

(19)



(11)

EP 4 825 219 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
21.10.2026 Bulletin 2026/43

(51) International Patent Classification (IPC):
A24F 40/46 ^(2020.01) **A24F 40/20** ^(2020.01)
A24F 40/57 ^(2020.01)

(21) Application number: **25170939.0**

(52) Cooperative Patent Classification (CPC):
A24F 40/46; **A24F 40/20**; **A24F 40/57**

(22) Date of filing: **16.04.2025**

(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:
GE KH LA MA MD TN

(71) Applicant: **Imperial Tobacco Limited
Bristol BS3 2LL (GB)**

(72) Inventor: **FORSTER, Benjamin James
Bristol, BS3 2LL (GB)**

(74) Representative: **Mewburn Ellis LLP
Aurora Building
Counterslip
Bristol BS1 6BX (GB)**

(54) **AN AEROSOL GENERATING SYSTEM**

(57) An aerosol generating system is provided. The system is for generating an aerosol for user inhalation from an aerosol generating article. The aerosol generating system includes an aerosol generating unit including a metal heater support. The metal heater sup-

port forms a cavity for receiving the aerosol generating article. The aerosol generating unit includes a thin film heating unit surrounding the cavity to thereby heat the aerosol generating article in use. An improved aerosol generating system is thus provided.

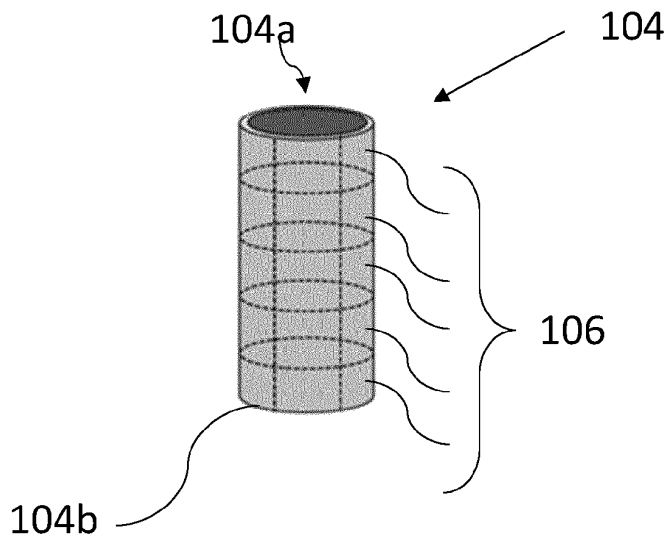


Figure 5

Description

FIELD

[0001] The present disclosure relates to an aerosol generating system for generating an aerosol for user inhalation.

BACKGROUND

[0002] A heat-not-burn (HNB) device, also known as a heated tobacco device, is a type of aerosol-generating system in which an aerosol precursor (e.g., a solid precursor such as tobacco) is heated by a heating system to produce an aerosol that can be inhaled by the user. One category heat-not-burn devices and system are those in which the aerosol precursor is heated from outside the precursor. How the aerosol precursor is heated effects the user experience. Controlling the heating of the precursor therefore provides a mechanism by which to improve the user experience.

[0003] It is against this background that the present invention has been developed.

SUMMARY

[0004] The present disclosure provides an aerosol generating system for generating an aerosol for user inhalation from an aerosol generating article, where the aerosol generating system comprises an aerosol generating unit including a heater support, wherein the heater support forms a cavity for receiving the aerosol generating article; wherein the aerosol generating unit includes a heating unit surrounding the cavity to thereby heat the aerosol generating article in use.

[0005] Optionally the heater support is metal. For example, the heater support may be steel. For example, the heater support may be aluminium. Optionally, the heater support is formed from a non-metal material, for example a heat-resistant plastic (e.g. PEEK) or a ceramic. Optionally the heater support is tubular.

[0006] Optionally the heating unit is a thin film heating unit. Optionally the heating unit is a flexible thin film heating unit. Optionally the heating unit includes a flexible substrate (for example polyimide). Optionally electrically conductive heating element(s) are located in or on the substrate. For example, the electrically conductive heating elements are embedded within the substrate.

[0007] Optionally the thin film heating unit is located on an internal surface of the heater support such that the thin film heating unit is located between the cavity and the heater support. Optionally the heating unit is attached to the internal surface of the heater support. Optionally an internal surface of the cavity is defined by the heating unit. This may increase speed of heating of the article, and in particular the aerosol forming material within the article.

[0008] Optionally the thin film heating unit is located on an external surface of the heater support such that the thin film heating unit is located outside the heater support. Optionally heat is applied to the article within the cavity via transmission through the heater support. This may improve ease of cleaning.

[0009] Optionally the thin film heating unit includes a plurality of electrically resistive heating elements. Each heating element may correspond to a heating zone.

10 Optionally each heating element is located to heat a portion of the aerosol forming material in the article. Optionally the electrically conductive heating element(s) are located within or on a heater substrate. For example, the electrically conductive heating elements are embedded within the substrate. Heat may be generated by resistive heating in which a current is passed through the resistive material of the heating element (e.g. the material of a wire, coil, mesh or track).

20 A resistive heating element may be formed from a variety of suitable materials that include, but not limited to metals, metal alloys, ceramics, ceramic metals, carbon-based materials, and composites thereof. Examples of suitable metals and metal alloys include: silver, copper, nickel, titanium, tungsten, zirconium, tantalum, platinum group metals, stainless steel, nickel-, cobalt-, chromium-, aluminium- titanium- zirconium-, hafnium-, niobium-, molybdenum-, tantalum-, tungsten-, tin-, gallium-, manganese- and iron-containing alloys, and superalloys based on nickel, iron, cobalt, stainless steel, and iron-manganese-aluminium based alloys.

[0010] The resistive heating element may comprise one or more electrically conductive tracks formed of the abovementioned metal and metal alloys.

35 **[0011]** Examples of suitable ceramics include silicon carbide, molybdenum disilicide, aluminium oxide, silicon nitride, titanium carbide. The ceramic may be doped or undoped.

[0012] Optionally the cavity is elongate along a longitudinal axis. Optionally the article is received into the cavity along the longitudinal axis. Optionally the cavity is generally tubular. Optionally the article is generally cylindrical. Optionally the article is snugly received into the cavity. Optionally the cavity has a generally constant size and shape of cross section (perpendicular to the longitudinal axis). For example, the shape of the cross section may be a circle.

[0013] Optionally a longitudinal plurality of the electrically resistive heating elements are arranged along the longitudinal axis of the cavity. Optionally there are between 2 and 10 heating elements along the longitudinal axis of the cavity, for example between 2 and 7, for example between 4 and 6, for example 5. Optionally the heating unit includes a plurality of resistive heating elements along the longitudinal axis of the heating unit.

50 **[0014]** Optionally a circumferential plurality of the electrically resistive heating elements are arranged circumferentially around the cavity. Optionally there are between 2 and 10 heating elements arranged circum-

ferentially around the cavity, for example between 2 and 7, for example between 4 and 6, for example 5.

[0015] Optionally, the plurality of electrically resistive heating elements are arranged in an array surrounding the cavity. Optionally the array is a 2-dimensional array of electrically resistive heating elements. Optionally the number of electrically resistive heating elements along the longitudinal direction is equal to the number of heating elements around the circumferential direction. Optionally the number of electrically resistive heating elements along the longitudinal direction is different from the number of heating elements around the circumferential direction.

