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(54) **AEROSOL GENERATING SYSTEM**

(57) Disclosed is an aerosol generating system (1) comprising a consumable (70) comprising first and second sections (101, 102) formed of different materials. The first section comprises a smokeable substrate (105) and the second section comprises a carrier (106) formed of propylene glycol and/or glycerine. The system also comprises a heating system (52) arranged to heat the first and second sections of the consumable. The heating system is configured to heat the second section of the consumable, in use, to a higher temperature than the first section of the consumable. Also disclosed is an aerosol generating apparatus (50) and a method of generating aerosol.

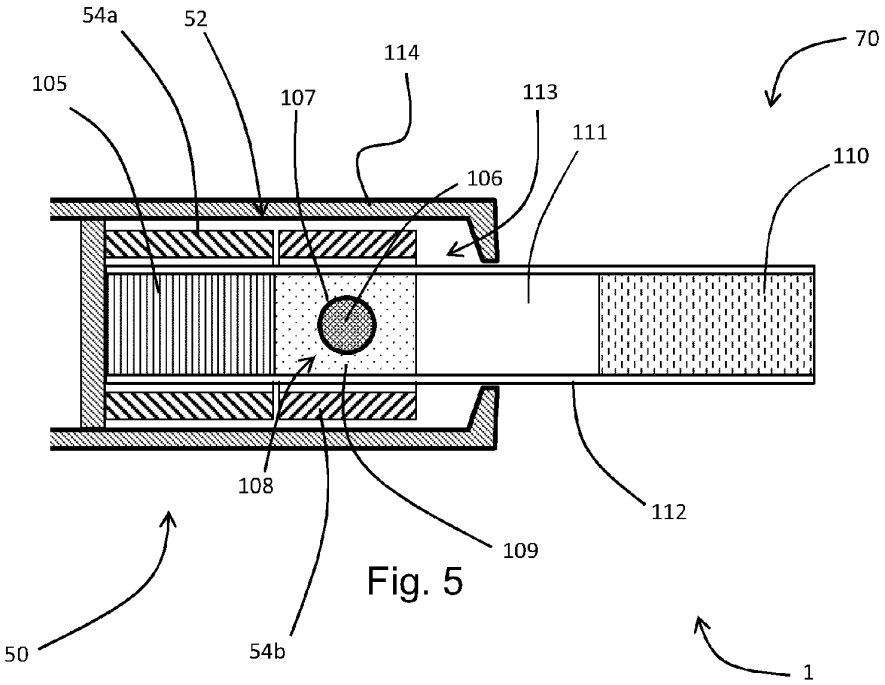

Fig. 5

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Description

FIELD

[0001] The present disclosure relates to an aerosol generating system, an aerosol generating apparatus and a method of generating aerosol.

BACKGROUND

[0002] A typical aerosol generating apparatus may comprise a power supply, an aerosol generating unit that is driven by the power supply, an aerosol precursor, which in use is aerosolised by the aerosol generating unit to generate an aerosol, and a delivery system for delivery of the aerosol to a user.

[0003] One approach for an aerosol generating system is the "heated tobacco" ("HT") approach in which tobacco is heated or warmed to release vapour. The tobacco may be leaf tobacco or reconstituted tobacco. The vapour may contain nicotine and/or flavourings. In the HT approach the intention is that the tobacco is heated but not burned, i.e. the tobacco does not undergo combustion.

[0004] A typical HT system may include a heating system and a consumable. The consumable may include the tobacco material. In use, the tobacco material is heated by the heating system, wherein airflow through the tobacco material causes moisture in the tobacco material to be released as vapour. A vapour may also be formed from a carrier in the tobacco material (this carrier may for example include propylene glycol and/or vegetable glycerine) and additionally volatile compounds released from the tobacco. The released vapour may be entrained in the airflow drawn through the tobacco.

[0005] There is a general desire to improve the overall quality of the vapour generated by such systems, while minimising (or entirely avoiding) any burning of the tobacco material. In spite of the effort already invested in the development of aerosol generating apparatuses/systems further improvements are desirable.

SUMMARY

[0006] In a first aspect, the present disclosure provides an aerosol generating system comprising:

a consumable comprising first and second sections formed of different materials, the first section comprising a smokeable substrate, optionally tobacco, and the second section comprising a carrier formed of propylene glycol and/or glycerine (e.g. vegetable glycerine);

a heating system arranged to heat the first and second sections of the consumable, the heating system being configured to heat the second section of the consumable, in use, to a higher temperature than the first section of the consumable.

[0007] In at least some cases, the temperature at which polypropylene glycol and/or glycerine is most effectively vapourised can be higher than a temperature at which tobacco is susceptible to burning. Such burning can be undesirable in systems in which the intention is to heat but not combust the tobacco (i.e. heat-not-burn systems). Arranging the tobacco and carrier in two different sections, and then heating those sections to different temperatures allows optimisation of the heating temperature of each of these components of the consumable. In particular, and in view of the above, heating the second (carrier) section to a higher temperature than the first (smokeable substrate) section can provide particularly effective vaporisation of the carrier while avoiding (or at least reducing the possibility of) burning of the smokeable substrate. The smokeable substrate may be tobacco.

[0008] The consumable may comprise an upstream end and a downstream end. The upstream end may represent a mouth end, or a mouthpiece, of the consumable. In normal use, air may flow through the consumable in a direction from the upstream end to the downstream end.

[0009] The first and second sections of the consumable may be axial sections of the consumable. The first and second sections may be arranged along an axis extending in a direction of airflow through or along the consumable in use. The axis may extend between the upstream and downstream end. The axis may be a longitudinal axis of the consumable (the consumable may be elongate, and the longitudinal axis may extend in the direction of elongation).

[0010] The second section may be downstream of the first section. In this way, in use, vapour generated from the first section may be entrained in an airflow through the consumable, and subsequently vapour from the carrier may be entrained in the airflow.

[0011] The second section may be directly downstream of the first section. The second section may be adjacent to the first section (e.g. may be in contact with the first section).

[0012] The first section may be at an upstream end of the consumable. The first section may define an upstream end of the consumable.

