



(51) International Patent Classification:

A24F 40/40 (2020.01) A24F 40/46 (2020.01)

(21) International Application Number:

PCT/EP2022/067286

(22) International Filing Date:

23 June 2022 (23.06.2022)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

21182181.4 28 June 2021 (28.06.2021) EP

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(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IQ, IR, IS, IT, JM, JO, JP, KE, KG, KH,

KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

— with international search report (Art. 21(3))

(54) Title: AEROSOL GENERATING DEVICE WITH A VACUUM INSULATOR

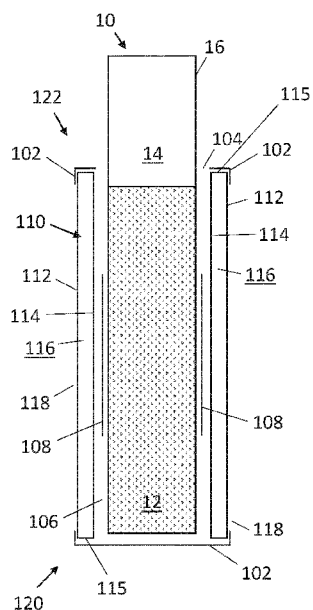


FIG. 1

(57) Abstract: An aerosol generating device (100) is disclosed comprising: a cavity (106) in which an aerosol forming substance (12) can be received; a heater (108) configured to heat an aerosol forming substance (12) received in the cavity (106); and a vacuum insulator (110) provided around the heater (108), wherein an external surface (112) of the vacuum insulator (110) is an outer surface of the aerosol generating device (100) that can be held by the user, in use.

AEROSOL GENERATING DEVICE WITH A VACUUM INSULATOR

FIELD OF INVENTION

The invention relates to aerosol generating devices. In particular, the invention
5 relates to aerosol generating devices with a vacuum insulator.

BACKGROUND TO THE INVENTION

Aerosol generating devices are typically carried around by a user on their person
on a day-to-day basis. There is therefore a demand for lighter and more
compact aerosol generating devices. Additionally, it is desirable that aerosol
10 generating devices can be made as efficient as possible, so that the battery life
can be extended and thus the convenience for the user can be increased. It is
an object of the present invention to address these competing demands.

SUMMARY OF INVENTION

According to an aspect of the present invention, there is provided an aerosol
15 generating device configured to generate an aerosol for inhalation by a user,
comprising: a cavity in which an aerosol forming substance can be received; a
heater configured to heat an aerosol forming substance received in the cavity;
and a vacuum insulator provided around the heater, wherein an external surface
of the vacuum insulator is an outer surface of the aerosol generating device that
20 can be held by the user, in use.

In this way, the vacuum insulator can provide effective insulation for the heater to
reduce the amount of heat that is lost to the environment. It has been found that
the vacuum insulator can be at least partially exposed to the user without
significantly compromising the ability of the vacuum insulator to insulate the
25 heater efficiently. By having the external surface of the vacuum insulator as an
outer surface of the aerosol generating device, the vacuum insulator can also act
as an outer casing to protect and shield the internal components of the device

from the user. In this way, the need to provide a full, separate outer casing is partially or entirely dispensed with, and thus an aerosol generating device can be provided which is both lighter and more compact. The vacuum insulator may be only partially exposed to the user, or in other words, the external surface of the vacuum insulator may be only partially an outer surface of the aerosol generating device. Alternatively, the external surface of the vacuum insulator may be fully exposed to the user so that the full external surface is an outer surface of the aerosol generating device.

In some embodiments, the aerosol generating device comprises an outer casing that partially encloses the vacuum insulator. In this way, the vacuum insulator can have an external surface which is an outer surface of the aerosol generating device and the device can be simple to manufacture and assemble. A partial enclosure of the vacuum insulator by the outer casing may increase the efficiency with which the heater is insulated. In one example embodiment, the vacuum insulator may be exposed to the external environment through a single, continuous gap or opening in the outer casing. In another example, the vacuum insulator may be exposed via a plurality of openings or gaps in the outer casing so that the external surface of the vacuum insulator is an outer surface of the aerosol generating device between the openings or gaps.

In other embodiments, the vacuum insulator may not be enclosed by the outer casing, but instead provided so that the external surface which is an outer surface of the aerosol generating device is externally flush with the outer casing.