[0016] Optionally the system further includes a controller operatively connected to the plurality of electrically resistive heating elements. Optionally the controller is a microcontroller. As used herein, a "processing resource" (or "processor" or "controller") may refer to one or more units for processing data, examples of which may include an ASIC, microcontroller, FPGA, microprocessor, digital signal processor (DSP) capability, state machine or other suitable component. A processing resource may be configured to execute a computer program, e.g. which may take the form of machine-readable instructions, which may be stored on a non-transitory memory and/or programmable logic. The processing resource may have various arrangements corresponding to those discussed for the circuitry, e.g. on-board and/or off board the device as part of the system. As used herein, any machine executable instructions, or computer readable media, may be configured to cause a disclosed method to be carried out, e.g. by an aerosol-generating system as disclosed herein, and may therefore be used synonymously with the term method.

[0017] Optionally the controller is configured to control heating of each of the plurality of electrically resistive heating elements independently from one another. As such, fine control the heating of the aerosol forming material is enabled both spatially and temporally.

[0018] Optionally the controller is configured to operate the plurality of electrically resistive heating elements in sub-groups of activated heating elements. Optionally the electrically resistive heating elements within each sub-group are activated simultaneously. As such, zonal control the heating of the aerosol forming material is enabled both spatially and temporally.

[0019] Optionally the controller is configured to receive from a user a selected experience mode, to translate the experience mode into a control mode of activating the electrically resistive heating elements, and to operate the electrically resistive heating elements according to the control mode. As such, the details of the heating of the aerosol forming material are obscured from the user. Instead, the user is presented with simpler, more intuitive options for control.

[0020] Optionally the controller is configured to operate an initial electrically resistive heating element of the

plurality of electrically resistive heating elements before operating a subsequent electrically resistive heating element of the plurality of the electrically resistive heating elements. As such, fine control the heating of the aerosol forming material is enabled temporally.

[0021] Optionally the controller is configured to supply a variable power level to at least one of the electrically resistive heating elements. The controller is configured to supply one of a plurality of power levels to at least one of the electrically resistive heating elements. Optionally the plurality of power levels includes at least two non-zero power levels. As such, fine control of power delivery to the aerosol forming material is enabled on a per element basis.

[0022] Optionally, the aerosol generating system includes a heat-not-burn device.

[0023] According to a second aspect, there is provided a system according to the first aspect, and an article for engagement with the system. Optionally the article includes an aerosol forming material for heating by the heating unit.

[0024] The aerosol-forming material may comprise plant material. The plant material may comprise or be formed of tobacco. Any type of tobacco may be used, including, but is not limited to, flue-cured tobacco, burley tobacco, Virginia tobacco, Maryland Tobacco, dark-air cured tobacco, oriental tobacco, dark-fired tobacco, perique tobacco, rustica tobacco. This also includes blends of the above-mentioned tobaccos. Any suitable parts of the tobacco plant may be used, including leaves, stems, roots, bark, seeds and flowers. The tobacco may comprise one or more of leaf tobacco, stem tobacco, tobacco powder, tobacco dust, tobacco derivatives, expanded tobacco, homogenised tobacco, shredded tobacco, extruded tobacco, cut rag tobacco and/or reconstituted tobacco (e.g. slurry recon or paper recon). For example, the aerosol-forming material may comprise a gathered sheet of homogenised (e.g. paper/slurry recon) tobacco or gathered shreds/strips formed from such a sheet.

[0025] The tobacco may be processed tobacco, steam treated stems or shredded dried stems. The tobacco material may be fermented, cured, uncured, toasted, or otherwise pre-treated. The tobacco may be unprocessed and/or untreated.

[0026] The aerosol-forming material may be absent of tobacco and/or nicotine.

[0027] The plant material may comprise at least one plant material selected from the list including *Amaranthus dubius*, *Arctostaphylos uva-ursi* (Bearberry), *Argemone mexicana*, *Arnica*, *Artemisia vulgaris*, Yellow Tees, *Galea zacatechichi*, *Canavalia maritima* (Baybean), *Cecropia mexicana* (Guamora), *Oestrum nocturnum*, *Cynoglossum virginianum* (wild comfrey), *Cytisus scoparius*, *Damiana*, *Entada rheedii*, *Eschscholzia californica* (California Poppy), *Fittonia albivenis*, *Hippobroma longiflora*, *Humulus japonica* (Japanese Hops), *Humulus lupulus* (Hops), *Lactuca virosa* (Lettuce)

Opium), *Laggetera alata*, *Leonotis leonurus*, *Leonurus cardiaca* (Motherwort), *Leonurus sibiricus* (Honeyweed), *Lobelia cardinalis*, *Lobelia inflata* (Indian-tobacco), *Lobelia siphilitica*, *Nepeta cataria* (Catnip), *Nicotiana* species (Tobacco), *Nymphaea alba* (White Lily), *Nymphaea caerulea* (Blue Lily), Opium poppy, *Passiflora incarnata* (Passionflower), *Pedicularis densiflora* (Indian Warrior), *Pedicularis groenlandica* (Elephant's Head), *Salvia divinorum*, *Salvia dorrii* (Tobacco Sage), *Salvia* species (Sage), *Scutellaria galericulata*, *Scutellaria lateriflora*, *Scutellaria nana*, *Scutellaria* species (Skullcap), *Sida acuta* (Wireweed), *Sida rhombi folia*, *Silene capensis*, *Syzygium aromaticum* (Clove), *Tagetes lucida* (Mexican Tarragon), *Tarhonanthus camphoratus*, *Tumera diffusa* (Damiana), *Verbascum* (Mullein), *Zamia latifolia* (Maconha Brava) together with any combinations, functional equivalents to, and/or synthetic alternatives of the foregoing.

[0028] The aerosol-forming material may comprise one or more additives selected from vapour generators, carrier agents, humectants, flavourants, fillers, aqueous/non-aqueous solvents and binders.

[0029] The aerosol-forming material may comprise propylene glycol (PG) and/or vegetable glycerin (VG). Propylene glycol (PG) and vegetable glycerin (VG) are typically used as base materials that act as aerosol generators (alternatively referred to as aerosol-formers), carrier agents, and/or humectants. The aerosol-forming material may comprise, alternatively or in addition, other substances that function as one or more of aerosol generators, carrier agents, and humectants.

[0030] The humectant content of the aerosol-forming material may have a lower limit of at least 5 wt %, such as at least 10 wt %. The humectant content of the aerosol-forming material may have an upper limit of at most 50 % by weight of the plant material, such as at most 40 wt %.

[0031] Flavourants may be provided in solid form, liquid form, gel form, or a combination thereof. Flavourants may include one or more of menthol (e.g. peppermint (*mentha piperita*), spearmint (*mentha spicata*), wild mint (*Mentha Arvensis*), horse mint (*Mentha longifolia*), pineapple mint (*Mentha suaveolens variegata*), applemint (*Mentha suaveolens*), pennyroyal (*Mentha pulegium*)), liquorice, chocolate/cocoa, fruit flavour (including e.g. apple, citrus, cherry, banana (Isoamyl acetate)), rose, vanilla (Ethylvanillin), spice (e.g. ginger, clove, cinnamon, star anise), tobacco extract/flavour, marijuana, hemp, cannabinoid compounds, citronella, orange, lemon, geraniol, thyme, fennel, green tea, black tea, coffee, *salvia dorrii*, *salvia*, *passiflora incarnata*, *arctostaphylos uva-ursi*, *lobelia inflata*, matcha, Yerba mate, lemon grass, flax, cedar wood, coumarin, helio, eucalyptus, ginkgo biloba, hazel, hibiscus, laurel, chamomile, rosemary, lavender, rooibos, or combinations thereof. The flavourant may be evenly dispersed throughout the aerosol-forming material or may be provided in isolated locations and/or varying concentra-

tions throughout the aerosol-forming material.