[0013] The first section may comprise leaf material (e.g. tobacco leaf material). The first section may include a substrate, e.g. reconstituted tobacco to carry one or more of an active component (e.g. one or more of nicotine; caffeine; a cannabidiol oil; a non-pharmaceutical formulation, e.g. a formulation which is not for treatment of a disease or physiological malfunction of the human body). The substrate may carry e.g. a flavouring (e.g. a component that provides a taste and/or a smell to the user. The flavouring may include one or more of: Ethylvanillin (vanilla); menthol, Isoamyl acetate (banana oil); or other.

[0014] The second section may have less tobacco (e.g. by weight) than the first section. The second section may, for example, be substantially free of tobacco.

[0015] The carrier of the second section may be a liquid (i.e. at room temperature). The carrier may be held within a shell (e.g. a rigid shell). The shell may comprise a biopolymer (e.g. a polymer derived from seaweed). Together, the carrier and the shell may define a capsule.

[0016] The heating system may be configured to heat the second section to a temperature above the melting point of the shell. In this way, in use, the shell may melt to release the carrier when the second section is heated.

[0017] The second section may comprise a carrier element for supporting the carrier. For example, when the carrier forms part of a capsule the carrier element may contain the capsule. The carrier element may be configured to retain a liquid. For example, the carrier element may be porous (e.g. may be a fibrous material). The carrier element may be configured to wick liquid. Thus, when the shell of the capsule is melted, the carrier may flow from the shell into and throughout the carrier element (e.g. into and along the pores of the carrier element), to be retained by the carrier element. Such an arrangement may mean that the carrier is only released during use, which may minimise or avoid leakage of the carrier from the second section (or from the consumable entirely) prior to use.

[0018] The heating system may comprise a first heater arranged to heat the first section of the consumable in use and a second heater arranged to heat the second section of the consumable in use. The second heater may be configured to heat to a higher temperature than the first heater in use. Each heater may comprise one or more heating elements.

[0019] The first and second heaters of the heating system may be arranged axially along the consumable (e.g. along an elongate axis of the consumable and/or an axis extending between upstream and downstream ends). Thus, the first heater may be aligned with the first section of the consumable and the second heater may be aligned with the second section of the consumable (i.e. along the axis).

[0020] The first heater and/or the second heater may be configured to at least partly surround the consumable in use. In this respect, the first heater and/or second heater may be referred to as an external heater. The first heater and/or second heater may be tubular.

[0021] The heaters may take other forms. For example, the first heater and/or the second heater may be configured to extend into (i.e. penetrate) the consumable in use (e.g. may be an internal heater). For example, the first heater and/or second heater may be a rod or a blade.

[0022] The heating system may be configured to heat the first section to a temperature that is less than 290°C, or e.g. less than 280°C, or e.g. less than 250°C, or e.g. about 200°C. The first heater may be configured to heat, in use, to a temperature that is less than 290°C, or e.g. less than 280°C, or e.g. less than 250°C, or e.g. about 200°C.

[0023] The heating system may be configured to heat the second section to a temperature that is at least 200°C, or 220°C, or 240°C, or 260°C, or 280°C, or e.g. about 290°C. The second heater may be configured to heat, in use, to a temperature that is at least 200°C, or 220°C, or 240°C, or 260°C, or 280°C, or e.g. about 290°C.

[0024] A temperature difference between the first section and the second section may be at least 20°C and may be up to 60°C.

[0025] A temperature difference between the first heater and the second heater may be at least 20°C and may be up to 60°C.

[0026] The heating system may be configured to heat the first and second sections concurrently (the second section being heated to a higher temperature than the first section).

[0027] The system may comprise a controller operatively connected to the heating system for controlling the heating system. The above-described heating by the heating system (and the heaters of the heating system) may be controlled by the controller. The controller may be configured to control the heating of the first and second sections by the heating system. For example, in at least one operating mode of the heating system, the controller may be configured to control the first and second heaters to heat concurrently (the second heater being heated to a higher temperature than the first heater). As an example, the first heater may be controlled to heat to a first predetermined temperature and the second heater may be controlled to heat to a second predetermined temperature that is higher than the first predetermined temperature.

[0028] The controller may be configured to control the heating by controlling a power supply to the heating system. For example, the controller may comprise a power supply duty cycle. Where the heating system comprises first and second heaters, the controller may be configured to control the power supply to the first heater according to a first duty cycle and control the power supply to the second heater according to a second duty cycle that is different to the first duty cycle.

[0029] In other embodiments, where the heating system includes a single heater, the variation in temperature may be provided by regions of different material and or structure (e.g. regions of a single heating element or of a plurality of heating elements).

[0030] The consumable may be a heat-not-burn consumable. The aerosol generating system may be a heat-not burn system.

[0031] The heating system may form part of an aerosol generating apparatus. The aerosol generating apparatus may be configured for releasable engagement with the consumable. For example, the aerosol generating apparatus may comprise a consumable-receiving cavity for receipt of the consumable. The heating system may be disposed in and/or at least partly surround the consumable-receiving cavity. The heating system may, in some embodiments, at least partly define the cavity.

[0032] The consumable-receiving cavity may have a distal end arranged to be proximate to the upstream end

of a consumable when received in the cavity. The first heater may be closer to the distal end of the cavity than the second heater. The first heater may be adjacent to the distal end of the cavity.

[0033] In a second aspect, the present disclosure provides an aerosol generating apparatus comprising:

> a consumable-receiving cavity for receipt of a consumable, the cavity having a downstream end and an upstream end, whereby, in use, air flows through a consumable received in the cavity in a direction from the downstream end to the upstream end;
> a heating system arranged to heat a first zone of the cavity and a second zone of the cavity that is downstream of the first zone, the heating system being configured to heat the second zone to a higher temperature than the first zone in use.

[0034] As may be appreciated, the apparatus of the second aspect can be used with a consumable having a first section formed of one material (e.g. comprising tobacco) and a second section formed of a different material (e.g. comprising a carrier such as propylene glycol and/or glycerine). These sections may be received in different zones of the chamber in use, and thus may be heated to different temperatures in use. This can., in some cases, provide improved vapour generating performance while avoiding or at least limiting any burning of tobacco.

[0035] The heating system may be as described above with respect to the first aspect (and may include one or more optional features of the first aspect).

[0036] The heating system may comprise a first heater arranged to heat the first zone in use and a second heater arranged to heat the second zone in use. The second heater may be configured to heat to a higher temperature than the first heater in use. Each heater may comprise one or more heating elements.

[0037] The first and second heaters of the heating system may be arranged axially along the cavity (e.g. along an elongate axis of the cavity).