Preferably, the external surface of the vacuum insulator is an outer surface of the aerosol generating device around a substantially full circumference of the aerosol generating device. In this way, the diameter of the aerosol generating device can be decreased along at least some cross sections of the device, and the device can be made both lighter and more compact.

Preferably, the external surface of the vacuum insulator is an outer surface of the aerosol generating device along a substantially full length of the aerosol generating device. In this way, the aerosol generating device can be provided

with less outer casing and the device can be made both lighter and more compact.

Preferably, the vacuum insulator comprises metal. Metal vacuum insulators can be particularly efficient, and therefore use of a metal vacuum insulator can allow
5 exposure of a greater proportion of the vacuum insulator to the user without compromising the efficiency of the aerosol generating device. In other embodiments, the vacuum insulator may comprise any suitable material as is known in the art.

Preferably, the aerosol generating device is configured to receive a consumable
10 comprising tobacco within the cavity. The consumable may be in the form of a rod. The aerosol generating device may be a heat-not-burn device. When the consumable comprises tobacco, the provision of a vacuum insulator may be particularly important because of the high temperatures required to generate an aerosol from tobacco. In other embodiments, the aerosol generating device may
15 be configured to receive a refillable or disposable cartridge containing an aerosol generating fluid.

Preferably, the vacuum insulator has an annular cylindrical shape. In this way, the vacuum insulator can surround the heater completely, thereby providing a more effective means of insulation.

20 **BREIF DESCRIPTION OF THE DRAWINGS**

Embodiments of the invention are now described, by way of example, with reference to the drawings, in which:

Figure 1 is a cross-sectional schematic diagram of an aerosol generating device in an embodiment of the invention.

25 **DETAILED DESCRIPTION OF THE DRAWINGS**

Figure 1 is a cross-sectional schematic diagram of an aerosol generating device in an embodiment of the invention. An aerosol generating device 100 is

provided and comprises an outer casing 102 for partially housing internal components of the aerosol generating device 100. The outer casing 102 comprises an opening 104 to a cavity 106 configured to receive a consumable 10. The consumable 10 comprises tobacco 12 and a filter 14, both of which may
5 be held together by a tipping wrapper 16. A heater 108 is provided within the cavity 106 and is configured to provide heating to the consumable 10 when received within the cavity 106 to generate an aerosol. A vacuum insulator 110 is provided surrounding the heater 108 and has an annularly cylindrical shape with an external surface 112 and internal surface 114, between which a vacuum 116
10 is enclosed. The outer casing 102 comprises an opening 118 that extends along a substantially full length of the aerosol generating device and around its full circumference. The opening 118 partially exposes the external surface 112 to the user, so that the external surface 112 of the vacuum insulator 110 is an outer surface of the aerosol generating device 100. The aerosol generating device
15 100 also comprises a controller (not shown) for controlling operations of the aerosol generating device 100, a button (not shown) for receiving instructions from a user, an air inlet (not shown) in fluid communication with the cavity 106, and a battery (not shown) to power the aerosol generating device 100. The controller and battery are in electric communication with the button and heater
20 108 via wires.

The outer casing 102 may comprise any suitable material as is known in the art. The aerosol generating device 100 is elongate along a longitudinal direction, and the cavity 106 is elongate along the longitudinal direction.

In the embodiment of Figure 1, the heater 108 is provided as a film heater that is
25 resistively or inductively heatable. In alternative embodiments, the heater 108 may be provided as any suitable heater that can heat the consumable 10 within the cavity 106 to generate an aerosol. The heater 108 may be provided at a periphery of the cavity 106 as one or more curved heating films that extend around a substantially full circumference of the cavity 106. Alternatively, the
30 heater 108 may be provided as one or more substantially flat heating films or plates provided at spaced positions around a periphery of the cavity 106. The

heater 108 may be configured to contact with the consumable 10 received within the cavity 106, so that the consumable 10 is held within the cavity 106 by friction against the heater 108. The heater 108 may be fixed to the internal surface 114 of the vacuum insulator 110 by one or more mechanical couplings. Alternatively, 5 the heater 108 may be held within the cavity 106 by a support structure attached to the outer housing 102.

In other embodiments, the cavity 106 and the heater 108 may be configured to receive and heat, respectively, other forms of consumables as is known in the art. For example, the cavity 106 may be configured to receive a consumable 10 cartridge comprising a reservoir containing an aerosol generating fluid, and the heater 108 may be configured to provide heating to the consumable when received in the cavity 106. In such cases, the vacuum insulator 110 and cavity 106 may be shaped appropriately so that the cartridge can be received within the cavity 106 to be heated by the heater 108 and insulated by the vacuum 15 insulator 110.

