(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 4 483 729 A1

(12) EUROPEAN PATENT APPLICATION

published in accordance with Art. 153(4) EPC

(43) Date of publication:
01.01.2025 Bulletin 2025/01

(21) Application number: **22933203.6**

(22) Date of filing: **29.12.2022**

(51) International Patent Classification (IPC):
A24F 40/46 *(2020.01)* ***A24F 40/40*** *(2020.01)*
A24F 40/20 *(2020.01)* ***A24D 1/20*** *(2020.01)*

(86) International application number:
PCT/CN2022/143279

(87) International publication number:
WO 2023/179156 (28.09.2023 Gazette 2023/39)

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA
Designated Validation States:
KH MA MD TN

(30) Priority: **25.03.2022 CN 202210305700**

(71) Applicant: **Shenzhen Merit Technology Co., Ltd.**
Shenzhen, Guangdong 518105 (CN)

(72) Inventors:
- **LIANG, Feng**
  Shenzhen, Guangdong 518105 (CN)
- **PAN, Fumin**
  Shenzhen, Guangdong 518105 (CN)

(74) Representative: **Westphal, Mussgnug & Partner, Patentanwälte mbB**
Werinherstraße 79
81541 München (DE)

(54) CARBON CUP HEATING BODY AND AEROSOL GENERATING PRODUCT CONTAINING SAME

(57) A carbon cup heating body and an aerosol generating product containing same.the carbon cup heating body (l) having a bottom wall and a side wall, the space betwveenthe outer surface and the inner surface of the carbon cup heating body (l) being filled with aferromagnetic metal heating body (l 1), and the inner surface of the carbon cup heating body(1l) being provided with metal foil (l2). In use, no open fire is ignited, and the space between the outer surface and the inner surface of the carbon cup healing body (1) is filled with thefcrromagnctic metal heating body, so that the carbon cup heating body (l) can be easily and wholly ignited by means of an electromagnetic heating mode, after the catbon cup heatingbody is iguited, the aerosol generating product can be independently used without the needof considering whether a heating apparatus has sufficient power and without limitation of thcheating apparatus; and a combustion waste gas generated during the combustion of the carboncup healing body is isolated by the metal foil and will not be inhaled by a human body. thusachicving a good hamn reduction effect.

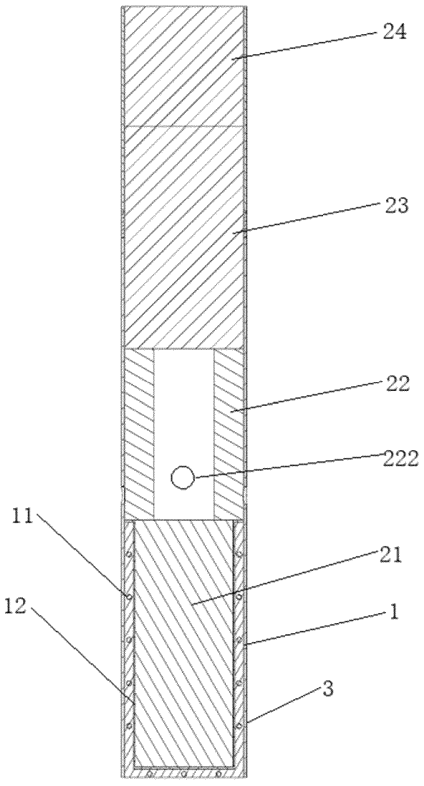

FIG.4

EP 4 483 729 A1

Description

FIELD

[0001] The present invention relates to the technical field of aerosol generation products, and more specifically, to a carbon cup heating element and an aerosol generation product containing same.

BACKGROUND

[0002] Existing aerosol generation products form an aerosol that can be inhaled by users by heating an aerosol-generating matrix without burning it mainly by means of electric-heating and carbon-heating, so that the content of harmful substances in the aerosol can be reduced, thereby improving the safety and health of smoking of aerosol generation products. Therefore, heat-not-burn aerosol generation products are popular among consumers.

[0003] However, existing aerosol generation products generally have issues with user convenience. The electric-heating aerosol generation product needs to be used together with a heating device during use, and it is limited by the power consumption of the heating device, making it less convenient to use. The carbon-heating aerosol generation products do not require the additional heating device during use. However, during the heating process of this type of product, open flames are utilized to ignite a carbon heat source from the outside, and the ignition is difficult. In addition, when the carbon heat source is ignited, the carbon heat source can only burn locally, resulting in non-uniform carbon heating and poor heat conduction capability, and there is also a problem that when using the aerosol generation product, the waste gas produced by the combustion of the carbon heat source can easily be inhaled by the user, resulting in an unclear harm reduction effect.

[0004] In order to solve the above problems, the present invention is proposed.