[0038] The first heater and/or the second heater may at least partly surround the cavity. In this respect, the first heater and/or second heater may be referred to as an external heater. The first heater and/or second heater may be tubular.

[0039] The heaters may take other forms. For example, the first heater and/or the second heater may be configured to extend into cavity (e.g. may be an internal heater). For example, the first heater and/or second heater may be a rod or a blade.

[0040] The heating system may be configured to heat the first zone to a temperature that is less than 290°C, or e.g. less than 250°C, or e.g. about 200°C. The first heater may be configured to heat, in use, to a temperature that is less than 290°C, or e.g. less than 250°C, or e.g. about 200°C.

[0041] The heating system may be configured to heat the second zone to a temperature that is greater than greater than 200°C, or 220°C, or 240°C, or 260°C, or 280°C, or e.g. about 290°C. The second heater may be configured to heat, in use, to a temperature that is greater than 200°C, or 220°C, or 240°C, or 260°C, or 280°C, or e.g. about 290°C.

[0042] The heating system may be configured to heat the first and second zones such that there is a temperature difference between the first zone and the second zone. The temperature difference between the first zone and the second zone may be at least 20 degrees and may be up to 60 degrees.

[0043] The heating system may be configured to heat the first and second zones concurrently (the second zone being heated to a higher temperature than the first zone).

[0044] The system may comprise a controller operatively connected to the heater system for controlling the heating system. The above-described heating by the heating system (and the heaters of the heating system) may be controlled by the controller. The controller may be configured to control the heating of the first and second sections by the heating system. For example, in at least one operating mode of the apparatus, the controller may control the first and second heaters to heat concurrently (the second heater being heated to a higher temperature than the first heater).

[0045] The heating system may comprise a first heater to heat the first zone and a second heater to heat the second zone.

[0046] The first heater and/or the second heater may be configured to at least partly surround the cavity. In such embodiments the first and/or second heater may be referred to as an external heater. The first and/or second heater may be tubular (e.g. having a hollow interior for receipt of the consumable).

[0047] In other embodiments, the first heater and/or second heater may be configured for penetration into the consumable, and may be referred to as an internal heater (e.g. may be a rod or blade heater).

[0048] In a third aspect, the disclosure provides a method of generating an aerosol, the method comprising heating a consumable comprising first and second sections formed of different materials, the first section comprising tobacco and the second section comprising a carrier formed of propylene glycol and/or glycerine (e.g. vegetable glycerine), wherein the second section is heated to a higher temperature than the first section.

[0049] The consumable may be as otherwise described above with respect to the first aspect. The heating may be performed by a heating system as described above with the respect to the first or second aspect.

[0050] In a fourth aspect the present disclosure may provide electrical circuitry and/or a computer program configured to cause an aerosol generating apparatus/-system to perform any method or method step disclosed herein. A computer readable medium comprising the computer program is also disclosed.

[0051] In a fifth aspect, the present disclosure may

provide a use of an aerosol generating apparatus for generating an aerosol according to the method of the second aspect.

[0052] In a sixth aspect, there is provided a consumable with an upstream end and a downstream end, a first section and a second section; wherein the second section is downstream from the first section; and wherein the first section comprises a smokeable material, optionally tobacco, and the second section comprises propylene glycol and/or glycerine.

[0053] 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 or spirit of the subject matter described herein in any way. Moreover, the above and/or proceeding 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 drawings.

BRIEF DESCRIPTION OF THE FIGURES

[0054] Aspects, features and advantages of the present disclosure will become apparent from the following description of examples in reference to the appended drawings in which like numerals denote like elements.

Fig. 1 is a block system diagram showing an example aerosol generating apparatus.

Fig. 2 is a block system diagram showing an example implementation of the apparatus of Fig. 1, where the aerosol generating apparatus is configured to generate aerosol from a solid precursor.

Fig. 3 is a schematic diagram showing an example implementation of the apparatus of Fig. 2.

Fig. 4 is section view showing a consumable for use with a heat-not-burn apparatus.

Fig. 5 is a section view of an aerosol generating system according to a first embodiment including the consumable of Fig. 4.

Fig. 6 is a section view of an aerosol generating system according to a second embodiment including the consumable of Fig. 4.

DETAILED DESCRIPTION OF EMBODIMENTS

[0055] Before describing several examples implementing the present disclosure, it is to be understood that the present disclosure is not limited by specific construction details or process steps set forth in the following description and accompanying drawings. Rather, it will be apparent to those skilled in the art having the benefit of the present disclosure that the systems, apparatuses and/or methods described herein could be embodied differently and/or be practiced or carried out in various alternative ways.

[0056] Unless otherwise defined herein, scientific and technical terms used in connection with the presently disclosed inventive concept(s) shall have the meanings that are commonly understood by those of ordinary skill in the art, and known techniques and procedures may be performed according to conventional methods well known in the art and as described in various general and more specific references that may be cited and discussed in the present specification.

[0057] Any patents, published patent applications, and non-patent publications mentioned in the specification are hereby incorporated by reference in their entirety.

[0058] All examples implementing the present disclosure can be made and executed without undue experimentation in light of the present disclosure. While particular examples have been described, it will be apparent to those of skill in the art that variations may be applied to the systems, apparatus, and/or methods and in the steps or in the sequence of steps of the methods described herein without departing from the concept, spirit, and scope of the inventive concept(s). All such similar substitutions and modifications apparent to those skilled in the art are deemed to be within the spirit, scope, and concept of the inventive concept(s) as defined by the appended claims.

[0059] The use of the term "a" or "an" in the claims and/or the specification may mean "one," as well as "one or more," "at least one," and "one or more than one." As such, the terms "a," "an," and "the," as well as all singular terms, include plural referents unless the context clearly indicates otherwise. Likewise, plural terms shall include the singular unless otherwise required by context.

[0060] The use of the term "or" in the present disclosure (including the claims) is used to mean an inclusive "and/or" unless explicitly indicated to refer to alternatives only or unless the alternatives are mutually exclusive. For example, a condition "A or B" is satisfied by any of the following: A is true (or present) and B is false (or not present), A is false (or not present) and B is true (or present), and both A and B are true (or present).

[0061] As used in this specification and claim(s), the words "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.