[0032] The cannabinoid compounds may be selected from the non-exhaustive list comprising: tetrahydrocannabinol (THC), cannabidiol (CBD), cannabinol (CBN).

[0033] Fillers can strengthen the aerosol-forming material. Fillers may comprise fibrous (non-tobacco) fillers such as cellulose fibres, lignocellulose fibres (e.g. wood fibres), jute fibres and combinations thereof.

[0034] Binders can act to bind together the components forming the aerosol-forming material. Binders may comprise starches and/or cellulosic binders such as methyl cellulose, ethyl cellulose, hydroxy propyl cellulose, hydroxyethyl cellulose and methyl cellulose, gums such as xanthan, guar, arabic and/or locust bean gum, organic acids and their salts such as alginic acid/sodium alginate, agar and pectins.

[0035] According to a third aspect, the present disclosure provides a method of operating an aerosol generating system according to the first or second aspects, to generate an aerosol for user inhalation from an aerosol generating article, where the aerosol generating system comprises an aerosol generating unit including a heater support, wherein the heater support forms a cavity for receiving the aerosol generating article; wherein the aerosol generating unit includes a heating unit surrounding the cavity, the method including operating the heating unit to heat the aerosol generating article.

[0036] Features of the system are described above in respect of the first and second aspect. The features of the system are described above in respect of the first and second aspect are applicable to the system of the method of operating the system.

[0037] Optionally the method includes operating a first subset of the heating elements in a first heating phase, and operating a second subset of the heating elements in a second heating phase. Optionally the first subset is different from the second subset. Optionally the controller is configured to operate the plurality of electrically resistive heating elements in sub-groups of activated heating elements. Optionally the method includes activating the electrically resistive heating elements within each sub-group simultaneously. As such, zonal control the heating of the aerosol forming material is enabled both spatially and temporally.

[0038] Optionally the method includes operating the heating elements independently from one another. As such, fine control the heating of the aerosol forming material is enabled both spatially and temporally.

[0039] Optionally the method includes receiving from a user a selected experience mode, translating the experience mode into a control mode of activating the electrically resistive heating elements, and operating the electrically resistive heating elements according to the control mode. As such, the details of the heating of the aerosol forming material are obscured from the user. Instead, the user is presented with simpler, more intuitive options for control.

[0040] Optionally the method includes operating an initial electrically resistive heating element of the plurality of electrically resistive heating elements before operating a subsequent electrically resistive heating element of the plurality of the electrically resistive heating elements. As such, fine control the heating of the aerosol forming material is enabled temporally.

[0041] Optionally the method includes supplying a variable power level to at least one of the electrically resistive heating elements. Optionally the method includes supplying one of a plurality of power levels to at least one of the electrically resistive heating elements. Optionally the plurality of power levels includes at least two non-zero power levels. As such, fine control of power delivery to the aerosol forming material is enabled on a per element basis.

[0042] The preceding summary is provided for purposes of summarizing some examples to provide a basic understanding of aspects of the subject matter described herein. Accordingly, the above-described features should not be construed to narrow the scope of the subject matter described herein in any way. Moreover, the above and/or following examples may be combined in any suitable combination to provide further examples, except where such a combination is clearly impermissible or expressly avoided. Other features, aspects, and advantages of the subject matter described herein will become apparent from the following text and the accompanying figures.

BRIEF DESCRIPTION OF THE FIGURES

[0043] Aspects, features and advantages of the present disclosure will become apparent from the following description of examples in reference to the appended figures in which like numerals denote like elements.

Figure 1 shows an example of an aerosol-generating system;

Figure 2 shows the components of the aerosol-generating system in a 'disengaged state';

Figure 3 shows the components of the aerosol-generating system in an 'engaged state';

Figure 4 shows an aerosol generating unit and article in an 'engaged state';

Figure 5 shows a heating unit of the aerosol generating unit;

Figure 6 shows the heating unit in an unrolled state, and;

Figures 7A to 7C illustrate example heating modes of the heating unit.

DETAILED DESCRIPTION OF EMBODIMENTS

[0044] Figure 1 shows an example of an aerosol-generating system 1 comprising a device body 20 and an article 30 (alternatively referred to as a "consumable") for insertion into the device body 20. In this ex-

ample, the device body 20 is a heat-not-burn device (HNB) configured to produce an aerosol by heating an aerosol-forming material 10 (e.g. a solid precursor, such as tobacco material) to a temperature below its combustion temperature.

[0045] The term "aerosol-forming material" refers to a material capable of releasing volatile components that can form an aerosol, e.g. by releasing volatile compounds in the aerosol-forming material 10. An "aerosol" is a dispersion of solid particles and/or liquid droplets dispersed in a gas. The aerosol may be visible or invisible.

[0046] Figure 2 shows a schematic representation of the internal components of the device body 20 and article 30. The device body 20 and article 30 are shown in a "disengaged state" in which the article 30 is separated from the device body 20.

[0047] The aerosol-generating system 1 has an aerosol-generating unit 2 in the form of a heating system. The heating system comprises a heating element 2a configured to surround the article 30. The heating element 2a heats the aerosol-forming material 10 to a temperature lower than its combustion temperature such that an aerosol can be formed by evaporation, torrefaction and pyrolysis.

[0048] The aerosol-generating system 1 includes a power source 4. In this example, the power source 4 includes a battery 4a configured to supply electrical energy to operate the aerosol-generating unit 2 and other components. The aerosol-generating system 1 may be powered, alternatively or in addition to the battery 4a, by an external power source.

[0049] The article 30 defines an air passageway which transmits aerosol generated from the aerosol-forming material 10 to a downstream end 32 (i.e. terminal end or mouth end) of the article 30. The article 30 may comprise one or more filter elements 34, one or more spacer elements 36, and one or more wrapping layers 38 (e.g. paper, foil or composite layers). One or more of the filter elements 34 and spacer elements 36 may define the air passageway. In the present example, the article 30 comprises an aerosol-forming material 10 at the upstream end 31 of the article 30, a filter element 34 at the downstream end 32, and a spacer element 36 positioned between them, all circumscribed by a wrapping layer 38.

[0050] Figure 3 shows the aerosol-generating system 1 in an "engaged state" in which the article 30 is inserted into an internal chamber (or cavity) 22 of the device body 20.

[0051] The heating element 2a is arranged to extend along a length of the aerosol-forming material 10 when inserted therein, such that when the heating element 2a is activated, heat is transferred radially inward from the heating element 2a to the aerosol-forming material 10 resulting in formation of an aerosol. This may be referred to as an 'outside in' heating arrangement. The aerosol is subsequently entrained in an airflow pro-

duced by the action of the user drawing on the downstream end 32 of the article 30. the aerosol-forming material 10. This may be referred to as an 'outside-in' heating arrangement. In this example, the heating element 2a is a resistive heating element.

[0052] The device body 20 may include any one or more of electrical circuitry, a memory, a wireless interface, and one or more other components. The device body 20 may include a printed circuit board (PCB) 25 on which components of the electrical circuitry, memory, wireless interface, and other components may be mounted.

[0053] The electrical circuitry may include a processing resource for controlling one or more operations of the body 20 and article 30, e.g. based on instructions stored in the memory. The wireless interface may be configured to communicate wirelessly with an external (e.g. mobile) device, e.g. via Bluetooth. The other component(s) may include one or more user interface devices configured to convey information to a user, a pressure sensor 15, and/or a charging port 18.

