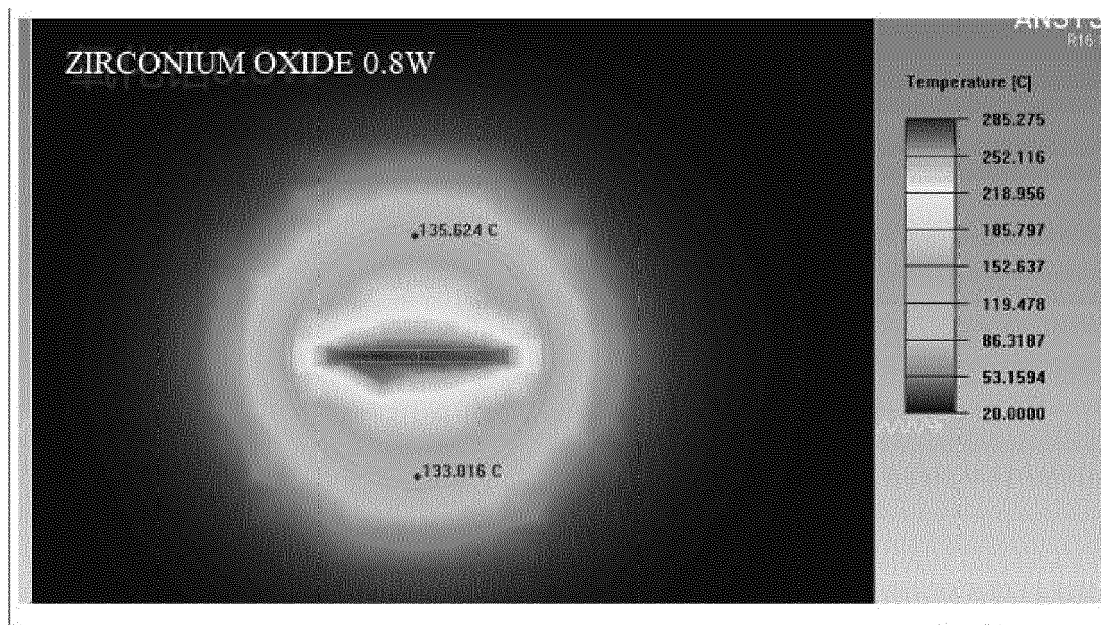


FIG. 7



EUROPEAN SEARCH REPORT

Application Number
EP 19 19 8577

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	CN 207 411 491 U (SHENZHEN FIRST UNION TECH CO) 29 May 2018 (2018-05-29)	1-5,7	INV. A24F40/20 A24F40/46 H05B3/02
Y	* figures 1-9 * * paragraphs [0038] - [0045] *	6,8,9	
Y	----- CN 205 757 216 U (ZHUHAI 4U ELECTRONIC CERAM CO LTD) 7 December 2016 (2016-12-07)	6,8,9	
A	* figures 1-4 * * paragraphs [0023] - [0025] * * claims 1-2 *	10	
			TECHNICAL FIELDS SEARCHED (IPC)
			A24F H05B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 28 January 2020	Examiner Mier Abascal, Ana
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 19 19 8577

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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28-01-2020

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Patent document cited in search report		Publication date	Patent family member(s)	Publication date
CN 207411491	U	29-05-2018	NONE	

CN 205757216	U	07-12-2016	NONE	

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