SUMMARY

[0005] The present invention provides a carbon cup heating element and an aerosol generation product including the carbon cup heating element, so as to improve the convenience of using the aerosol generation product.

[0006] The first aspect of the present invention provides a carbon cup heating element, which includes a bottom wall and a side wall, a ferromagnetic metal heater 11 is filled between an outer surface and an inner surface of the carbon cup heating element 1, and a metal foil 12 is arranged on the inner surface of the carbon cup heating element 1.

[0007] The carbon cup heating element 1 can be ignited by electromagnetic heating.

[0008] Preferably, the ferromagnetic metal heater 11 includes ferromagnetic metal particles or a ferromagnetic metal layer.

[0009] Preferably, the metal foil 12 has no holes and covers the inner surface of the entire side wall or the inner surface of the entire bottom wall of the carbon cup heating element 1, or covers the inner surface of the entire side wall and the inner surface of the entire bottom wall of the carbon cup heating element 1, playing a role in isolating gas.

[0010] The second aspect of the present invention provides an aerosol generation product including the carbon cup heating element of the first aspect of the present invention, the carbon cup heating element 1 is sleeved on an aerosol-generating matrix 21 of the aerosol generation product.

[0011] Preferably, the downstream of the aerosol-generating matrix 21 further includes a hollow section 22 and/or a cooling section 23 and/or a filter section 24. That is, the downstream of the aerosol-generating matrix 21 may include any one, two, or all three of the following: the hollow section 22, the cooling section 23, and the filter section 24, and, of course, the most preferred configuration is to have all three sections in sequence.

[0012] Preferably, the hollow section 22 provides air inlet 222 that is in communication with the outside environment; the air inlets 222 can be one or multiple.

[0013] Preferably, the carbon cup heating element 1 and the aerosol-generating matrix 21 are integrally connected.

[0014] Preferably, the carbon cup heating element 1 and the aerosol-generating matrix 21 are detachably connected to each other.

[0015] Preferably, the aerosol generation product further includes a wrapping layer 3 wrapping the carbon cup heating element 1, which has a thermochromic material, the thermochromic material is a composite material composed of a chromophoric agent, a color-developing agent, and a solven; the chromophoric agent is selected from but not limited to bromocresol green, fluorine compounds, triarylmethane compounds or schiff base compounds; the color developing agent is selected from but not limited to rare earth ions, phenolic hydroxyl groups compounds and their derivatives or carboxyl groups compounds and their derivatives; the solvent is selected from but not limited to molten compounds, alcohol compounds, higher aliphatic ketone compounds, ester compounds, ether compounds, amide compounds or carboxylic acids compounds.

[0016] Compared with the existing technology, the present invention has the following beneficial effects:

1. The carbon cup heating element of the present invention has the bottom wall and the side wall, and a ferromagnetic metal heater is filled between the outer surface and the inner surface of the carbon cup heating element. When the carbon cup heating element is placed in a heating device that can generate alternating electromagnetic fields, the ferromagnetic metal heater is heated by means of electromagnetic

heating, the ferromagnetic metal heater easily ignites the whole carbon cup heating element from the inside, and the carbon cup heating element heats the aerosol-generating matrix to produce the aerosol for consumers to inhale. The aerosol generation product including the carbon cup heating element can be used alone after the carbon cup heating element is ignited, and the heating device is only used for a moment to ignite the carbon cup heating element and does not need to be continuously used. Therefore, there is no need to consider whether the heating device has sufficient power, and there is no limitation of the heating device. In addition, the ignition by means of electromagnetic heating can also avoid safety hazards associated with open flame ignition.

2. The inner surface of the carbon cup heating element of the present invention is provided with a metal foil, which isolates the carbon cup heating element from the aerosol-generating matrix. When the carbon cup heating element burns, the generated combustion waste gas is blocked by the metal foil from entering the aerosol-generating matrix, so that the aerosol generated by heating the aerosol-generating matrix will not be mixed with the waste gas. As such, the waste gas generated from the burning of the carbon cup heating element will not be inhaled into the human body, thus achieving a good harm reduction effect.

3. The carbon cup heating element of the present invention is sleeved on the aerosol-generating matrix, so that when the entire carbon cup heating element is ignited by means of electromagnetic heating, the heat generated by the combustion of the carbon cup heating element can be evenly guided to the aerosol-generating matrix through the metal foil inside the carbon cup heating element, thereby achieving uniform and quick heating and providing the user with a good smoking experience.

4. The carbon cup heating element of the present invention is detachably connected to the aerosol-generating matrix of the aerosol generation product, so that it can be adapted to existing aerosol generation products.