[0054] The aerosol-generating system 1 may comprise one or more input and/or output elements. The input and/or output elements may form part of a user interface (UI) of the system 1. For instance, figure 1 shows an input element in the form of a button 16 and an output element in the form of a set of lights (LEDs) 17. The button 16 is configured to control at least one function of system 1, such as power supply to the heating element 2a. The lights 17 are configured to convey information to the user regarding the state of the system 1 and/or article. It will be appreciated that the input element(s) may be provided in various forms such as touch screens, switches, and sensors, and the output element(s) may be provided in various forms such as display screens, speakers, or a haptic output generated by a vibration generator.

[0055] Figure 4 shows the article 30 engaged with the aerosol generating unit 2. The rest of the system is omitted from Figure 4 for clarity. The aerosol forming material 10 of the article 30 is received within a cavity 100 of the aerosol generating unit 2. The cavity 100 is formed by a metal tube 102. The metal tube 102 is an example of a heater support. The metal tube 102 may, for example, be formed from steel or aluminium. In other embodiments, the tube 102 may be formed from another suitable material, for example a heat-resistant plastic (e.g. PEEK) or a ceramic.

[0056] The metal tube 102 defines the cavity 100. The cavity 100 is a portion of the device chamber 22. The cavity 100 has an opening 102a for receiving the article 30 and an upstream end 102b. The upstream end 102b defines an airflow opening such that air can flow into the aerosol forming material 10 of the article 30, in use. Airflow, in use, generally goes from the upstream end 102b to the downstream end of the article 30 through the downstream end 32 of the article 30. The cavity 100 is elongate and defines a longitudinal

axis (up the page in Figure 4). The article 30 is received into the cavity 100 along the longitudinal axis (in a direction down the page in Figure 4). When the article 30 is properly received into the cavity 100, the opening of the cavity 102a defined by the metal tube 102 generally aligns with the downstream end of the aerosol forming material 10.

[0057] The metal tube 102 is surrounded by an electrically resistive, heating unit 104. In the embodiment of Figure 4, the heating unit 104 is located on an external surface of the metal tube 102. In other words, in use, the metal tube 102 is located between the heating unit 104 and the article 30. For example, in use, the metal tube 102 is located between the heating unit 104 and the aerosol forming material 10. In other embodiments, the heating unit 104 is located on an internal surface of the metal tube 102. In other words, in use, the heating unit 104 is located between the metal tube 102 and the article 30. For example, in use, the heating unit 104 is located between the metal tube 102 and the aerosol forming material 10.

[0058] Figure 5 shows the structure of the heating unit 104. The heating unit 104 is generally tubular with a circular cross-section. Other embodiments are envisaged in which the cross section takes the form of other polygonal shapes, for example, square, rectangular or triangular. The heating unit 104 includes a heating unit opening 104a into which the article 30 is received. The heating unit 104 includes a heating unit terminal end 104b. The heating unit terminal end 104b may be open or partially closed. The heating unit terminal end 104b includes a heating unit airflow inlet so that air can flow into the upstream end of the article 30 when the article 30 is engaged with the heating unit 104.

[0059] The heating unit 104 is a thin film heating unit. The heating unit 104 is formed from an electrically insulating substrate upon which or within which electrically resistive heating tracks are formed. The substrate may be, for example, polyimide. The heating unit 104, and in particular, the substrate may be flexible. As such the heating element can conform to the shape of the metal tube 104 (internally or externally).

[0060] The heating unit 104 includes a plurality of heating elements 106. The heating elements 106 may be embedded within the substrate. The heating elements 106 are distributed across the (internal or external) surface of the metal tube 102. The heating elements 106 are distributed in an array, for example in a checkerboard pattern.

[0061] The heating elements 106 are arranged longitudinally along the heating unit 104 with a longitudinal number of longitudinally arranged heating elements 106. In the embodiment of Figure 6, the longitudinal number is five. In some embodiments, the longitudinal number is between 1 and 12, for example between 2 and 10, for example between 3 and 7.

[0062] The heating elements 106 are arranged circumferentially around the heating unit 104 with a cir-

cumferential number of circumferentially arranged heating elements 106. In the embodiment of Figure 6, the circumferential number is five. In some embodiments, the circumferential number is between 1 and 12, for example between 2 and 10, for example between 3 and 7.

[0063] In some embodiments the circumferential number is the same as the longitudinal number. In other embodiments, the circumferential number is different from the longitudinal number.

[0064] The system 1 includes a processing resource. The processing resource includes a controller (not shown). The controller is operatively connected to the heating unit 104 and in particular to the heating elements 106. As such, the controller is configured to control on an individual basis the operation of the heating elements 106. For example, the controller is configured to control the supply of power to the heating elements 106 from the battery 4a.

[0065] The controller is configured to control the supply of power to the heating elements 106 on a per heating element basis. In some embodiments, the controller is configured to activate all heating elements 106 at the same time. In some embodiments, the heating elements 106 are individually addressable in terms of heating. In other words, the heating elements 106 can be independently controlled from one another by the controller. As such, the heating elements 106 can be heated independently from one another. The controller is configured to control the heating of the heating elements 106 on a time basis. In other words, the controller can individually control the heating elements 106 independently from one another in both time and heating element location.

[0066] When the article 30 is located within the heating unit 104, and in particular when the aerosol forming material is located within the heating unit 104, the heating of the aerosol forming material 10 can be controlled can be controlled accurate spatially and temporally by the control of the heating elements 106. The user experience can thus be controlled and modified by controlling the spatial and temporal patterns of heating the heating elements 106.

[0067] Figure 6 shows the heating unit 104 in an unrolled configuration. The heating elements 106 are visible. The array of heating elements 106 forms a checkerboard pattern. The longitudinal number 108 of heating elements 106 is illustrated. The circumferential number 110 of heating elements 106 is illustrated. Each heating element 106 has a rectangular shape. For example, the longitudinal height of each heating element 106 is smaller than a circumferential width of the heating element 106. In the embodiment of Figure 7, all of the heating elements 106 are the same size and shape. In other embodiments, the heating elements 106 may have different sizes and shapes from each other. In other embodiments, the heating elements 106 may have the same size and shape, but different from that

of Figure 7, for example squares. In some embodiments, the array of heating elements 106 tessellate. In some embodiments, the array of heating elements 106 forms a repeating pattern.

[0068] Figures 7A, 7B and 7C illustrate three example control modes of the heating unit 104, and in particular modes of controlling the heating elements 106. Each mode is illustrated with deactivated heating elements 106a and activated heating elements 106b. Patterns of deactivated heating elements 106a activated heating elements 106b are created across the heating element array. Each pattern is activated for a pattern activation period. The controller may be configured to heat the aerosol forming material, generally speaking, for a session duration. The session duration may be between 3 and 7 minutes, for example 5 minutes. The session duration may include within it multiple activation patterns. Each pattern may be activated for a portion of the session duration.

[0069] Figure 7A illustrates a first example control mode of the heating unit 104. In particular a first control mode of controlling the heating elements 106. In the first control mode, a longitudinal subset of the heating elements 106 are heated as activated heating elements 106b. The remaining heating elements 106 are not activated during the first control mode and remain unheated as deactivated heating elements 106a. In the first control mode, the activated heating elements 106b form a longitudinal sequence of activated heating elements 106b. In embodiments, the first control mode may include multiple longitudinal sequences of activated heating elements 106b circumferentially separated from one another around the circumference of the heating unit 104 by longitudinal sequences of deactivated heating elements 106a. In embodiments, during a session, the first control mode may be operated. In embodiments, during the session, the longitudinal sequences of activated heating elements 106b and deactivated heating elements 106a may be alternated. In other embodiments, the longitudinal sequence of activated heating elements 106b may progress stepwise around the heating unit 104.

