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(54) **AEROSOL GENERATING DEVICE AND HEATER**

(57) An aerosol generating device, comprising: a chamber (30), that is for receiving a smokable material (A), the chamber having a first radial direction and a second radial direction that are perpendicular to one another; and a first infrared emitter (21) and a second infrared emitter (22) that are arranged along the first radial direction of the chamber, and that are used to radiate infrared rays to the chamber so as to heat the smokable material, the first infrared emitter and the second infrared emitter at least partially extending along the second radial direction, thereby defining the chamber between the first infrared emitter and the second infrared emitter, and such that the size of the chamber along the second radial direction is greater than that along the first radial direction. In the foregoing aerosol generating device, a first infrared emitter and a second infrared emitter are oppositely disposed and define and form a chamber the size of which is smaller along a first radial direction than that along a second radial direction, thereby increasing the ability and efficiency of absorbing infrared rays in a smokable material, such that a surface layer and the interior of the

smokable material can be relatively uniformly heated.

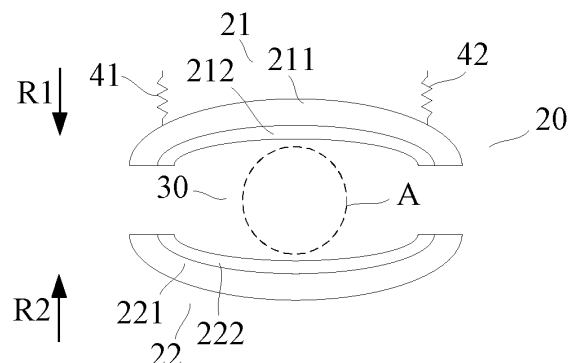


FIG. 2

Description**CROSS REFERENCE TO RELATED APPLICATION(S)**

[0001] This application claims priority to Chinese Patent Application No. 2020100481609, entitled "Aerosol generating device" and submitted to China National Intellectual Property Administration on January 16th, 2020, the entire content of which is incorporated herein by reference.

TECHNICAL FIELD

[0002] The embodiment of the present disclosure relates to the technical field of heating nonburning smoking sets, and in particular to an aerosol generating device.

BACKGROUND

[0003] Tobacco products (e.g., cigarettes, cigars, etc.) are burning tobaccos to produce tobacco smoke during use. People attempt to make products that release compounds without burning so as to replace these tobacco products burning tobaccos.

[0004] An example of this kind of products is a heating device, which heats rather than burns a material to release compounds, for example, the material may be a tobacco product or other non-tobacco products which may contain or not contain nicotine. As another example, there exists an infrared heating device which heats a tobacco product through infrared radiation so that the tobacco product releases a compound to generate an aerosol. For example, Chinese Patent Application No. 201821350103.0 of a known technology provides a heating device structure in which a nano far infrared coating and a conductive coating are formed in turn on an outer surface of a quartz tube, wherein the conductive coating is connected to a power source configured to supply power, so that the nano far infrared coating itself generates heat under the supply of power and at the same time forms electron transition to generate infrared rays which then radiate onto the tobacco product within the quartz tube to heat the tobacco product. During implementations, the radiated infrared rays are absorbed at the surface layer of the tobacco product and the interior of the tobacco product is difficult to be heated, preventing the internal utilization of the tobacco product.

SUMMARY

[0005] In order to solve the problem of inefficiency of the heating device in heating the interior of tobacco products in existing technologies, the embodiment of the present disclosure provides an aerosol generating device.

[0006] In view of the above, the aerosol generating device according to the present disclosure, configured to

heat a smokable material to generate an aerosol for inhalation, includes:

a chamber, configured to receive a smokable material;

the chamber having a first radial direction, and a second radial direction that is perpendicular to the first radial direction; and

a first infrared emitter and a second infrared emitter that are arranged in the first radial direction of the chamber and configured to radiate infrared rays towards the chamber so as to heat the smokable material, the first infrared emitter and the second infrared emitter extending at least partially in the second radial direction, thereby defining the chamber between the first infrared emitter and the second infrared emitter, such that the size of the chamber in the second radial direction is greater than that in the first radial direction.