5. When the inner surface of entire bottom wall and the inner surface of the entire side wall of the carbon cup heating element of the present invention are provided with the metal foil and there is no hole in the metal foil, the carbon cup also plays a role in isolating the aerosol-generating matrix from the air, so that the aerosol-generating matrix is heated to release the aerosol in absence of the passage of outside air. Since there is no passage of outside air, it is equivalent to cancelling the oxygen of the three elements of combustion (combustible, oxygen, and a temperature higher than the ignition point), so that the aerosol-generating matrix will not burn even when heated to a very high temperature (for example, above 350°C). This not only avoids various harmful aerosol components and burnt smell generated by combustion, but also makes the released aerosol flavor purer. Furthermore, heating the aerosol-generating matrix to a higher temperature can increase the released aerosol and improve the utilization rate of the aerosol-generating matrix, and can release those flavor components with a release temperature above 350°C that could not be released originally, thereby enriching the flavor. When the hollow section 22 with the air inlet 222 is used, the outside air entering from the air inlet can also cool the aerosol and carry it downstream, thereby promoting the diffusion of the aerosol within the aerosol-generating matrix in the downstream direction.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017]

FIG. 1 is a schematic structural diagram of an aerosol generation product inserted into a heating start-up device;

FIG. 2 is a schematic structural diagram of an aerosol generation product separated from a heating start-up device;

FIG. 3 is a schematic diagram of an assembled structure of an aerosol generation product when a carbon cup heating element and an aerosol-generating matrix are integrally connected;

FIG. 4 is a schematic cross-sectional structural view of an aerosol generation product when a carbon cup heating element and an aerosol-generating matrix are integrally connected;

FIG. 5 is a schematic structural diagram of a carbon cup heating element separated from an aerosol-generating matrix;

FIG. 6 is a schematic structural diagram of an aerosol generation product in which a carbon cup heating element and an aerosol-generating matrix are detachably connected;

FIG. 7 is a schematic cross-sectional structural diagram of an aerosol generation product in which a carbon cup heating element and an aerosol-generating matrix are detachably connected;

Description of reference signs of the drawings:

[0018] 1-carbon cup heating element, 11-ferromagnetic metal heater, 12-metal foil, 21-aerosol-generating matrix, 22-hollow section, 222-air inlet, 23-cooling section, 24-filter section, 3-wrapping layer, 4-heating start-up device.

DESCRIPTION OF THE EMBODIMENTS

[0019] In order to better understand the purpose, structure and function of the present invention, the present invention will be described in further detail below in conjunction with the accompanying drawings.

[0020] In this application, "upstream" to "downstream" are relative terms. When the aerosol generation product is heated and inhaled, the flowing direction of aerosol in the aerosol generation product is from "upstream" to "downstream".

[0021] The present invention provides a carbon cup heating element, which includes a bottom wall and a side wall. Ferromagnetic metal particles are filled between an outer surface and an inner surface of the carbon cup heating element, and a heat-permeable and air-impermeable metal foil 12 is arranged on the inner surface of the carbon cup heating element.

[0022] The metal foil 12 has no holes and covers the inner surface of the entire side wall and the inner surface of the entire bottom wall of the carbon cup heating element 1, playing a role in isolating gas.

[0023] An aerosol generation product including the carbon cup heating element 1 is provided, the carbon cup heating element 1 is sleeved on the aerosol-generating matrix 21 of the aerosol generation product, and the carbon cup heating element 1 and the aerosol-generating matrix 21 are separated by the metal foil 12; the aerosol-generating matrix 21 can be atomized to form an aerosol.

[0024] The carbon cup heating element 1 is arranged at the upstream of the aerosol-generating matrix 21.

[0025] A hollow section 22, a cooling section 23 and a filter section 24 are connected sequentially downstream of the aerosol-generating matrix 21; the hollow section 22 provides air inlet 222 in communication with the outside.

[0026] Before using the aerosol generation product, the carbon cup heating element 1 is ignited with a heating start-up device 4. The heating start-up device 4 can be an electromagnetic heating device which, by means of electromagnetic heating, heats the ferromagnetic metal particles in the carbon cup heating element, so that the entire carbon cup heating element 1 is ignited and can self-sustain the combustion. After that, the aerosol generation product can be used independently without continuing to use the heating device. Therefore, there is no need to consider whether the power of the heating device is sufficient, and the carbon cup heating element 1 can be easily ignited, not limited by the heating device, and not requiring an open flame.

[0027] The heat generated during burning of the carbon cup heating element 1 can continuously heat the aerosol-generating matrix 21, causing the aerosol-generating matrix 21 to be heated to release aerosol. The waste gas produced by the burning of the carbon cup heating element 1 is isolated by the metal foil 12,which is located between the carbon cup heating element 11 and the aerosol-generating matrix 21, so that the waste gas will not be inhaled by the user, thereby reducing harm to the human body.

[0028] The carbon cup heating element 1 and the aerosol-generating matrix 21 are integrally connected, or the carbon cup heating element 1 and the aerosol-generating matrix 21 are detachably connected to each other.