The vacuum insulator 110 has an annularly cylindrical shape with a circular cross-section. The vacuum insulator 110 is hollow and encloses a vacuum 116 between a curved internal surface 114, a curved external surface 112, and two flat surfaces 115 that connect the internal surface 114 and the external surface 20 112. In other embodiments, the vacuum insulator 110 may have other shapes. For example, the vacuum insulator 110 may have a square or polygonal cross-section. In other embodiments, the vacuum insulator 110 may be provided as two or more vacuum insulators, for example semi-circular or flat vacuum insulators, provided around the heater 108. In such embodiments, the two or 25 more vacuum insulators may surround and insulate the heater 108 collectively.

As shown in Figure 1 towards a first end 120 and a second end 122 of the aerosol generating device 100, the vacuum insulator 110 is partially enclosed by the outer casing 102, which partially covers the external surface 112 of the vacuum insulator 110. The vacuum insulator 110 may be mechanically attached 30 to the outer casing 102 by one or more mechanical couplings. The vacuum

insulator 110 may be a high-performance metal vacuum insulator. In other embodiments, the vacuum insulator 110 may comprise other suitable materials.

The opening 118 of the outer casing 102 extends along a substantially full longitudinal length and around a full external circumference of the aerosol
5 generating device 100. In other example embodiments, the opening 118 may be smaller so that less of the external surface 112 of the vacuum insulator 110 is exposed and visible to the user. Alternatively, the outer casing 102 may comprise a plurality of openings through which the external surface 112 of the vacuum insulator 110 is visible and exposed to the user.

10 The controller may be housed within the outer casing 102 and comprises a memory and a processor for storing and executing instructions to control various operations of the aerosol generating device 100. The air inlet may be provided as an opening in the outer casing 102 towards the first end 120 of the aerosol
15 generating device 100 to enable the user to draw air through the cavity 106 via the filter 14. The button may also be provided on an external surface of the outer casing 102 for receiving an input from the user. Alternatively, any other input mechanism, such as a fingerprint sensor, may be provided for receiving an input from the user.

An example use of the aerosol generating device 100 will now be described with
20 reference to Figure 1. In use, a user can insert the consumable 10 through the opening 104 into the cavity 106. The heater 108 holds the consumable 10 in place within the cavity 106 by friction. This contact between the heater 108 and the consumable 10 also increases the efficiency with which heat is delivered to the tobacco 12 within the consumable 10. When the user is ready to initiate
25 vaporisation, the user may press the button, which in turn triggers the controller to turn on the heater 108. The heater 108 provides heating to the air and tobacco 12 within the cavity 106, while the vacuum 116 within the vacuum insulator 110 drastically inhibits the escape of heat from the cavity 106 by conduction and convection. Thus, the cavity 106, the heater 108, and the
30 vacuum insulator 110 form an oven in which the tobacco 12 within the consumable 10 can be heated to a desired temperature. The controller may be

configured to instruct the heater 108 to heat the tobacco to temperatures below the combustion temperature of tobacco. As the tobacco 12 is heated, an aerosol is produced inside the cavity 106. The user can inhale the aerosol by drawing air through the air inlet via the filter 14 to generate an airflow through the cavity
5 106 which carries the aerosol to the user.

The external surface 112 of the vacuum insulator 110 is exposed to the user via the opening 118 so that the external surface 112 is an outer surface of the aerosol generating device 100 that can be held by the user, in use. Thus, the aerosol generating device 100 is both lighter and more compact than would be
10 the case if the outer casing 102 completely covered the external surface 112. The vacuum insulator 110 provides sufficient insulation to the heater 108 and the heated air inside the cavity 106 such that the efficiency of the aerosol generating device 100 is not significantly impacted by the opening 118. The opening 118 extends along a substantially full length and around a full circumference of the
15 aerosol generating device 100, thus reducing the diameter of the aerosol generating device 100. This makes the aerosol generating device 100 more convenient for the user to store and carry.