[0062] Unless otherwise explicitly stated as incompatible, or the physics or otherwise of the embodiments, examples, or claims prevent such a combination, the features of examples disclosed herein, and of the claims,

may be integrated together in any suitable arrangement, especially ones where there is a beneficial effect in doing so. This is not limited to only any specified benefit, and instead may arise from an "ex post facto" benefit. This is to say that the combination of features is not limited by the described forms, particularly the form (e.g. numbering) of example(s), embodiment(s), or dependency of claim(s). Moreover, this also applies to the phrase "in one embodiment," "according to an embodiment," and the like, which are merely a stylistic form of wording and are not to be construed as limiting the following features to a separate embodiment to all other instances of the same or similar wording. This is to say, a reference to 'an,' 'one,' or 'some' embodiment(s) may be a reference to any one or more, and/or all embodiments, or combination(s) thereof, disclosed. Also, similarly, the reference to "the" embodiment 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.

[0063] The present disclosure may be better understood in view of the following explanations, wherein the terms used that are separated by "or" may be used interchangeably:

[0064] As used herein, an **"aerosol generating apparatus"** (or **"electronic(e)-cigarette"**) may be an apparatus configured to deliver an aerosol to a user for inhalation by the user. The apparatus may additionally/alternatively be referred to as a "smoking substitute apparatus", if it is intended to be used instead of a conventional combustible smoking article. As used herein a combustible "smoking article" may refer to a cigarette, cigar, pipe or other article, that produces smoke (an aerosol comprising solid particulates and gas) via heating above the thermal decomposition temperature (typically by combustion and/or pyrolysis). An aerosol generated by the apparatus (when used with a consumable) may comprise an aerosol with particle sizes of 0.2 - 7 microns, or less than 10 microns, or less than 7 microns. This particle size may be achieved by control of one or more of: heater temperature; cooling rate as the vapour condenses to an aerosol; flow properties including turbulence and velocity. The generation of aerosol by the aerosol generating apparatus may be controlled by an input device. The input device may be configured to be user-activated, and may for example include or take the form of an actuator (e.g. actuation button) and/or an airflow sensor.

[0065] Each occurrence of the aerosol generating apparatus being caused to generate aerosol for a period of time (which may be variable) may be referred to as an **"activation"** of the aerosol generating apparatus. The aerosol generating apparatus may be arranged to allow an amount of aerosol delivered to a user to be varied per activation (as opposed to delivering a fixed dose of aerosol), e.g. by activating an aerosol generating unit of the apparatus for a variable amount of time, e.g. based on the strength/duration of a draw of a user through a flow path of the apparatus (to replicate an effect of smoking a conventional combustible smoking article).

[0066] The aerosol generating apparatus may be portable. As used herein, the term **"portable"** may refer to the apparatus being for use when held by a user.

[0067] As used herein, an **"aerosol generating system"** may be a system that includes an aerosol generating apparatus and a consumable.

[0068] As used herein, an **"aerosol"** may include a suspension of precursor, including as one or more of: solid particles; liquid droplets; gas. Said suspension may be in a gas including air. An aerosol herein may generally refer to/include a vapour. An aerosol may include one or more components of the precursor.

[0069] As used herein, a **"flow path"** may refer to a path or enclosed passageway through an aerosol generating apparatus and/or consumable, e.g. for delivery of an aerosol to a user. The flow path may be arranged to receive aerosol from an aerosol generating unit. When referring to the flow path, upstream and downstream may be defined in respect of a direction of flow in the flow path, e.g. with an outlet being downstream of an inlet.

[0070] As used herein, a **"delivery system"** may be a system operative to deliver an aerosol to a user. The delivery system may include a mouthpiece and a flow path.

[0071] As used herein, a **"flow"** may refer to a flow in a flow path. A flow may include aerosol generated from the precursor. The flow may include air, which may be induced into the flow path via a puff by a user.

[0072] As used herein, a **"puff"** (or **"inhale"** or **"draw"**) by a user may refer to expansion of lungs and/or oral cavity of a user to create a pressure reduction that induces flow through the flow path.

[0073] As used herein, an **"aerosol generating unit"** may refer to a device configured to generate an aerosol from a precursor. The aerosol generating unit may include a unit to generate a vapour directly from the precursor (e.g. a heating system or other system) or an aerosol directly from the precursor (e.g. an atomiser including an ultrasonic system, a flow expansion system operative to carry droplets of the precursor in the flow without using electrical energy or other system). A plurality of aerosol generating units to generate a plurality of aerosols (for example, from a plurality of different aerosol precursors) may be present in an aerosol generating apparatus.

[0074] As used herein, a **"heating system"** may refer to an arrangement of at least one heating element, which is operable to aerosolise a precursor once heated. The at least one heating element may be electrically resistive to produce heat from the flow of electrical current therethrough. The at least one heating element may be arranged as a susceptor to produce heat when penetrated by an alternating magnetic field. The heating system may be configured to heat a precursor to below 300 or 350 degrees C, including without combustion.

[0075] As used herein, a **"consumable"** may refer to a unit that includes a precursor. The consumable may

include a mouthpiece. The consumable may include an information carrying medium. The consumable may be referred to as a "stick" or "package" or "heat-not-burn consumable". In a heat-not-burn consumable, the mouthpiece may be implemented as a filter.

[0076] As used herein **"heat-not-burn"** (or **"HNB"** or **"heated precursor"**) may refer to the heating of a precursor, typically tobacco, without combustion, or without substantial combustion (i.e. localised combustion may be experienced of limited portions of the precursor, including of less than 5% of the total volume).

[0077] As used herein, **"electrical circuitry"** may refer to one or more electrical components, examples of which may include: an Application Specific Integrated Circuit (ASIC); electronic/electrical componentry (which may include combinations of transistors, resistors, capacitors, inductors etc); one or more processors; a non-transitory memory (e.g. implemented by one or more memory devices), that may store one or more software or firmware programs; a combinational logic circuit; interconnection of the aforesaid. The electrical circuitry may be located entirely at the apparatus, or distributed between the apparatus and/or on one or more external devices in communication with the apparatus, e.g. as part of a system

[0078] 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 apparatus 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 a aerosol generating apparatus or system as disclosed herein, and may therefore be used synonymously with the term method.

[0079] As used herein, an **"external device"** (or **"peripheral device"**) may include one or more electronic components external to an aerosol generating apparatus. Those components may be arranged at the same location as the aerosol generating apparatus or remote from the apparatus. An external device may comprise electronic computer devices including: a smartphone; a PDA; a video game controller; a tablet; a laptop; or other like device.