[0029] The aerosol generation product further includes a wrapping layer 3 wrapping the carbon cup heating element 1. The wrapping layer 3 has a thermochromic material, which is a composite material composed of a chromophoric agent, a color-developing agent, and a solvent, the chromophoric agent is selected from bromocresol green, the color-developing agent is selected from rare earth ions, and the solvent is selected from molten compounds.The thermochromic material serves as a temperature indicator near the carbon cup heating element 1,the thermochromic material in the wrapping layer 3 displays different colors with temperature changes to indicate approximate temperature information to the user.

[0030] When the carbon cup heating element 1 is detachably connected to the aerosol-generating matrix 21, making it compatible with existing aerosol generation products.

[0031] It is understood that the present invention has been described by way of some embodiments. Those skilled in the art know that various changes or equivalent substitutions can be made to these features and embodiments without departing from the spirit and scope of the present invention. In addition, under the teachings of the present invention, the features and embodiments may be modified to adapt to a particular situation and material without departing from the spirit and scope of the invention. Therefore, the present invention is not limited to the specific embodiments disclosed herein, and all embodiments falling within the scope of the claims of the present invention are within the scope of protection of the present invention.

Claims

1. A carbon cup heating element, comprising a bottom wall and a side wall, wherein
   a ferromagnetic metal heater (11) is filled between an outer surface and an inner surface of the carbon cup heating element (1), a metal foil (12) is arranged on the inner surface of the carbon cup heating element (1).

2. The carbon cup heating element according to claim 1, **characterized in that**, the ferromagnetic metal heater (11) comprises ferromagnetic metal particles or a ferromagnetic metal layer.

3. The carbon cup heating element according to claim 2, **characterized in that**, the metal foil (12) has no holes and covers the inner surface of the entire side wall and/or the inner surface of the entire bottom wall of the carbon cup heating element (1).

4. An aerosol generation product comprising the carbon cup heating element according to any one of claims 1 to 3, **characterized in that**, the carbon cup heating element (1) is sleeved on an aerosol-generating matrix (21) of the aerosol generation product.

5. The aerosol generation product according to claim 4, **characterized in that**, a hollow section (22) and/or a cooling section (23) and/or a filter section (24) are arranged at the downstream of the aerosol-generating matrix (21).

6. The aerosol generation product according to claim 5, **characterized in that**, the hollow section (22) provides anair inlet (222) in communication with the outside environment.

7. The aerosol generation product according to claim 4, **characterized in that**, the carbon cup heating element (1) and the aerosol-generating matrix (21) are integrally connected.

8. The aerosol generation product according to claim 4, **characterized in that**, the carbon cup heating element (1) and the aerosol-generating matrix (21) are detachably connected to each other.

9. The aerosol generation product according to claim 4, **characterized in that**, the aerosol generation product further comprises a wrapping layer (3) wrapping the carbon cup heating element (1), the wrapping layer (3) has a thermochromic material, the thermochromic material is a composite material composed of a chromophoric agent, a color-developing agent, and a solvent, the chromophoric agent is selected from bromocresol green, fluorine compounds, triarylmethane compounds or schiff base compounds, the color developing agent is selected from rare earth ions, phenolic hydroxyl groups compounds and their derivatives or carboxyl groups compounds and their derivatives, the solvent is selected from molten compounds, alcohol compounds, higher aliphatic ketone compounds, ester compounds, ether compounds, amide compounds or carboxylic acids compounds.