[0070] Figure 7B illustrates a second example control mode of the heating unit 104. In particular a second control mode of controlling the heating elements 106. In the second control mode, a circumferential subset of the heating elements 106 are heated as activated heating elements 106b. In the example of Figure 7B, two circumferential subsets of the heating elements 106 are activated as activated heating elements 106b. The remaining heating elements 106 are not activated during the second control mode, and remain unheated as deactivated heating elements 106a. In the second control mode, the activated heating elements 106b form two longitudinally separated circumferential sequences of activated heating elements 106b. In embodiments, the second control mode may include one or multiple circumferential sequences of activated heating ele-

ments 106b longitudinally separated from one another along the heating unit 104 by circumferential sequences of deactivated heating elements 106a. In embodiments, during a session, the second control mode may be operated. In examples, during the session, the circumferential sequences of activated heating elements 106b and deactivated heating elements 106a may be alternated. In other embodiments, the circumferential sequence of activated heating elements may progress stepwise up or down (longitudinally) the heating unit 104.

[0071] Figure 7C illustrates a third example control mode of the heating unit 104. In particular a third control mode of controlling the heating elements 106. In the third control mode, a spiral subset of the heating elements 106 are heated as activated heating elements 106b. In the example of Figure 7C, two spiral subsets of the heating elements 106 are activated as activated heating elements 106b. The remaining heating elements 106 are not activated during the third control mode, and remain unheated as deactivated heating elements 106a. In the third control mode, the activated heating elements 106b form two longitudinally and circumferentially separated spiral sequences of activated heating elements 106b. In embodiments, the third control mode may include one or multiple spiral sequences of activated heating elements 106b longitudinally and circumferentially separated from one another along and around the heating unit 104 by spiral sequences of deactivated heating elements 106a. In embodiments, during a session, the third control mode may be operated. In examples, during the session, the spiral sequences of activated heating elements 106b and deactivated heating elements 106a may be alternated. In embodiments, the spiral sequence of activated heating elements may progress stepwise up or down the heating unit 104. In embodiments, the spiral sequence of activated heating elements may progress stepwise around the heating unit 104.

[0072] Other control modes are possible. For example a chessboard pattern of activated heating elements 106b and deactivated heating elements 106a may be formed across the heating elements 106. In some modes, a particular heating element 106 may be activated as an activated heating element 106b more than once during a session.

[0073] In any control mode the individual heating elements 106 may be controlled according to a power level. For example, each heating element 106 may be supplied with zero power (i.e. deactivated), a low power, a medium power, or a high power. High, medium and low powers are examples of non-zero powers. Every heating element 106 may be individually controllable according to power. Further, the specificity of the heating of the aerosol forming material 10 can be controlled to produce differing and tailored user experiences.

[0074] The aerosol-generating system 1 has one or

more input and/or output elements. The input and/or output elements may form part of a user interface (UI) of the system 1. For instance, figure 1 shows an input element in the form of a button 16 and an output element in the form of a set of lights (LEDs) 17. The button 16 is configured to control at least one function of system 1. In embodiments the control mode of the heating elements 106 may be controlled / selected by the user by using the button 16. The lights 17 are configured to convey information to the user regarding the state of the system 1 and/or article.

[0075] In embodiments the selected / operational control mode of the heating elements 106 may be conveyed to the user via the lights 17. In embodiments the operation of the heating elements 106 may be obscured from the user. The user may not need to know about which heating elements 106 are activated or not.

[0076] The user may be presented with a set of possible operational experience modes according to the experience desired. The controller receives a selected experience mode from the user, for example via an input element (e.g. button 16) of the system 1. The controller is configured to translate the user's selected experience mode into a control mode of the heating elements 106. The user experience mode may define any or all of the timing, power and sequencing of the activation of the heating elements 106. As such, the details of heater control parameters are obscured from the user. These experience / control modes may deliver different sensorial experiences to the user. For example, through variations in flavour release, aerosol density, smell, etc. In some examples, the user may be to create personalised experience / control modes through adjusting any or all of the timing, power and sequencing of the activation of the heating elements 106. The experience / heating mode is adaptable to both tobacco and herbal aerosol forming substrates. The system 1 may include a pre-defined set of experience / control modes to replicate, from which the user can select. For example, mode or modes to replicate cigarette smoking sensorial experiences, heated tobacco / heat-not-burn experiences and other categories of experience. The system 1 may also include a randomiser option for the user to try different experience modes, through randomising the delivery of different experience / control modes.

[0077] It is to be understood that the present disclosure, which includes the specification and claim(s), is not limited by specific construction details or process steps. Rather, it will be clear to those skilled in the art that the systems, apparatuses, and methods described herein can be embodied and practiced in various alternative ways without departing from the scope of the invention.

[0078] Unless defined otherwise, scientific and technical terms used herein have their meanings commonly understood by those skilled in the art and that known techniques and procedures may be performed accord-

ing to conventional methods.

[0079] In the present disclosure, the terms "a" and "an" may mean "one", "one or more", "at least one", and "one or more than one" unless the context clearly indicates otherwise. Likewise, plural terms shall include the singular unless otherwise required by context.

[0080] In the present disclosure, the term "or" means an inclusive "and/or" unless explicitly indicated to refer to alternatives only or unless the alternatives are mutually exclusive.

[0081] In the present disclosure, the terms "comprising", "having," "including," or "containing" (and any forms thereof, such as "comprise" and "comprises," "have" and "has," "includes" and "include," or "contains" and "contain," respectively) are inclusive or open-ended and do not exclude additional, unrecited elements or method steps.

[0082] Unless stated otherwise, the features of examples disclosed herein, and of the claims, may be integrated together in any suitable arrangement such that combinations of features are not limited by the described forms, particularly the form (e.g. numbering) of example(s), embodiment(s), or dependency of claim(s). This also applies to the phrase "in one example", "according to an example" and the like, which are merely a stylistic form of wording not to be construed as limiting the features to a separate embodiment. This is to say, a reference to 'an,' 'one,' or 'some' examples(s) may be a reference to any one or more, and/or all examples, or combination(s) thereof, disclosed. Also, similarly, reference to "the" example may not be limited to the immediately preceding embodiment. Further, all references to one or more embodiments or examples are to be construed as non-limiting to the claims.

Claims

1. An aerosol generating system (1) for generating an aerosol for user inhalation from an aerosol generating article (30), the aerosol generating system (1) including:

an aerosol generating unit (2) including a metal heater support (102), wherein the metal heater support (102) forms a cavity (100) for receiving the aerosol generating article (30); wherein the aerosol generating unit (2) includes a thin film heating unit (104) surrounding the cavity (100) to thereby heat the aerosol generating article (30) in use.

2. An aerosol generating system (1) according to claim 1, wherein the thin film heating unit (104) is located on an internal surface of the heater support (102) such that the thin film heating unit (104) is located between the cavity (100) and the heater support (102).