CLAIMS

1. An aerosol generating device configured to generate an aerosol for inhalation by a user, comprising:
 - a cavity in which an aerosol forming substance can be received;
 - 5 a heater configured to heat an aerosol forming substance received in the cavity; and
 - a vacuum insulator provided around the heater, wherein an external surface of the vacuum insulator is an outer surface of the aerosol generating device that can be held by the user, in use.
- 10 2. The aerosol generating device of claim 1, further comprising an outer casing that partially encloses the vacuum insulator.
3. The aerosol generating device of claim 1 or claim 2, wherein the external surface of the vacuum insulator is an outer surface of the aerosol generating device around a substantially full circumference of the aerosol
15 generating device.
4. The aerosol generating device of any of the preceding claims, wherein the external surface of the vacuum insulator is an outer surface of the aerosol generating device along a substantially full length of the aerosol generating device.
- 20 5. The aerosol generating device of any of the preceding claims, wherein the vacuum insulator comprises metal.
6. The aerosol generating device of any of the preceding claims, configured to receive a consumable comprising tobacco within the cavity.
7. The aerosol generating device of any of the preceding claims, wherein
25 the vacuum insulator has an annular cylindrical shape.

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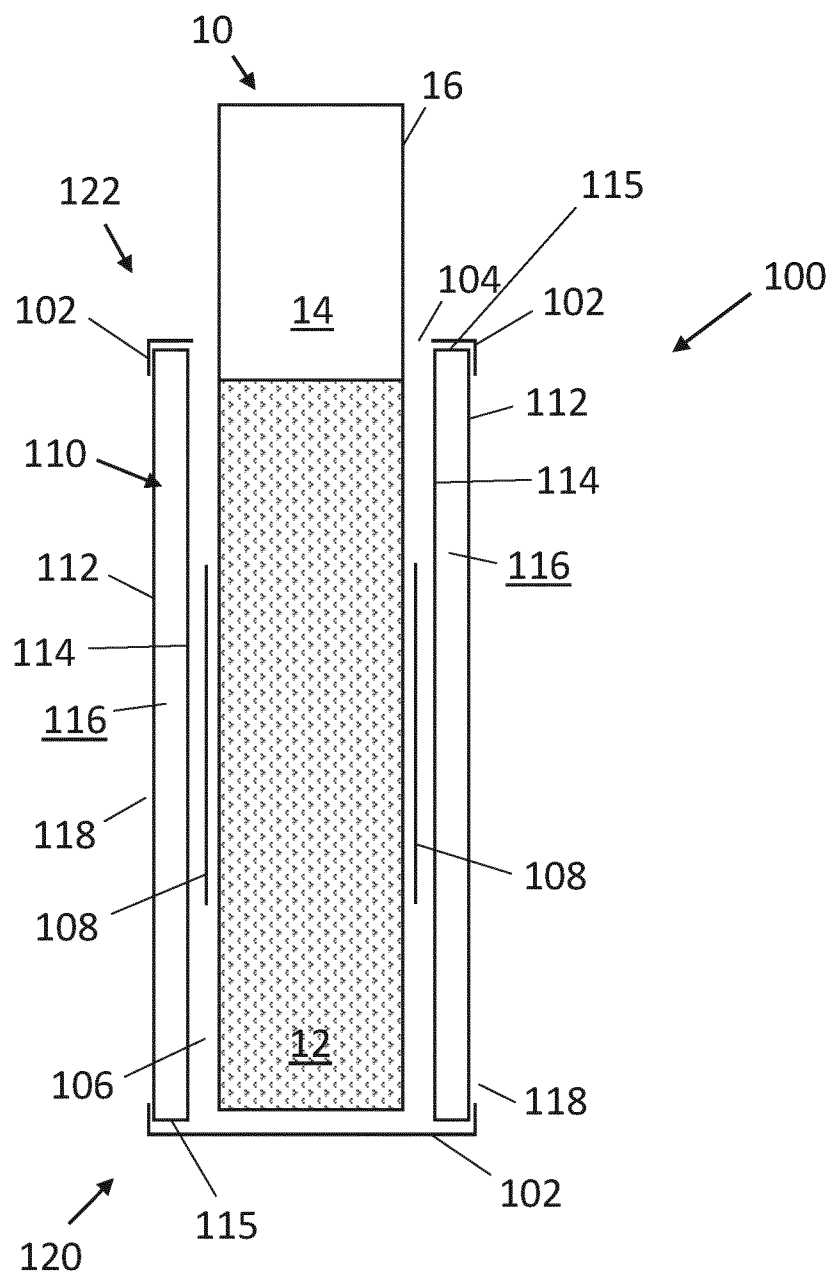


FIG. 1

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2022/067286

A. CLASSIFICATION OF SUBJECT MATTER

INV. A24F40/40 A24F40/46

ADD.