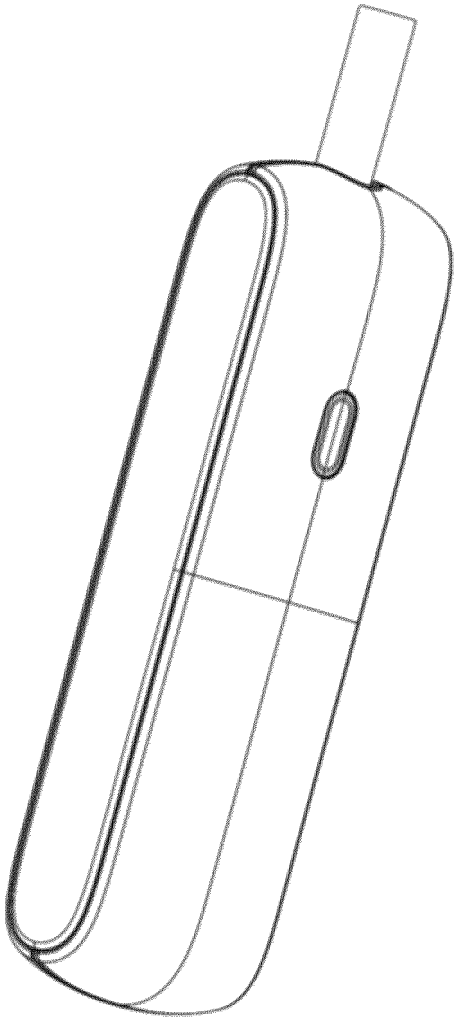

FIG.1

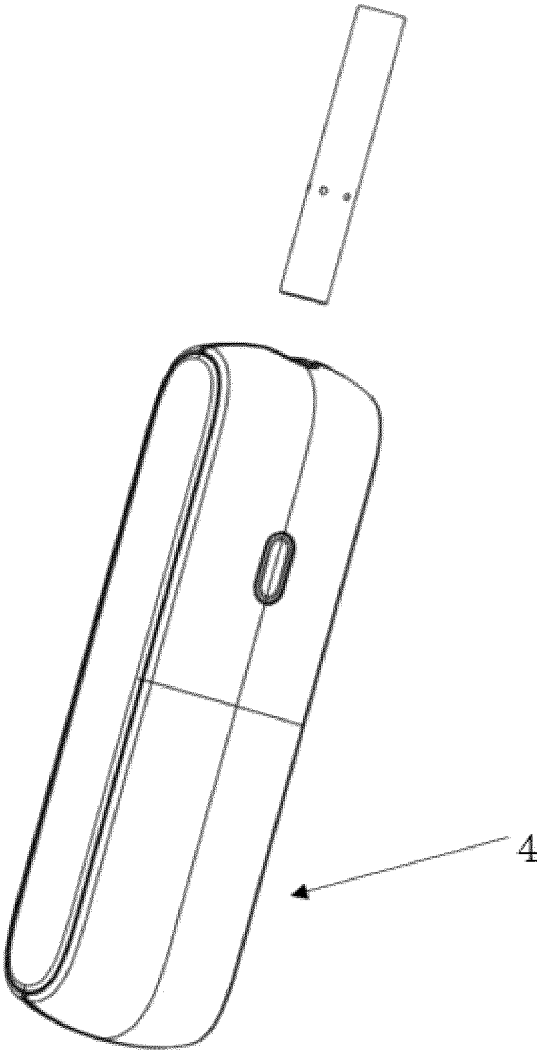

FIG.2

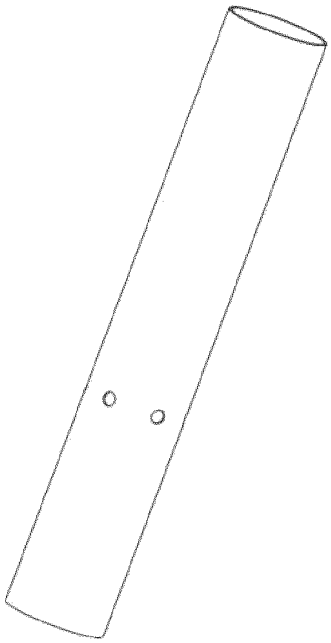

FIG.3

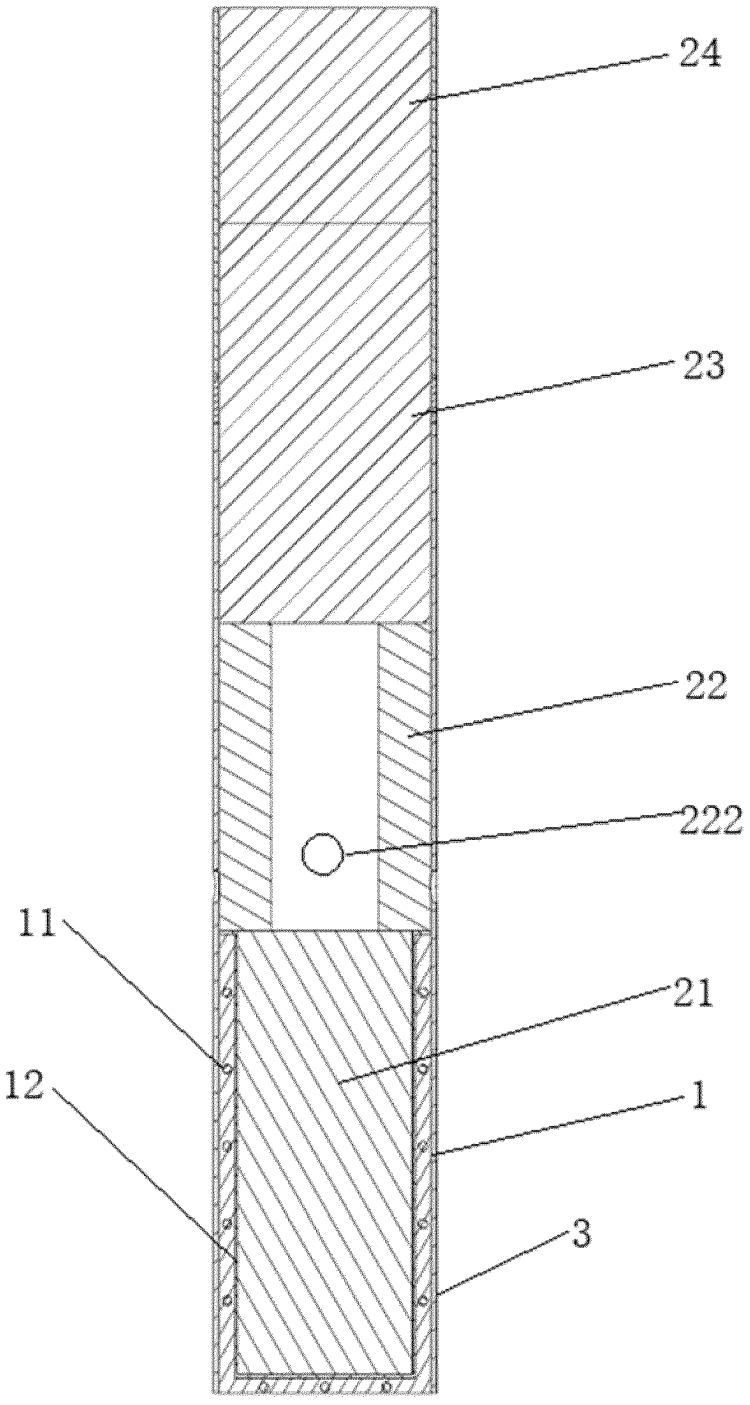

FIG.4

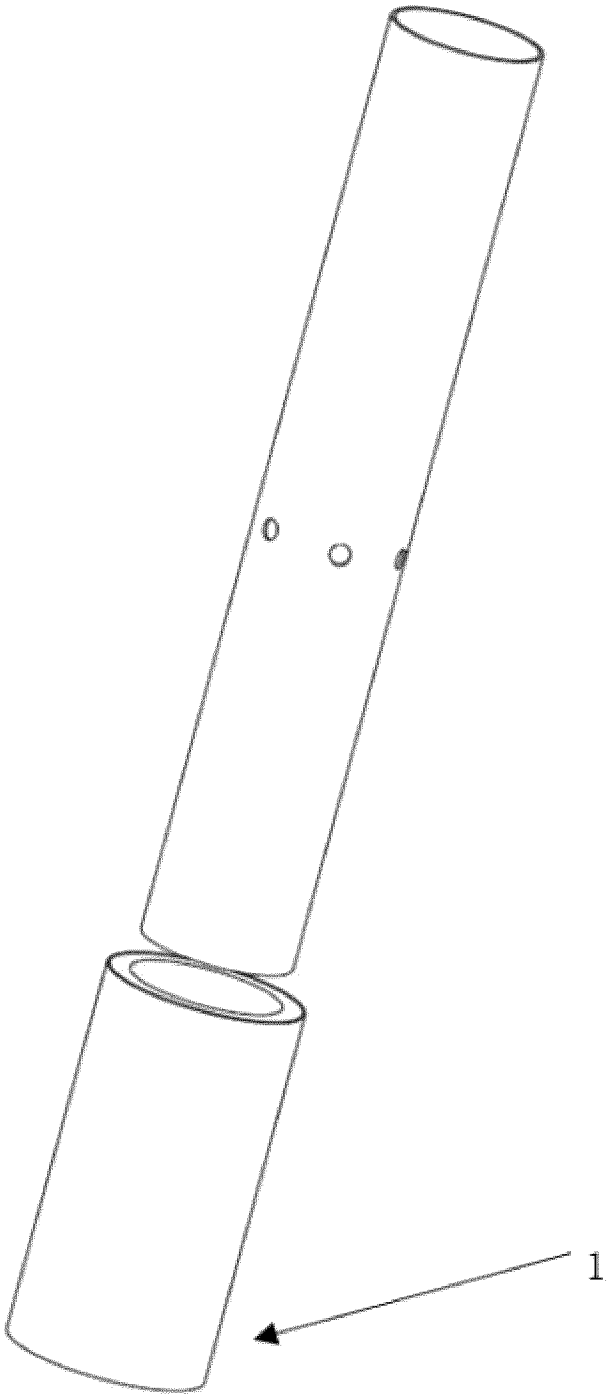

FIG.5

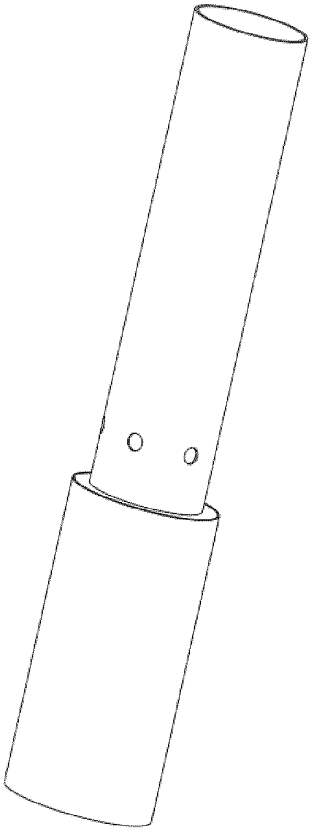

FIG.6

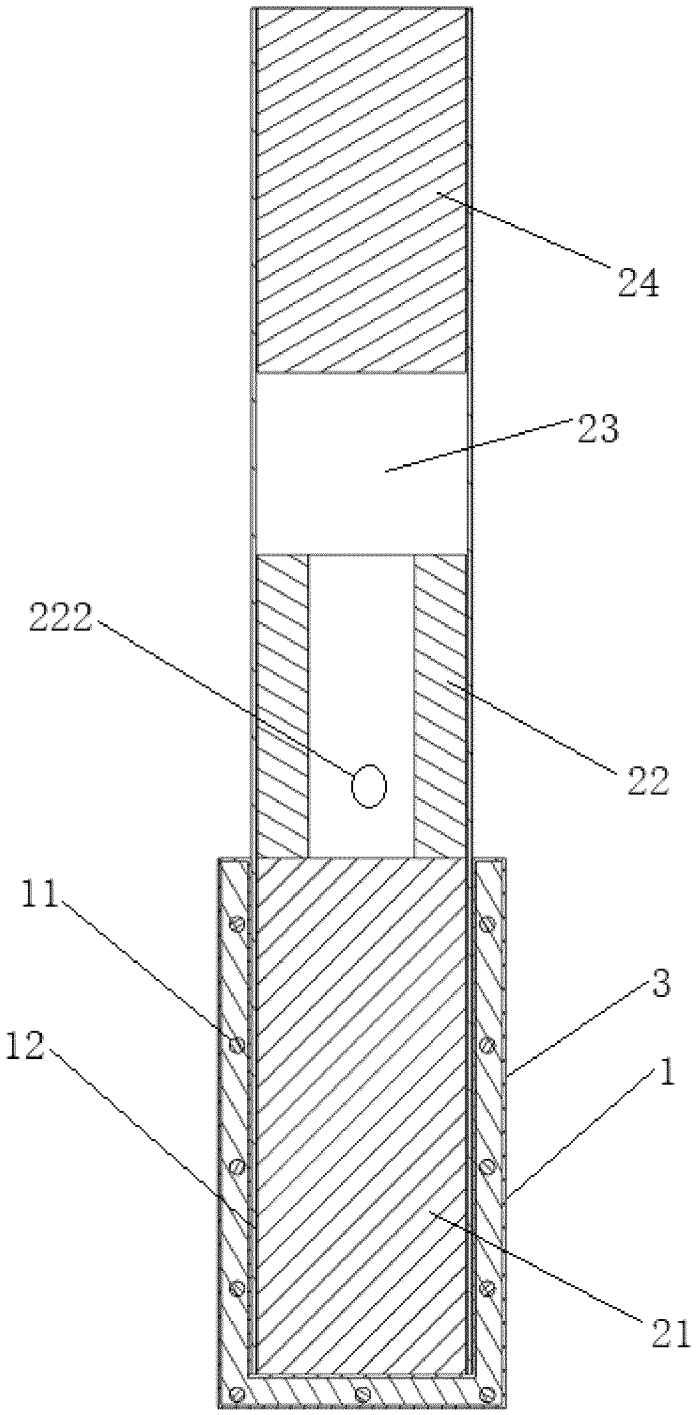

FIG.7

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2022/143279

A. CLASSIFICATION OF SUBJECT MATTER

A24F40/46(2020.01)i;A24F40/40(2020.01)i;A24F40/20(2020.01)i;A24D1/20(2020.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A24F40/-