3. An aerosol generating system (1) according to claim 1, wherein the thin film heating unit (104) is located on an external surface of the heater support (102) such that the thin film heating unit (104) is located outside the heater support (102).
4. An aerosol generating system (1) according to any preceding claim, wherein the thin film heating unit (104) includes a plurality of electrically resistive heating elements (106).
5. An aerosol generating system (1) according to any preceding claim, wherein the cavity (100) is elongate along a longitudinal axis, and wherein the article (30) is received into the cavity (100) along the longitudinal axis.
6. An aerosol generating system (1) according to claim 4 or claim 5, wherein a longitudinal plurality of the electrically resistive heating elements are arranged along the longitudinal axis of the cavity (100).
7. An aerosol generating system (1) according to any of claims 4 to 6, wherein a circumferential plurality of the electrically resistive heating elements (106) are arranged circumferentially around the cavity (100).
8. An aerosol generating system (1) according to any of claims 4 to 7, wherein the plurality of electrically resistive heating elements (106) are arranged in an array surrounding the cavity (100).
9. An aerosol generating system (1) according to any of claims 4 to 8, further including a controller operatively connected to the plurality of electrically resistive heating elements (106).
10. An aerosol generating system (1) according to claim 9, wherein the controller is configured to control heating of each of the plurality of electrically resistive heating elements (106) independently from one another.
11. An aerosol generating system (1) according to claim 10, wherein the controller is configured to operate the plurality of electrically resistive heating elements (106) in sub-groups of activated heating elements, wherein the electrically resistive heating elements (106) within each sub-group are activated simultaneously.
12. An aerosol generating system (1) according to claim 11, wherein the controller is configured to receive from a user a selected experience mode indication, to translate the experience mode indication into a control mode of activating the electrically

resistive heating elements (106), and to operate the electrically resistive heating elements (106) according to the control mode.

13. An aerosol generating system (1) according to claim 10 or claim 11, wherein the controller is configured to operate an initial electrically resistive heating element (106) of the plurality of electrically resistive heating elements (106) before operating a subsequent electrically resistive heating element (106) of the plurality of the electrically resistive heating elements (106). 5 10
14. An aerosol generating system (1) according to any of claims 9 to 13, wherein the controller is configured to supply a variable power level to at least one of the electrically resistive heating elements (106). 15
15. An aerosol generating system (1) according to any preceding claim, wherein the aerosol generating system includes a heat-not-burn device. 20