[0080] As used herein, a **"computer readable medium/media"** (or **"memory"** or **"data storage"**) may include any medium capable of storing a computer program, and may take the form of any conventional non-transitory memory, for example one or more of: random access memory (RAM); a CD; a hard drive; a solid state drive; a memory card; a DVD. The memory may have various arrangements corresponding to those discussed for the circuitry /processor. The present disclosure includes a computer readable medium configured to cause an apparatus or system disclosed herein to perform a method as disclosed herein.

[0081] Referring to Fig. 1, an example aerosol generating system 1 includes a power supply 2, for supply of electrical energy. The system 1 includes an aerosol generating unit 4 that is driven by the power supply 2. The power supply 2 may include an electric power supply in the form of a battery and/or an electrical connection to an external power source. The system 1 includes a precursor 6, which in use is aerosolised by the aerosol generating unit 4 to generate an aerosol. The system 1 includes a delivery system 8 for delivery of the aerosol to a user.

[0082] Electrical circuitry (not shown in figure 1) may be implemented to control the interoperability of the power supply 4 and aerosol generating unit 6.

[0083] Fig. 2 shows an implementation of the system 1 of Fig. 1, where the aerosol generating system 1 is configured to generate aerosol by a-heat not-burn process.

[0084] In this example, the system 1 includes an aerosol generating apparatus 50 and a consumable 70. The apparatus 50 includes the power supply 4 and a heating system 52. The heating system 52 includes at least one heating element 54. The apparatus 50 may additionally include any one or more of electrical circuitry 56, a memory 58, a wireless interface 60, one or more other components 62.

[0085] The electrical circuitry 56 may include a processing resource for controlling one or more operations of the apparatus 50, e.g. based on instructions stored in the memory 58.

[0086] The wireless interface 60 may be configured to communicate wirelessly with an external (e.g. mobile) device, e.g. via Bluetooth.

[0087] The other component(s) 62 may include an actuator, one or more user interface devices configured to convey information to a user and/or a charging port, for example (see e.g. Fig. 5).

[0088] The apparatus 50 is configured to engage with the consumable 70 such that the at least one heating element 54 of the heating system 52 can heat the precursor 6 of the consumable 70. In use, a user may activate the aerosol generating system 1 to cause the heating system 52 of the apparatus 50 to cause the at least one heating element 54 to heat the precursor 6 of the consumable 70 (without combusting it) by conductive heat transfer, to generate an aerosol which is inhaled by the user.

[0089] Fig. 3 shows an example implementation of the aerosol generating system 1 of Fig. 2.

[0090] As depicted in Fig. 3, the consumable 70 is implemented as a stick, which is engaged with the apparatus 50 by inserting the stick into an aperture at a top end

53 of the apparatus 50, which causes the at least one heating element 54 of the heating system 52 to penetrate into or at least partly surround, the precursor 6.

[0091] The consumable 70 includes the solid precursor 6 proximal to the apparatus 50, and a filter distal to the body 50. The filter serves as the mouthpiece of the consumable 70 and thus the system 1 as a whole. The solid precursor 6 may be a reconstituted tobacco formulation.

[0092] In this example, the at least one heating element 54 is tube-shaped (e.g. with a hollow transverse profile). Other heating element shapes are possible, e.g. the at least one heating element may be a rod-shaped element with a circular transverse profile, or may be blade-shaped (with a rectangular transverse profile).

[0093] In this example, the apparatus 50 includes a cap 51. In use the cap 51 is engaged at a top end 53 of the body 50. Although not apparent from Fig. 5, the cap 51 is moveable relative to the apparatus 50. In particular, the apparatus 51 is slidable and can slide along a longitudinal axis of the apparatus 50.

[0094] The apparatus 50 also includes an actuator 55 on an outer surface of the apparatus 50. In this example, the actuator 55 has the form of a button.

[0095] The apparatus 50 also includes a user interface device configured to convey information to a user. Here, the user interface device is implemented as a plurality of lights 57, which may e.g. be configured to illuminate when the apparatus 50 is activated and/or to indicate a charging state of the power supply 4. Other user interface devices are possible, e.g. to convey information haptically or audibly to a user.

[0096] The apparatus 50 may also include an airflow sensor which detects airflow in the aerosol generating system 1 (e.g. caused by a user inhaling through the consumable 70). This may be used to count puffs, for example.

[0097] In this example, the consumable 70 includes a flow path which transmits aerosol generated by the at least one heating element 54 to the mouthpiece of the consumable 70.

[0098] In this example, the aerosol generating unit 4 is provided by the above-described heating system 52 and the delivery system 8 is provided by the above-described flow path and mouthpiece of the consumable 70.

[0099] Referring to Figure 4, an aerosol generating consumable 70, which may be implemented in any of the preceding examples, is shown. The consumable 70, which is for use with a heat-not-burn apparatus, comprises a first 101 and second 102 sections arranged along an elongate axis of the consumable 70 extending between upstream 103 and downstream 104 ends of the consumable 70. The first section 101 and second section 102 are formed of different materials. In particular, the first section 101 comprises tobacco in the form of a reconstituted tobacco substrate 105. The second section 102 of the consumable 70 comprises a carrier 106 formed of propylene glycol and/or glycerine. The reconstituted tobacco 105 and carrier 106 can be considered to provide the precursor 6 of the consumable 70 in that each of these contribute to the aerosol that is ultimately formed when the consumable 70 is heated.

[0100] The carrier 106 is a liquid (at room temperature) and is held within a spherical shell 107 (which may be formed of a biopolymer, such as a polymer derived from seaweed). Together, the liquid carrier 106 and the shell 107 form a capsule 108. The capsule 108 is supported within a cylindrical porous (e.g. fibrous) carrier element 109, that is positioned directly downstream of the tobacco substrate 105 (so as to be adjacent to the tobacco substrate 105).

[0101] In use, the carrier 106 is released from the shell 107 before a user inhales from the consumable 70. To facilitate this, the shell 107 of the capsule 108 is configured to melt when heated by an aerosol generating apparatus (the shell 107 may, for example, be configured to melt at a temperature that is lower than a temperature at which the carrier 106 is typically vapourised). When the shell 107 melts, the carrier 106 is released so as to flow into the pores of the carrier element 109. The porous nature of the carrier element 109 means that it wicks the liquid carrier 106 such that the carrier 106 is distributed throughout the carrier element 109.