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

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

CNPAT, CNKI, WPI, EPODOC: 电磁, 加热, 金属, 箔, 碳, 隔离, 隔绝, 氧气, 空气, electromagnetic, heat+, metal, foil, carbon, isolation, oxygen, air

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	CN 113598419 A (SHENZHEN MAISHI TECHNOLOGY CO., LTD.) 05 November 2021 (2021-11-05) description, paragraphs [0034]-[0085], and figures 1-6	1-9
Y	CN 109496128 A (PHILIP MORRIS PRODUCTS S.A.) 19 March 2019 (2019-03-19) description, paragraphs [0048]-[0052] and [0196]	1-9
Y	CN 108366617 A (PHILIP MORRIS PRODUCTS S.A.) 03 August 2018 (2018-08-03) description, paragraphs [0055] and [0189], and figure 1	9
PX	CN 217885103 U (SHENZHEN MAISHI TECHNOLOGY CO., LTD.) 25 November 2022 (2022-11-25) description, paragraphs [0034]-[0042], and figures 1-7	1-9
A	CN 109640716 A (PHILIP MORRIS PRODUCTS S.A.) 16 April 2019 (2019-04-16) entire document	1-9
A	US 5020548 A (R. J. REYNOLDS TOBACCO COMPANY) 03 June 1991 (1991-06-03) entire document	1-9