25

30

35

40

45

50

55

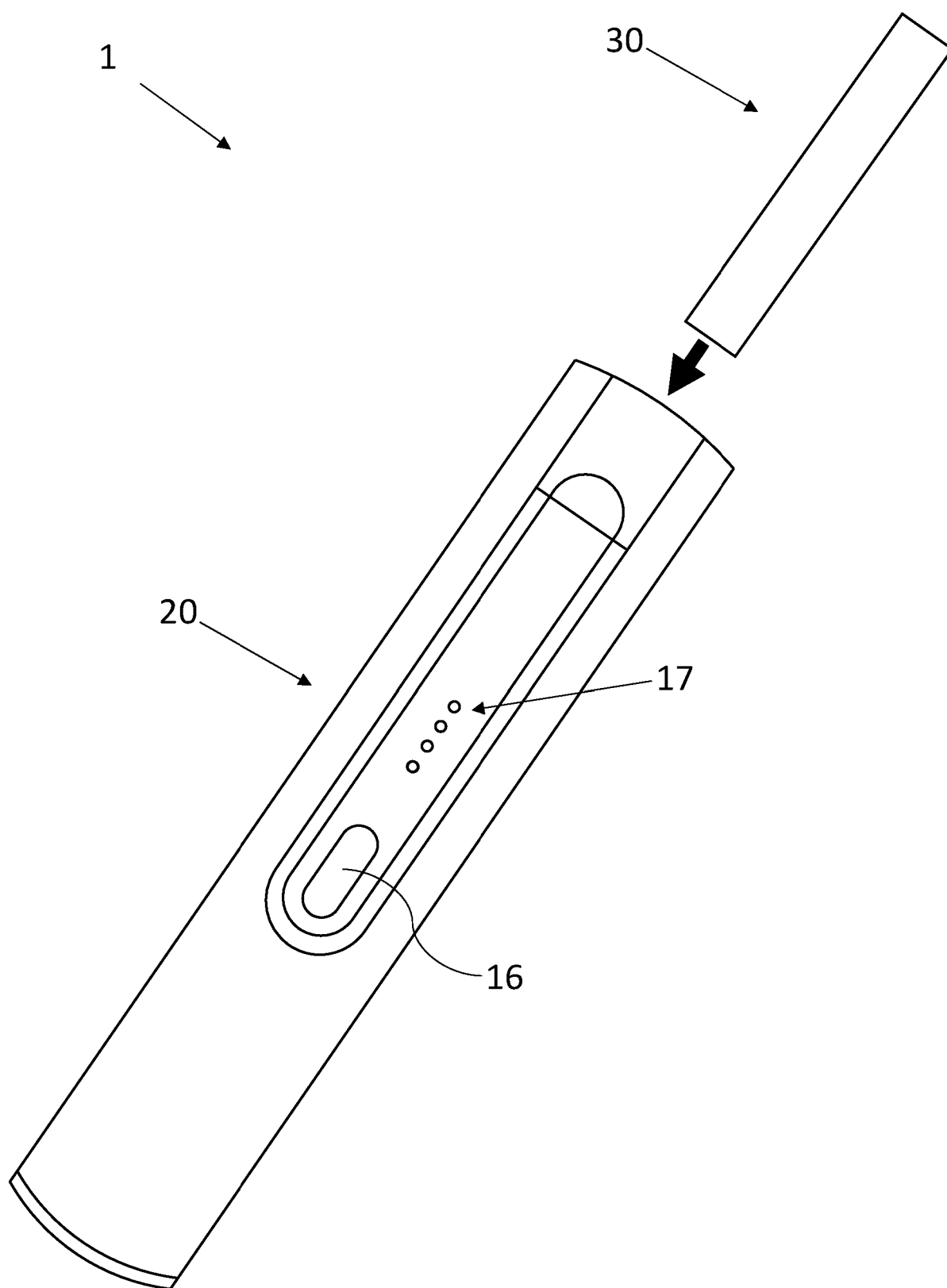


Figure 1

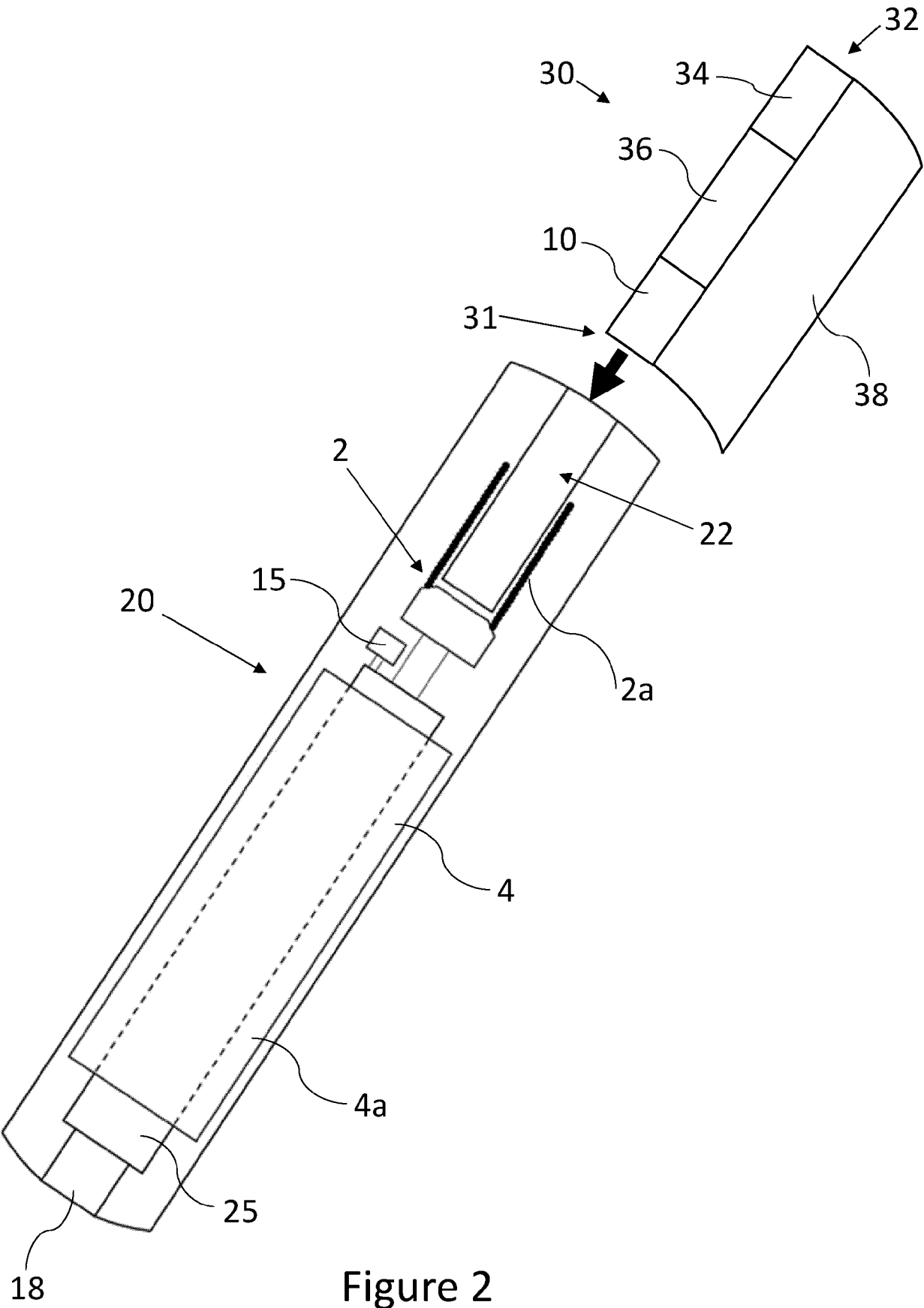


Figure 2

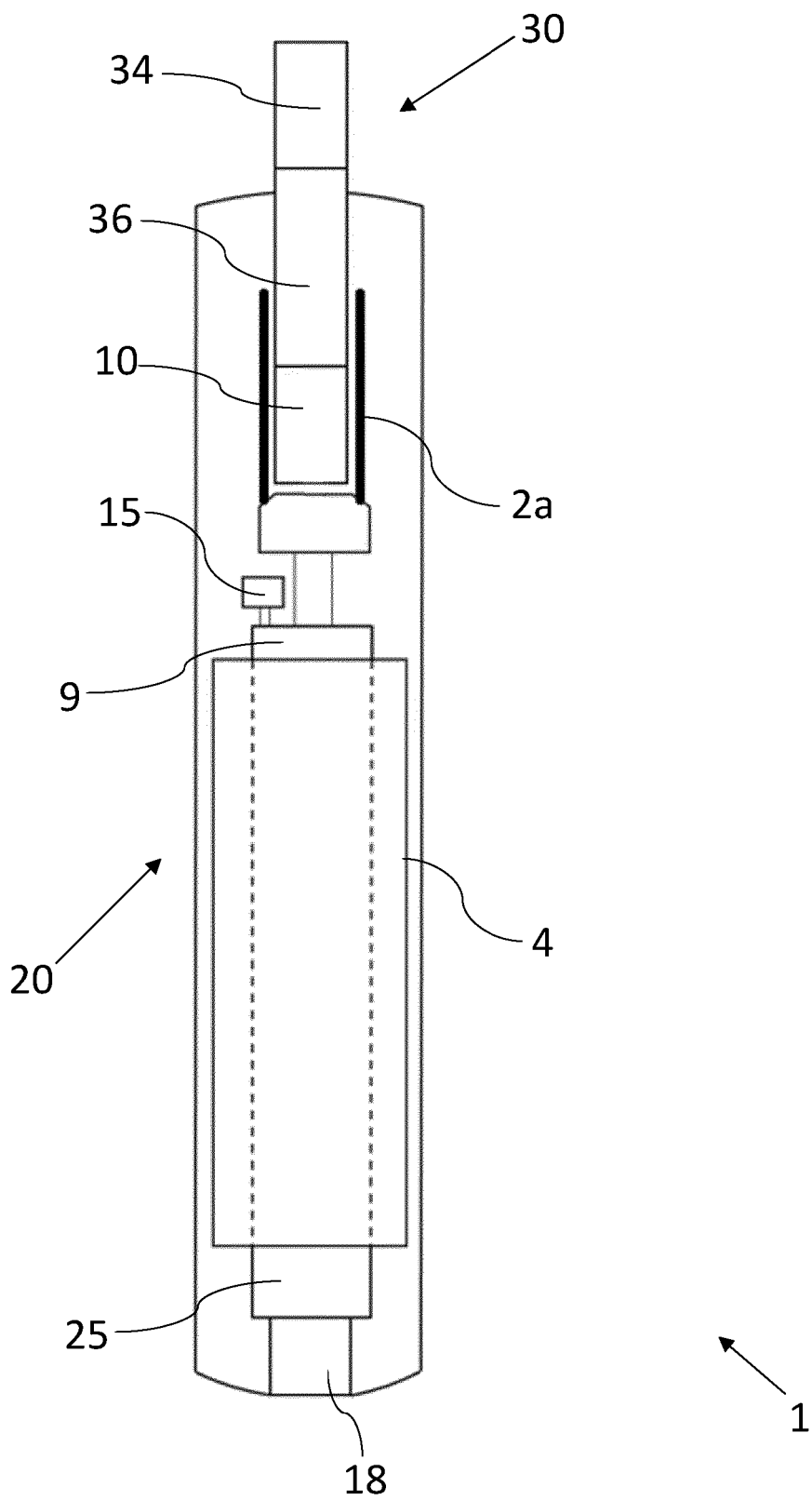


Figure 3

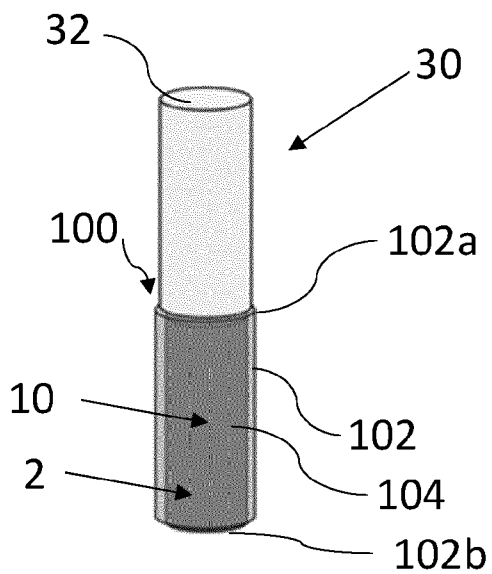


Figure 4

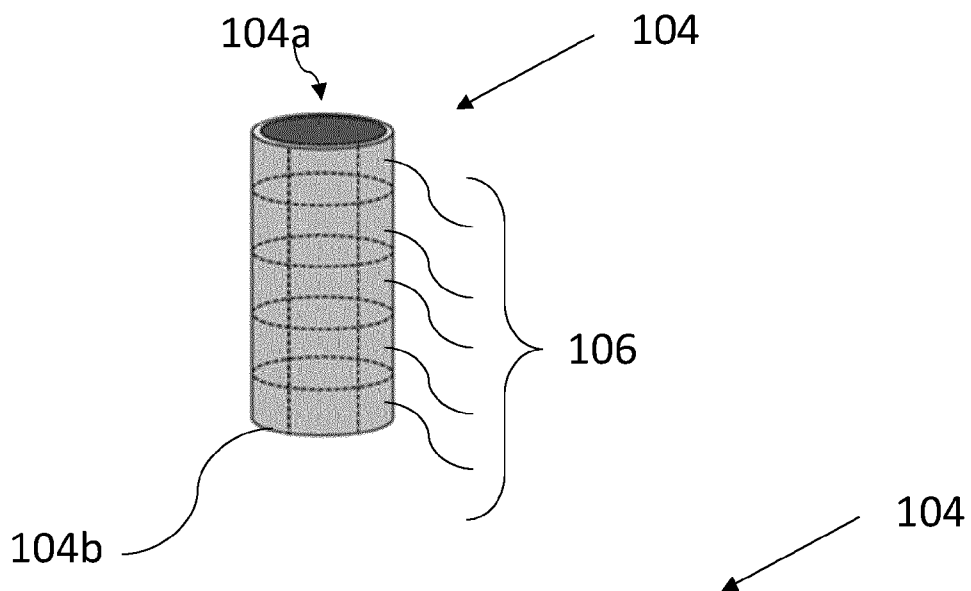


Figure 5

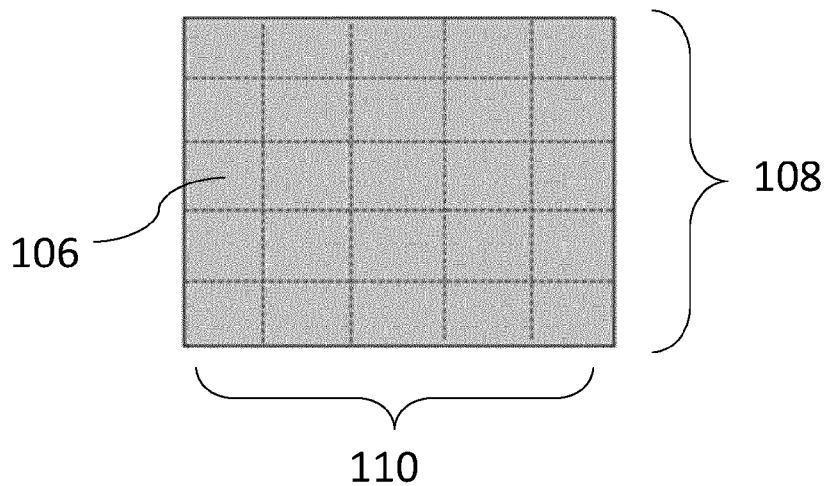


Figure 6

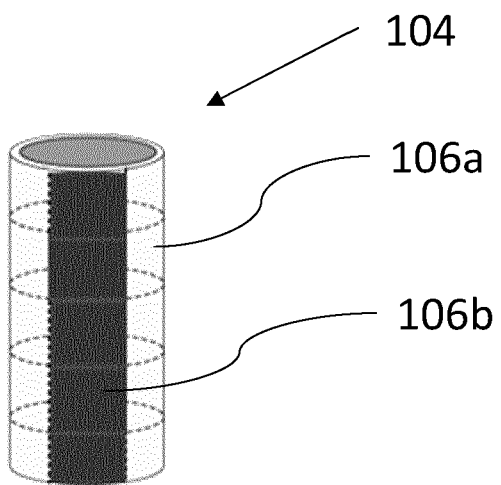


Figure 7A

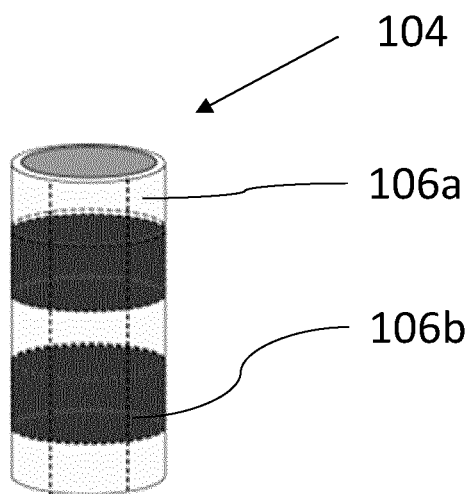


Figure 7B

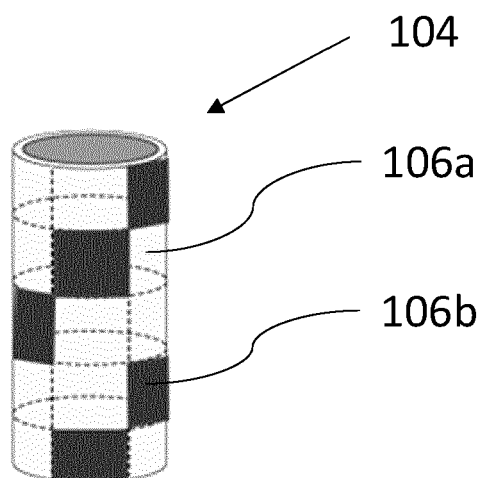


Figure 7C



EUROPEAN SEARCH REPORT

Application Number

EP 25 17 0939

5

10

15

20

25

30

35

40

45

50

55

1

EPO FORM 1503 03.82 (P24C01)

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	US 2024/057667 A1 (BLANDINO THOMAS PAUL [US] ET AL) 22 February 2024 (2024-02-22)	1-10, 13-15	INV. A24F40/46
Y	* paragraphs [0105], [0133], [0136], [0138], [0152], [0153]; figures 1, 2 *	11,12	ADD. A24F40/20 A24F40/57
X	WO 2021/105379 A1 (JT INT SA [CH]) 3 June 2021 (2021-06-03)	1-6,9, 10,14,15	
A	* figures 1A, 1B, 4A-4D * * page 11, line 1 - line 10 * * page 14, line 14 - line 26 * * page 16, line 17 - line 18 * * page 17, line 6 - line 7 * * page 17, line 14 - line 15 * * page 18, line 2 - line 4 * * page 23, line 27 - line 30 * * page 26, line 9 - line 10 *	12	
X	WO 2022/207536 A1 (JT INT SA [CH]) 6 October 2022 (2022-10-06)	1,15	
	* figures 1, 2 * * page 8, line 1 - line 5 * * page 8, line 8 - line 15 *		TECHNICAL FIELDS SEARCHED (IPC)