[0007] In a preferred embodiment, the first infrared emitter and the second infrared emitter are separated from each other.

[0008] In a preferred embodiment, the first infrared emitter and the second infrared emitter are spaced with certain distance, to form an airflow channel for external air to enter the chamber.

[0009] In a preferred embodiment, the first infrared emitter is configured to be able to move in the first radial direction relative to the second infrared emitter, to change the size of the chamber in the first radial direction.

[0010] In a preferred embodiment, the first infrared emitter has a first position and a second position opposite to the second infrared emitter, and is able to move between the first position and the second position in the first radial direction relative to the second infrared emitter; wherein

the size of the chamber in the first radial direction when the first infrared emitter is at the first position is less than the size of the chamber in the first radial direction when the first infrared emitter is at the second position.

[0011] In a preferred embodiment, the aerosol generating device further includes a retaining mechanism, which is configured to stably retain the first infrared emitter at the first position and/or the second position.

[0012] In a preferred embodiment, the aerosol generating device further includes a biasing element, which is configured to bias the first infrared emitter towards the second position.

[0013] In a preferred embodiment, the first infrared emitter and/or the second infrared emitter are/is configured as the shape of a sheet extending in the second radial direction.

[0014] In a preferred embodiment, the first infrared emitter and/or the second infrared emitter are/is configured as the shape of a curve bending outwards in the first radial direction of the chamber.

[0015] In a preferred embodiment, the first infrared

emitter or the second infrared emitter includes:

- a base; and,
- an infrared emitting coating formed on a surface of the base or an infrared emitting film bonded to a surface of the base.

[0016] According to the above aerosol generating device, a first infrared emitter and a second infrared emitter are oppositely disposed and define and form a chamber the size of which is smaller in a first radial direction than that in a second radial direction, thereby reducing the distance between the radiated infrared rays and the internal center of the smokable material, increasing the ability and efficiency of absorbing infrared rays inside a smokable material, such that a surface layer and the interior of the smokable material can be relatively uniformly heated.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] One or more embodiments are illustrated through the image(s) in corresponding drawing(s). These illustrations do not form restrictions to the embodiments. Elements in the drawings with a same reference number are expressed as similar elements, and the images in the drawings do not form proportional restrictions unless otherwise stated.

FIG. 1 is a structure diagram, after assembly, of an aerosol generating device according to one embodiment,

FIG. 2 is a sectional view of a heating mechanism in the aerosol generating device shown in FIG. 1.

FIG. 3 is a sectional view of the heating mechanism shown in FIG. 2 moved to a second position.

FIG. 4 is a structure diagram of a retaining mechanism in the heating mechanism shown in FIG. 2

FIG. 5 is a diagram of a first infrared emitter according to another embodiment.

FIG. 6 is a sectional view of a heating mechanism according to another embodiment.

FIG. 7 is a diagram of a smokable material according to another embodiment.

DETAILED DESCRIPTION

[0018] The present disclosure will become better understood from a detailed description of the present disclosure below taken in conjunction with drawings and particular embodiments.

[0019] One embodiment of the present disclosure provides an aerosol generating device which heats rather than burns a smokable material such as a cigarette, so that at least one ingredient of the smokable material is volatilized or released to form an aerosol for inhalation.

[0020] In a preferred embodiment, the aerosol generating device heats the smokable material by radiating far

infrared rays having a heating effect, for example, far infrared rays of $3\mu\text{m}$ to $15\mu\text{m}$; during operation, when the wavelength of the infrared rays matches with the wavelength absorbable by the volatile ingredient of the smokable material, the energy of the infrared rays is easy to be absorbed by the smokable material, thus the smokable material is heated so that at least one volatile ingredient is volatilized to generate an aerosol for inhalation.