[0102] At the downstream end 104, the consumable 70 comprises a terminal filter element 110. The terminal filter element 110 is formed of cellulose acetate tow with a paper plug wrapper (not shown). The terminal filter element 110 is spaced downstream from the carrier element 109, such that a space 111 (which may promote mixing and/or cooling of vapour) is defined between the carrier element 109 and the terminal filter element 110.

[0103] The tobacco substrate 105, carrier element 109, space 111 and terminal filter 110 are all circumscribed by a paper wrapping layer 112. This holds the components of the consumable 70 together and provides a protective outer layer.

[0104] Referring now to Figure 5, the consumable 70 is shown engaged in a consumable-receiving cavity 113 of an aerosol generating apparatus 50. Together, the consumable 70 and aerosol generating apparatus 50 form an aerosol generating system 1.

[0105] The consumable-receiving cavity 113 of the apparatus 50 is defined by a housing 114 of the apparatus 50. Housed within the housing 114 is a heating system 52 that includes first 54a and second 54b heating elements. In the illustrated embodiment, the heating elements 54a, 54b are both tubular heating elements that circumferentially surround the consumable-receiving cavity 113 (and thus the consumable 70 when received therein).

[0106] The heating system 52 is configured to heat the first section 101 (and thus the reconstituted tobacco substrate 105) and second section 102 (including the capsule 108) of the consumable 70 to different temperatures. This is facilitated by the provision of the two heating elements 54a, 54b. In particular, the second heating element 54b is controlled (by e.g. a controller that is

not shown) to heat up to a higher temperature than the first heating element 54a. In particular, the controller is configured to heat the first heating element 54a to a first predetermined temperature and heat the second heating element 54b to a second predetermined temperature that is higher than the first predetermined temperature.

[0107] In this way, in use, when the apparatus 50 is activated, the carrier element 109 (and thus the carrier 106) is heated to a higher temperature than the tobacco substrate 105. In particular, the tobacco substrate 105 is heated to a lower temperature, while the carrier 106 is heated to a higher temperature. This may prevent burning of the tobacco 105, while ensuring efficient vaporisation of the carrier 106. Vaporisation of the carrier 106 may be particularly effective at temperatures of at least 290°C, but sufficient vaporisation may occur already at lower temperatures, such as 200°C. In some examples, the difference between the lower temperature and the higher temperature may be at least 20°C and may be up to 60°C.

[0108] In some examples, the lower temperature may be about 200°C and the higher temperature may be about 290°C.

[0109] In use, the user may initiate a usage session, or 'session' in which the apparatus 50 operates the heating system to cause aerosol generation. The first heating element 54a to be heated to different temperatures throughout a session. The first heating element 54a may be heated to a higher temperature, e.g. exceeding 300°C, for a first period of the session. The first period may also be referred to as a pre-heating period, and may last no longer 30 seconds. During a second period of the session, which is after the first period, the first heating element 54a may be heated to a lower temperature, for example of around 200°C.

[0110] Similar to the first heating element 54a, the second heating element 54b may be heated in the first period to a higher temperature, e.g. exceeding 300°C, and to a lower temperature in the second period of the session. In the second period of the session, the second heating element 54b may be heated to a temperature which is 20-60°C higher than the temperature of the first heating element 54a in the second period of the session.

[0111] Figure 6 shows an aerosol generating apparatus 50' that is a variation of the apparatus 50 of Figure 5. Many of the features of the aerosol generating apparatus 50' remain the same, and therefore the same reference numerals have been used. In the present apparatus 50' the only change is that the first heating element 54a is a rod heater rather than a tube heater. Thus, the heating element 54a is configured to penetrate the tobacco substrate 105 and heat the tobacco substrate 105 internally.

Claims

1. An aerosol generating system comprising:

a consumable comprising first and second sections formed of different materials, the first section comprising a smokeable substrate, optionally tobacco, and the second section comprising a carrier formed of propylene glycol and/or glycerine;

a heating system arranged to heat the first and second sections of the consumable, the heating system being configured to heat the second section of the consumable, in use, to a higher temperature than the first section of the consumable.

2. An aerosol generating system according to claim 1 wherein the carrier is a liquid; wherein the carrier is held within a shell, the carrier and shell defining a capsule; and wherein the shell comprises a biopolymer.

3. An aerosol generating system according to any one of the preceding claims wherein the second section comprises a porous carrier element for supporting the carrier.

4. An aerosol generating system according to any one of the preceding claims wherein the first section comprises a tobacco substrate.

5. An aerosol generating system according to any one of the preceding claims wherein the first and second sections of the consumable are arranged along an axis extending between upstream and downstream ends of the consumable; wherein the second section is downstream of the first section; wherein the second section is directly downstream of the first section.

6. An aerosol generating system according to any one of the preceding claims, wherein the first heater is configured, in use, to heat the first section to a first temperature and the second heater is configured to, in use, to heat the second section to a second temperature, wherein a temperature difference between the first temperature and the second temperature is in a range of 20 to 60°C.

7. An aerosol generating system according to any one of the preceding claims wherein the heating system comprises a first heater arranged to heat the first section of the consumable and a second heater arranged to heat the second section of the consumable.

8. An aerosol generating system according to claim 7 wherein the second heater is arranged downstream, in use, of the first heater.

9. An aerosol generating system according to claim 7 or 8 wherein the first and/or second heater is arranged

to at least partly surround the consumable.

10. An aerosol generating system according to any one of claims 7 to 9 wherein the first heater is configured, in use, to heat the first section to a temperature that is less than 280°C.

11. An aerosol generating system according to any one of claims 7 to 10 wherein the second heater is configured, in use, to heat the second section to a temperature that is greater than 200°C, optionally greater than 280°C.

12. An aerosol generating system according to any one of the preceding claims wherein the heating system forms part of an aerosol generating apparatus, the aerosol generating apparatus comprising a consumable-receiving cavity for receipt of the consumable, and wherein the heating system is disposed in and/or partly surrounds the consumable-receiving cavity; wherein the consumable-receiving cavity comprises a distal end arranged to be proximate the upstream end of the consumable when received in the cavity.