Y	US 2024/179805 A1 (BATISTA RUI NUNO [CH] ET AL) 30 May 2024 (2024-05-30)	11,12	A24F
A	* paragraphs [0016], [0017] *	13	
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 2 September 2025	Examiner Schäfer, Lucas
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	

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

EP 25 17 0939

5

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

02-09-2025

10

15

20

25

30

35

40

45

50

55

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2024057667 A1	22-02-2024	EP 4274439 A1	15-11-2023
		JP 7659066 B2	08-04-2025
		JP 2024502941 A	24-01-2024
		KR 20230117188 A	07-08-2023
		US 2024057667 A1	22-02-2024
		WO 2022148846 A1	14-07-2022

WO 2021105379 A1	03-06-2021	CN 114745983 A	12-07-2022
		EP 4064909 A1	05-10-2022
		JP 7636411 B2	26-02-2025
		JP 2023503284 A	27-01-2023
		WO 2021105379 A1	03-06-2021

WO 2022207536 A1	06-10-2022	NONE	

US 2024179805 A1	30-05-2024	CA 3014587 A1	02-11-2017
		CN 108882753 A	23-11-2018
		EP 3448184 A1	06-03-2019
		IL 262046 A	29-11-2018
		JP 7271177 B2	11-05-2023
		JP 7408702 B2	05-01-2024
		JP 2019519198 A	11-07-2019
		JP 2022058967 A	12-04-2022
		JP 2024026423 A	28-02-2024
		KR 20190002459 A	08-01-2019
		RU 2018137999 A	29-05-2020
		US 2024179805 A1	30-05-2024
		US 2025098779 A1	27-03-2025
		WO 2017186477 A1	02-11-2017

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82