[0021] The aerosol generating device according to one embodiment of the present disclosure can refer to FIG. 1 in structure, the overall shape of the device is roughly configured as a tabular tube, and external components of the aerosol generating device include:

- a shell 10, which is configured to be hollow inside, thereby forming an assembly space for necessary functional components such as infrared radiation; the shell 10 includes a proximal end 110 and a distal end 120 that are opposite in the length direction, wherein the proximal end 110 defines a receiving hole 111, and through the receiving hole 111, a smokable material A may be received within the shell 10 to be heated or may be removed from the shell 10.

[0022] To heat the smokable material A received within the shell 10 through radiation of infrared rays, further, the shell 10 is internally provided with an infrared emitter 20 for heating; in one embodiment, the structure can refer to FIG. 2 to FIG. 3, including:

[0023] the shell 10 is internally provided with a chamber 30 configured to receive a smokable material A;

- the infrared emitter 20 includes a first infrared emitter 21 and a second infrared emitter 22 that are arranged surrounding the chamber 30; specifically, according to the structure shown in figures, the first infrared emitter 21 and the second infrared emitter 22 are totally the same in structure and content, both including two parts:

- a base portion 211/221, which as a rigid support substrate material may be made of high-temperature resistant and infrared transmissive materials such as quartz glass, ceramic, mica, etc. during implementations; and

- an infrared emitting coating 212/222 formed on the base portion 211/221, wherein the infrared emitting coating 212/222 is capable of generating heat when electrified, thereby radiating infrared rays that can be used to heat the smokable material A, for example, the above far infrared rays of $3\mu\text{m}$ to $15\mu\text{m}$. When the wavelength of the infrared rays matches with the wavelength absorbable by the volatile ingredient of the smokable material, the energy of the infrared rays is easy to be absorbed by the smokable material.

[0024] Generally, during implementations, the infrared

emitting coating 212/222 may be a coating made of ceramic materials such as zirconium, or Fe-Mn-Cu series, tungsten series, or transition metals and their oxide materials.

[0025] In a preferred embodiment, the infrared emitting coating 212/222 preferably is composed of an oxide of at least one metallic element among Mg, Al, Ti, Zr, Mn, Fe, Co, Ni, Cu, Cr, Zn, etc.; these metallic oxides when heated to an appropriate temperature can radiate far infrared rays having a heating effect; the thickness of the coating preferably may be controlled between 30 μ m to 50 μ m; the formation mode on the surface of the base portion 211/221 may be achieved by spraying the oxides of the above metallic elements on the outer surface of the base portion 211/221 through an atmospheric plasma spraying method and then curing it, that is, obtaining an infrared emitting film bonded to the surface of the base.

[0026] The above first infrared emitter 21 and second infrared emitter 22, as shown in figures, are configured as a curved shape in cross section, such that it is easy to form the infrared emitting coating 212/222 on surfaces thereof respectively.

[0027] Further, in a preferred embodiment, the first infrared emitter 21 and the second infrared emitter 22 may be supplied with power or controlled separately, so that they can radiate infrared rays independently to heat different portions of the smokable material A. Specifically, in an optional control manner, the first infrared emitter 21 and the second infrared emitter 22 may be started alternately or at the same time.

[0028] Further, according to the embodiments of the heating state shown in FIG. 2 to FIG. 4, the chamber 30 is configured as a tabular shape, specifically an oval shape in FIG. 2, that is, the size in the vertical direction r1 is less than the size in the horizontal direction r2, such that the first infrared emitter 21 and the second infrared emitter 22 have a relative greater area of radiation for the smokable material A.

[0029] Further, in a preferred embodiment, the first infrared emitter 21 and the second infrared emitter 22 are separated from each other and may move relative to each other, specifically referring to FIG. 2 to FIG. 3.