13. An aerosol generating apparatus comprising:

a consumable-receiving cavity for receipt of a consumable, the cavity having a downstream end and an upstream end, whereby, in use, air flows through a consumable received in the cavity in a direction from the downstream end to the upstream end;
a heating system arranged to heat a first zone of the cavity and a second zone of the cavity that is downstream of the first zone, the heating system being configured to heat the second zone to a higher temperature than the first zone in use.

14. An aerosol generating apparatus according to claim 13 wherein the heating system comprises a first heater arranged to heat the first zone and a second heater to heat the second zone and wherein the second heater is configured to heat to a higher temperature than the first heater in use; wherein the first and/or second heater at least partly surrounds the cavity.

15. A method of generating aerosol, the method comprising heating a consumable comprising first and second sections formed of different materials, the first section comprising tobacco and the second section comprising a carrier formed of propylene glycol and/or glycerine, wherein the second section is heated to a higher temperature than the first section.

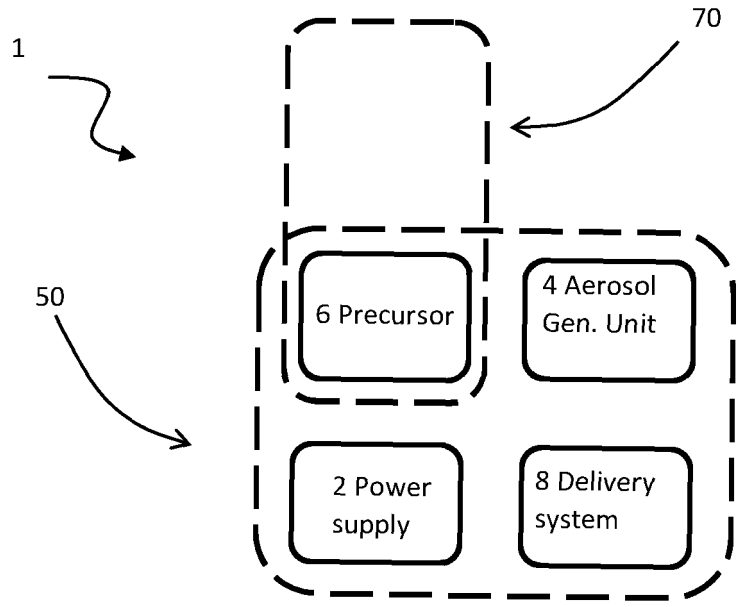

1
70
50
6 Precursor
4 Aerosol Gen. Unit
2 Power supply
8 Delivery system

Fig. 1

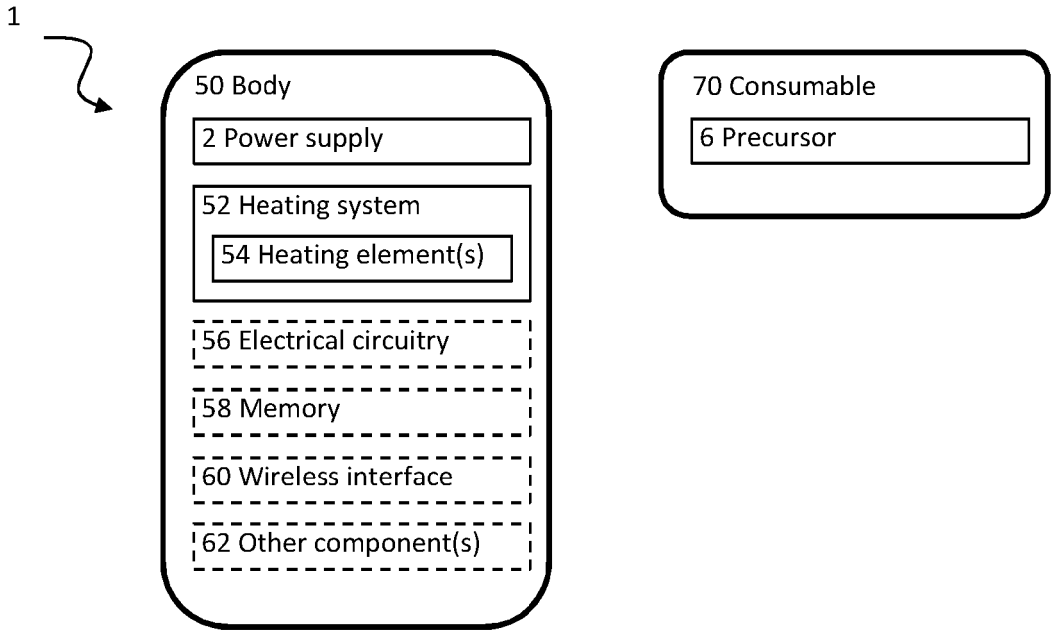

1
50 Body
2 Power supply
52 Heating system
54 Heating element(s)
56 Electrical circuitry
58 Memory
60 Wireless interface
62 Other component(s)
70 Consumable
6 Precursor