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

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"D" document cited by the applicant in the international application
"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

Date of the actual completion of the international search	Date of mailing of the international search report
31 January 2023	**14 February 2023**
Name and mailing address of the ISA/CN **China National Intellectual Property Administration (ISA/CN)** **China No. 6, Xitucheng Road, Jimenqiao, Haidian District, Beijing 100088** Facsimile No. **(86-10)62019451**	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (July 2022)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2022/143279

Patent document cited in search report			Publication date (day/month/year)	Patent family member(s)			Publication date (day/month/year)
CN	113598419	A	05 November 2021	None			
CN	109496128	A	19 March 2019	PH	12018502543	A1	30 September 2019
				EP	3503747	A1	03 July 2019
				EP	3503747	B1	23 December 2020
				US	2019269169	A1	05 September 2019
				US	11202467	B2	21 December 2021
				JP	2019526251	A	19 September 2019
				JP	6953516	B2	27 October 2021
				WO	2018037048	A1	01 March 2018
				AU	2017316515	A1	20 December 2018
				IL	263472	A	31 January 2019
				MX	2019001929	A	05 August 2019
				KR	20190053838	A	20 May 2019
				ZA	201808007	B	28 August 2019
				BR	112019001218	A2	30 April 2019
				CA	3028880	A1	01 March 2018
				RU	2019102197	A	28 September 2020
				RU	2749237	C2	07 June 2021
				SG	11201900668	QA	27 February 2019
CN	108366617	A	03 August 2018	EP	3397082	A1	07 November 2018
				EP	3397082	B1	22 April 2020
				KR	20180099674	A	05 September 2018
				CA	3006239	A1	06 July 2017
				RU	2018127845	A	04 February 2020
				RU	2722123	C2	26 May 2020
				IL	259397	A	31 July 2018
				IL	259397	B	31 May 2021
				JP	2019506145	A	07 March 2019
				JP	6913093	B2	04 August 2021
				WO	2017114895	A1	06 July 2017
				MX	2018008097	A	23 August 2018
				US	2020268039	A1	27 August 2020
				US	11330835	B2	17 May 2022
CN	217885103	U	25 November 2022	None			
CN	109640716	A	16 April 2019	SG	11201901139	QA	28 March 2019
				JP	2019526247	A	19 September 2019
				JP	7046055	B2	01 April 2022
				EP	3506771	A1	10 July 2019
				EP	3506771	B1	30 December 2020
				PH	12018502476	A1	14 October 2019
				MX	2019001928	A	05 August 2019
				AU	2017320216	A1	06 December 2018
				KR	20190039713	A	15 April 2019
				BR	112019001990	A2	07 May 2019
				ZA	201807722	B	28 August 2019
				TW	201811205	A	01 April 2018
				JP	2022075874	A	18 May 2022
				RU	2021104107	A	17 March 2021
				AR	109472	A1	12 December 2018
				WO	2018041450	A1	08 March 2018

Form PCT/ISA/210 (patent family annex) (July 2022)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2022/143279

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
		US 2019182909 A1	13 June 2019
		US 11240885 B2	01 February 2022
		CA 3026992 A1	08 March 2018
		IL 263470 A	31 January 2019
		EP 3806583 A1	14 April 2021
		RU 2019107930 A	01 October 2020
		RU 2743742 C2	25 February 2021
US 5020548 A	03 June 1991	TR 24213 A	01 July 1991
		CA 1309312 C	27 October 1992
		KR 870001792 A	28 March 1987
		KR 910008188 B1	11 October 1991
		PL 261175 A1	06 September 1987
		PL 154335 B1	29 August 1991
		MW 4986 A1	12 May 1987
		PH 25891 A	19 December 1991
		JO 1430 B	10 March 1988
		ZA 864932 B	25 February 1987
		JO 1430 B1	10 March 1988
		JPS 63214173 A	05 September 1988
		JPH 0253026 B2	15 November 1990
		PL 157649 B1	30 June 1992
		CZ 277824 B6	16 June 1993
		TNSN 86123 A1	01 January 1990
		ZM 6886 A1	27 March 1989
		HUT 44919 A	29 May 1988
		HU 202736 B	28 April 1991
		CA 1312251 C	05 January 1993
		JPS 6248370 A	03 March 1987
		JPS 6354357 B2	27 October 1988
		ZA 8604932 A	25 February 1987

Form PCT/ISA/210 (patent family annex) (July 2022)