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)

A24F A24D

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)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2013/034458 A1 (BRITISH AMERICAN TOBACCO CO [GB] ET AL.) 14 March 2013 (2013-03-14) abstract figures 1-22 page 5 - page 25 -----	1-7
X	CN 112 089 113 A (HUIZHOU PEIGESI TECH CO LTD) 18 December 2020 (2020-12-18) abstract figures 2, 3, 8, 9 paragraph [0051] - paragraph [0137] -----	1-7
X	EP 3 824 746 A2 (NICOVENTURES TRADING LTD [GB]) 26 May 2021 (2021-05-26) abstract figures 1-3, 5 paragraphs [0068] - [0070], [0084] -----	1, 3, 6, 7



Further documents are listed in the continuation of Box C.



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Date of the actual completion of the international search

12 July 2022

Date of mailing of the international search report

25/07/2022

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2022/067286

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2013034458 A1	14-03-2013	AR 088435 A1	11-06-2014
		AU 2012306503 A1	16-01-2014
		BR 112013032671 A2	24-01-2017
		BR 122016030996 A2	27-08-2019
		CA 2839806 A1	14-03-2013
		CL 2013003637 A1	25-07-2014
		CN 103826482 A	28-05-2014
		CN 106213591 A	14-12-2016
		CN 106307620 A	11-01-2017
		CN 106418701 A	22-02-2017
		EP 2753204 A1	16-07-2014
		EP 3033954 A1	22-06-2016
		ES 2570931 T3	23-05-2016
		HK 1194629 A1	24-10-2014
		HU E027407 T2	28-10-2016
		JP 6014132 B2	25-10-2016
		JP 6736608 B2	05-08-2020
		JP 2014520542 A	25-08-2014
		JP 2016178937 A	13-10-2016
		JP 2018166513 A	01-11-2018
		JP 2020184998 A	19-11-2020
		KR 20140068808 A	09-06-2014
		KR 20190040079 A	16-04-2019
		KR 20200004440 A	13-01-2020
		KR 20200128182 A	11-11-2020
		MX 355927 B	27-04-2018
		MY 168756 A	04-12-2018
		PL 2753204 T3	31-08-2016
		RU 2640438 C1	09-01-2018
		RU 2675712 C1	24-12-2018
		RU 2013156469 A	20-10-2015
		RU 2018135854 A	10-04-2020
		RU 2020135861 A	05-04-2021
		UA 111846 C2	24-06-2016
		UA 117923 C2	25-10-2018
		UA 122162 C2	25-09-2020
		US 2014270726 A1	18-09-2014
		US 2016088875 A1	31-03-2016
		US 2017095006 A1	06-04-2017
		WO 2013034458 A1	14-03-2013
CN 112089113 A	18-12-2020	NONE	
EP 3824746 A2	26-05-2021	AR 105828 A1	15-11-2017
		AU 2016313705 A1	01-03-2018
		CA 2996342 A1	09-03-2017
		CL 2018000521 A1	07-12-2018
		CN 107920602 A	17-04-2018
		EP 3344076 A2	11-07-2018
		EP 3799741 A2	07-04-2021
		EP 3824746 A2	26-05-2021
		EP 3939446 A2	19-01-2022
		HK 1251416 A1	01-02-2019
		JP 6833155 B2	24-02-2021
		JP 2018529324 A	11-10-2018
		JP 2021036874 A	11-03-2021
		JP 2021048842 A	01-04-2021
		JP 2021141891 A	24-09-2021

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2022/067286

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		JP 2022062135 A	19-04-2022
		KR 20180034640 A	04-04-2018
		KR 20200024369 A	06-03-2020
		KR 20200026317 A	10-03-2020
		KR 20210049206 A	04-05-2021
		KR 20210084706 A	07-07-2021
		KR 20210087112 A	09-07-2021
		MY 186293 A	06-07-2021
		PH 12018500255 A1	13-08-2018
		RU 2687811 C1	16-05-2019
		RU 2019113858 A	13-06-2019
		RU 2020135839 A	01-02-2021
		RU 2020135854 A	14-01-2021
		RU 2021112053 A	04-05-2022
		TW 201720319 A	16-06-2017
		UA 124729 C2	10-11-2021
		US 2017055583 A1	02-03-2017
		US 2020054069 A1	20-02-2020
		WO 2017036955 A2	09-03-2017