[0030] As shown in FIG. 2, the first infrared emitter 21 and the second infrared emitter 22 are located at the first position, under which condition the smokable material A is received within the chamber 30 and basically keeps its own shape, generally the smokable material is shaped as a cylinder with a circular cross section according to product preparation and familiar structures.

[0031] From FIG. 2, the first infrared emitter 21 and the second infrared emitter 22 approach each other along directions indicated by arrows R1 and R2 shown in FIG. 2 respectively, until reaching the second position shown in FIG. 3; when at the second position, the first infrared emitter 21 and the second infrared emitter 22 enclose and squeeze the smokable material A respectively, so that the smokable material deforms, wherein the smokable material roughly may be squeezed into the shape

of a cylinder with an oval cross section, as shown in FIG. 3; by the time, start the first infrared emitter 21 and the second infrared emitter 22, then the distance between the radiated infrared rays and the internal center O of the smokable material A is greatly reduced, thereby increasing the ability and efficiency of absorbing infrared rays inside the smokable material A compared to the state shown in FIG. 2, such that a surface layer and the interior of the smokable material A can be relatively uniformly heated.

[0032] To facilitate the operation of relative movement between the first infrared emitter 21 and the second infrared emitter 22, in the preferred embodiments shown in FIG. 2 and FIG. 3, the shell 10 is internally provided with a biasing element, which is configured to bias the first infrared emitter towards the second position. Specifically, the biasing element includes a first spring 41 and a second spring 42 which, after being stretched as shown in FIG. 3, provide an elastic restoring force so that the first infrared emitter 21 and the second infrared emitter 22 are biased towards the first position shown in FIG. 2, facilitating the removal of the smokable material A after the inhalation is completed.

[0033] Of course, further, in an optional embodiment, to enable the first infrared emitter 21 and the second infrared emitter 22 to be stably retained at different positions respectively, the shell 10 is internally provided with a retaining mechanism, for example, a first retaining element 51 located on the first infrared emitter 21 as shown in FIG. 4, for example, a mechanical connection mechanism such as a magnet, a fastener, etc., and a second retaining element 52 which may be located on the second infrared emitter 22 and may cooperate with the first retaining element 51 to form securing or connection, so that the first retaining element 51 may be retained at different positions.

[0034] In another variant embodiment as shown in FIG. 5, the infrared emitting coating 212a of the first infrared emitter 21a is formed on an outer surface away from the chamber 30, or is an infrared emitting film wrapped around an outer surface of the first infrared emitter 21a away from the chamber 30, for example, a zinc oxide film, a graphene film, an indium oxide film doped with rare earth metals, etc. Meanwhile, to facilitate power supply to the infrared emitting coating 212a so that it radiates infrared rays, upper and lower ends of the outer surface of the first infrared emitter 21a are formed, respectively, with a first conductive coating 213a and a second conductive coating 214a which are made of silver, gold or copper, etc., and have an excellent conductivity; and subsequently the conductive coating is connected to a power supply device through welding a lead or sleeving a conductive ring and so on, so as to supply power to the infrared emitting coating 212a.

[0035] Further, in a variant embodiment, the structure of the infrared emitter 20b may refer to FIG. 6, including: a first infrared emitter 21b and a second infrared emitter 22b that are configured as the shape of a sheet, wherein

the first infrared emitter 21b and the second infrared emitter 22b are arranged at two opposite sides of the chamber 30b, and they can move relative to each other to squeeze the smokable material A received within the chamber 30b, so that the smokable material A is squeezed into the oval shape shown in FIG. 3 to increase the efficiency of the infrared rays penetrating into the center, such that a surface layer and the interior of the smokable material A can be relatively uniformly heated.

[0036] In another variant embodiment, as shown in FIG. 7, the smokable material A is configured as the shape of a block or sheet, different from the shape of conventional cylinders; the first infrared emitter 21c and the second infrared emitter 22c of the infrared emitter 20c are oppositely arranged in the thickness direction of the smokable material A respectively, so that the block shaped smokable material A adapted to the chamber 30c may have a greater surface area to increase the efficiency of absorbing infrared rays, thereby improving the heating efficiency and enabling a surface layer and the interior of the smokable material A to be relatively uniformly heated.

[0037] During the smoking process of the above aerosol generating device, as indicated by the arrows R3 shown in FIG. 3, FIG. 4 or FIG. 7, external air may enter the chamber 30/30c from two sides thereof via the space between the first infrared emitter 21/21c and the second infrared emitter 22/22c, until passing through the smokable material A to be inhaled.

[0038] It is to be noted that the description of the present disclosure and the drawings just list preferred embodiments of the present disclosure and are not limited to the embodiments described herein. Further, for the ordinary staff in this field, improvements or variations may be made according to the above description, and all these improvements or variations are intended to be included within the scope of protection of the claims appended hereinafter.

Claims

1. An aerosol generating device, configured to heat a smokable material to generate an aerosol for inhalation, comprising:

a chamber, configured to receive a smokable material;
the chamber having a first radial direction, and a second radial direction that is perpendicular to the first radial direction; and
a first infrared emitter and a second infrared emitter that are arranged in the first radial direction of the chamber and configured to radiate infrared rays towards the chamber so as to heat the smokable material, the first infrared emitter and the second infrared emitter extending at least partially in the second radial direction,

thereby defining the chamber between the first infrared emitter and the second infrared emitter, such that the size of the chamber in the second radial direction is greater than that in the first radial direction.

2. The aerosol generating device according to claim 1, wherein the first infrared emitter and the second infrared emitter are separated from each other.
3. The aerosol generating device according to claim 1, wherein the first infrared emitter and the second infrared emitter are spaced with certain distance, to form an airflow channel for external air to enter the chamber.
4. The aerosol generating device according to any one of claim 1 to 3, wherein the first infrared emitter is configured to be able to move in the first radial direction relative to the second infrared emitter, to change the size of the chamber in the first radial direction.
5. The aerosol generating device according to claim 4, wherein the first infrared emitter has a first position and a second position opposite to the second infrared emitter, and is able to move between the first position and the second position in the first radial direction relative to the second infrared emitter; wherein the size of the chamber in the first radial direction when the first infrared emitter is at the first position is less than the size of the chamber in the first radial direction when the first infrared emitter is at the second position.
6. The aerosol generating device according to claim 5, further comprising a retaining mechanism, which is configured to stably retain the first infrared emitter at the first position and/or the second position.
7. The aerosol generating device according to claim 5, further comprising a biasing element, which is configured to bias the first infrared emitter towards the second position.
8. The aerosol generating device according to any one of claims 1 to 3, wherein the first infrared emitter and/or the second infrared emitter are/is configured as the shape of a sheet extending in the second radial direction.
9. The aerosol generating device according to any one of claims 1 to 3, wherein the first infrared emitter and/or the second infrared emitter are/is configured as the shape of a curve bending outwards in the first radial direction of the chamber.

10. The aerosol generating device according to any one of claims 1 to 3, wherein the first infrared emitter or the second infrared emitter comprises:

a base; and,
an infrared emitting coating formed on a surface of the base or an infrared emitting film bonded to a surface of the base.

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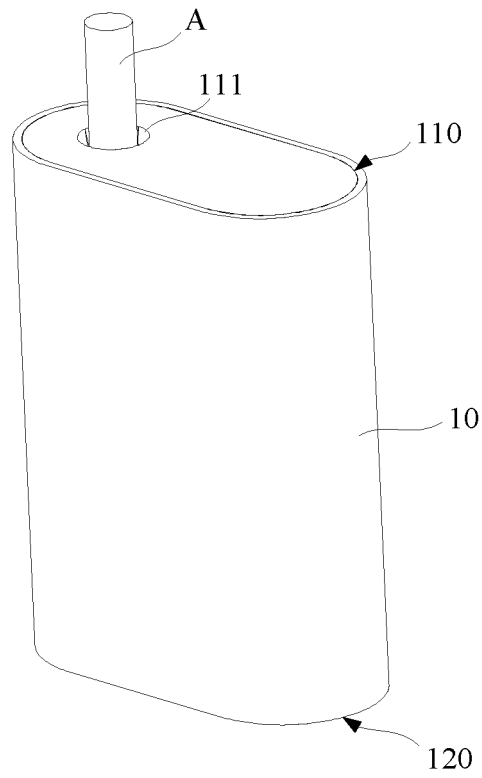


FIG. 1

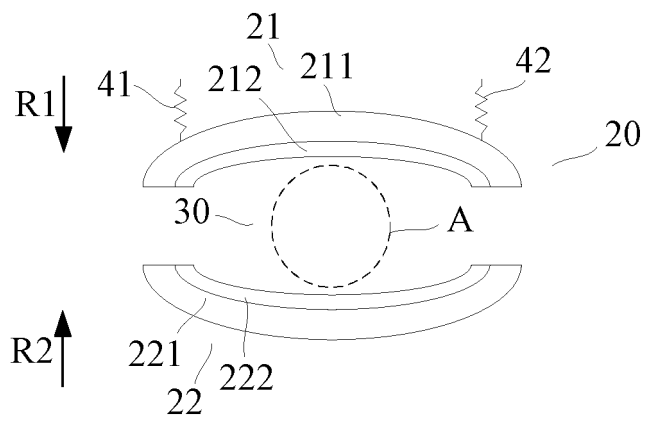


FIG. 2

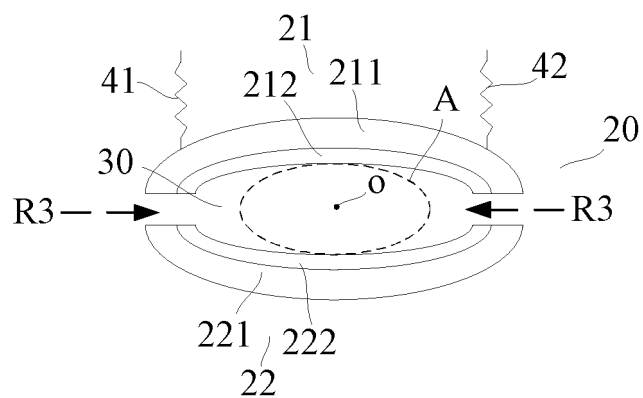


FIG. 3

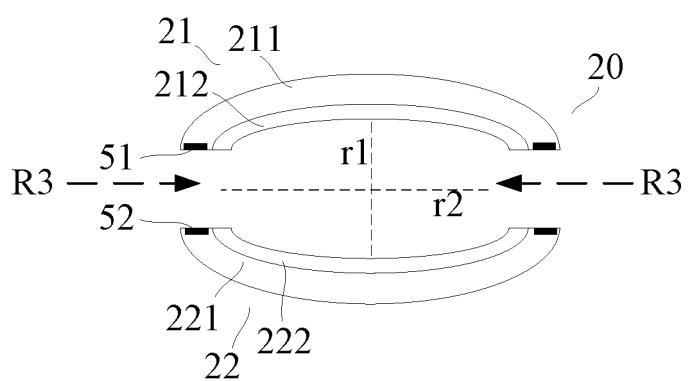


FIG. 4

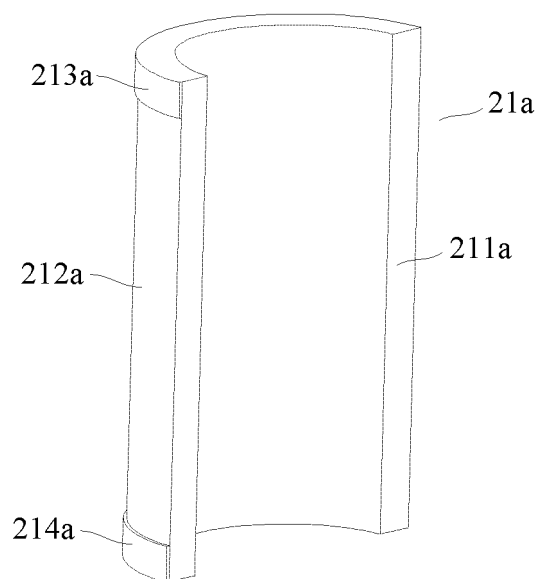


FIG. 5

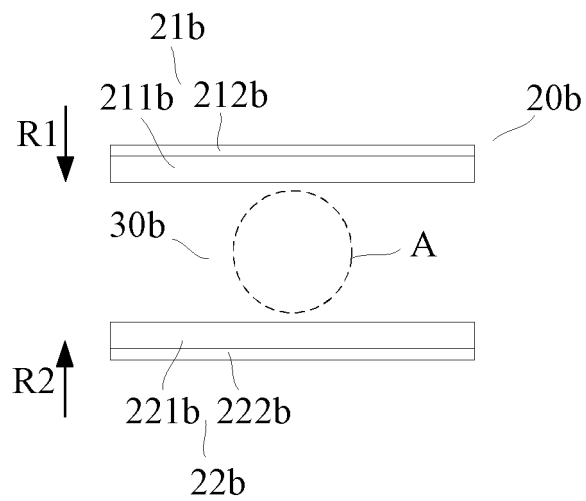


FIG. 6

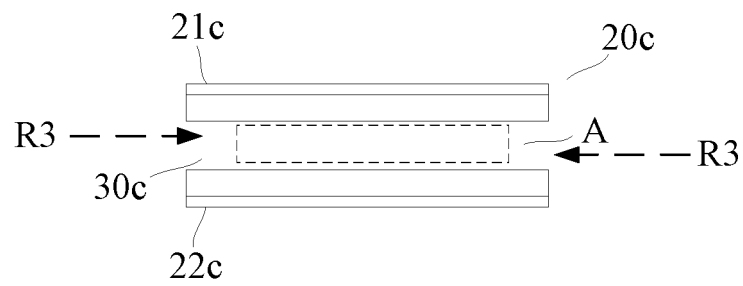


FIG. 7

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2021/072136

5	A. CLASSIFICATION OF SUBJECT MATTER	
	A24F 47/00(2020.01)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)	
	A24F	
	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)	
	CNPAT, WPI, EPODOC, CNKI: 烟, 气溶胶, 加热, 形变, 变形, 挤压, 偏压, 均匀, 红外, 距离, 间距, 位移, 移动, 弧形, tobacco, aerosol, smok+, heat+, squeeze, press, distance, displacement, move, arc	
	C. DOCUMENTS CONSIDERED TO BE RELEVANT	
20	Category*	Citation of document, with indication, where appropriate, of the relevant passages
	X	CN 110495649 A (KUNSHAN LIANTAO ELECTRONIC CO., LTD.) 26 November 2019 (2019-11-26) description, paragraphs 34-56, and figures 1-4
25	A	CN 108741237 A (BEIJING ZHIXIN WUMA INFORMATION TECHNOLOGY CO., LTD.) 06 November 2018 (2018-11-06) entire document
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30	A	CN 109007978 A (BEIJING ZHIXIN WUMA INFORMATION TECHNOLOGY CO., LTD.) 18 December 2018 (2018-12-18) entire document
35	A	WO 2019122880 A1 (BRITISH AMERICAN TOBACCO (INVESTMENTS) LTD.) 27 June 2019 (2019-06-27) entire document
	☒ 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 "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	
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	Date of the actual completion of the international search	Date of mailing of the international search report
	29 March 2021	19 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.

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

INTERNATIONAL SEARCH REPORT

International application No.

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INTERNATIONAL SEARCH REPORT
Information on patent family members

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- CN 201821350103 [0004]