Fig. 2

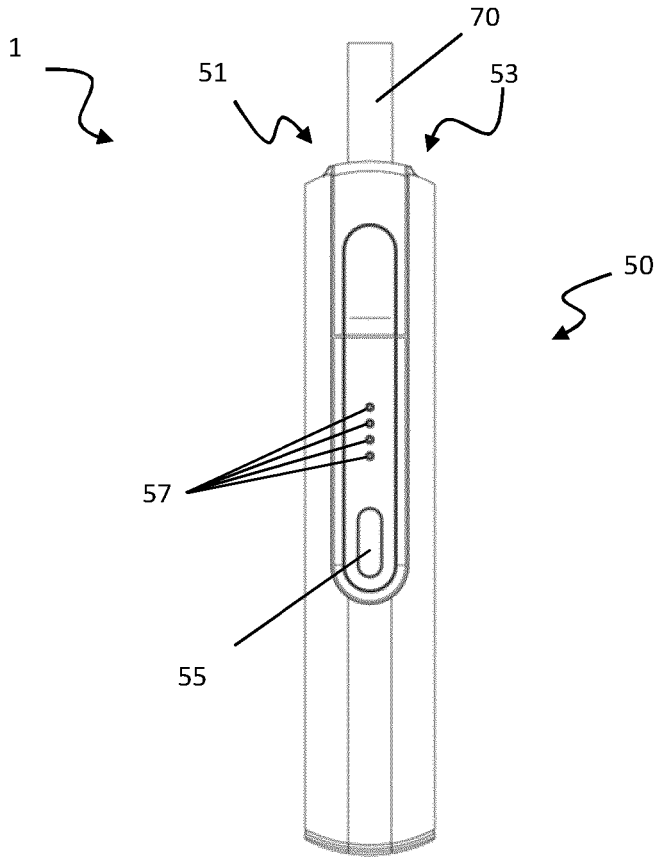
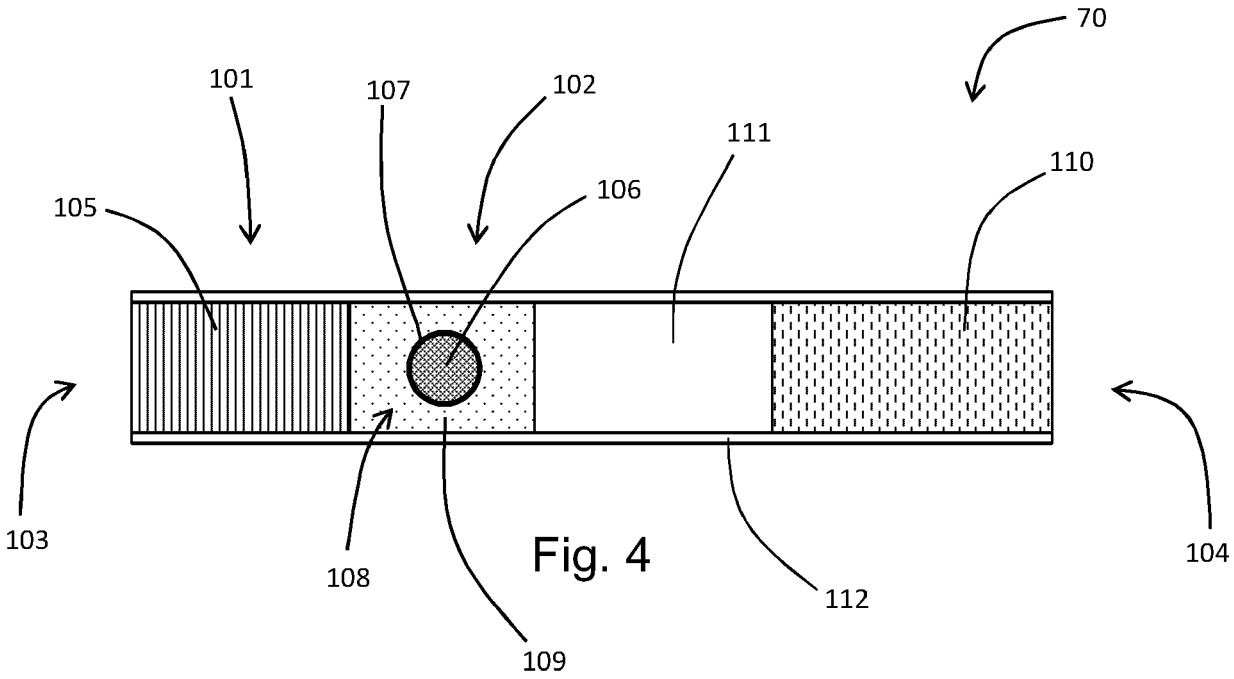

1
70
51
53
50
57
55

Fig. 3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101
107
102
111
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105
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112
104

Fig. 4

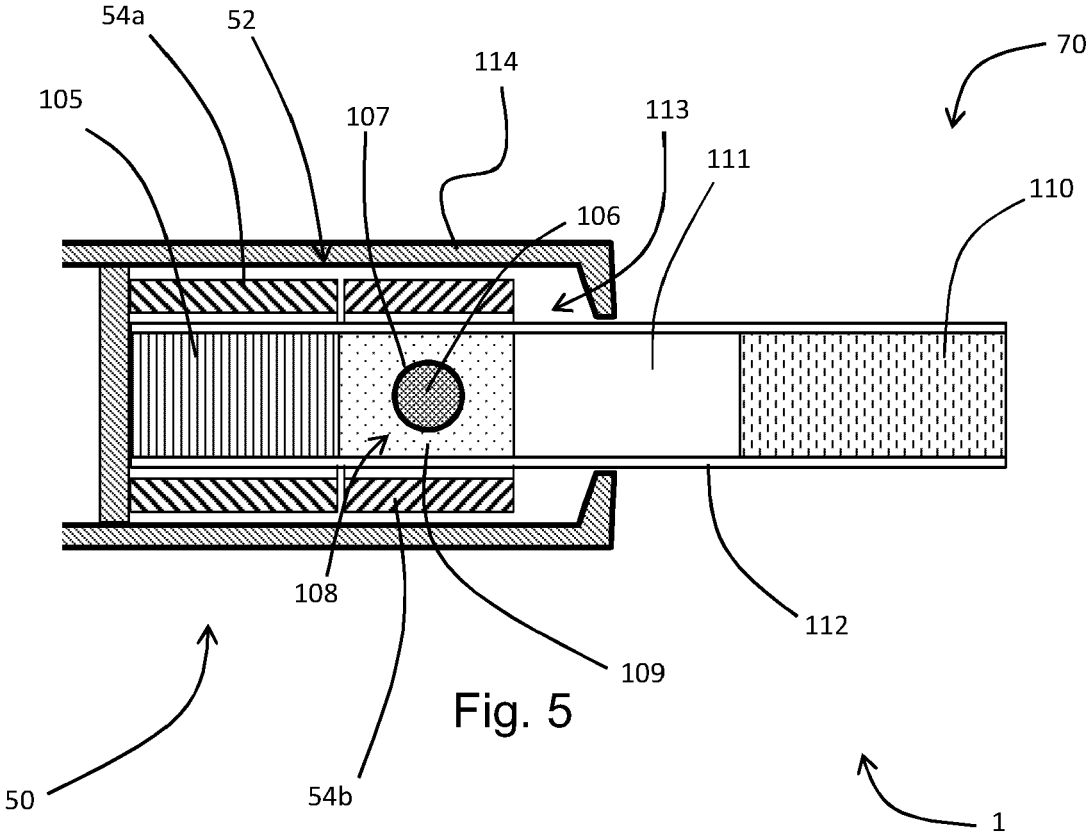
54a
52
114
70
105
107
113
111
110
106
108
112
109
50
54b
1

Fig. 5

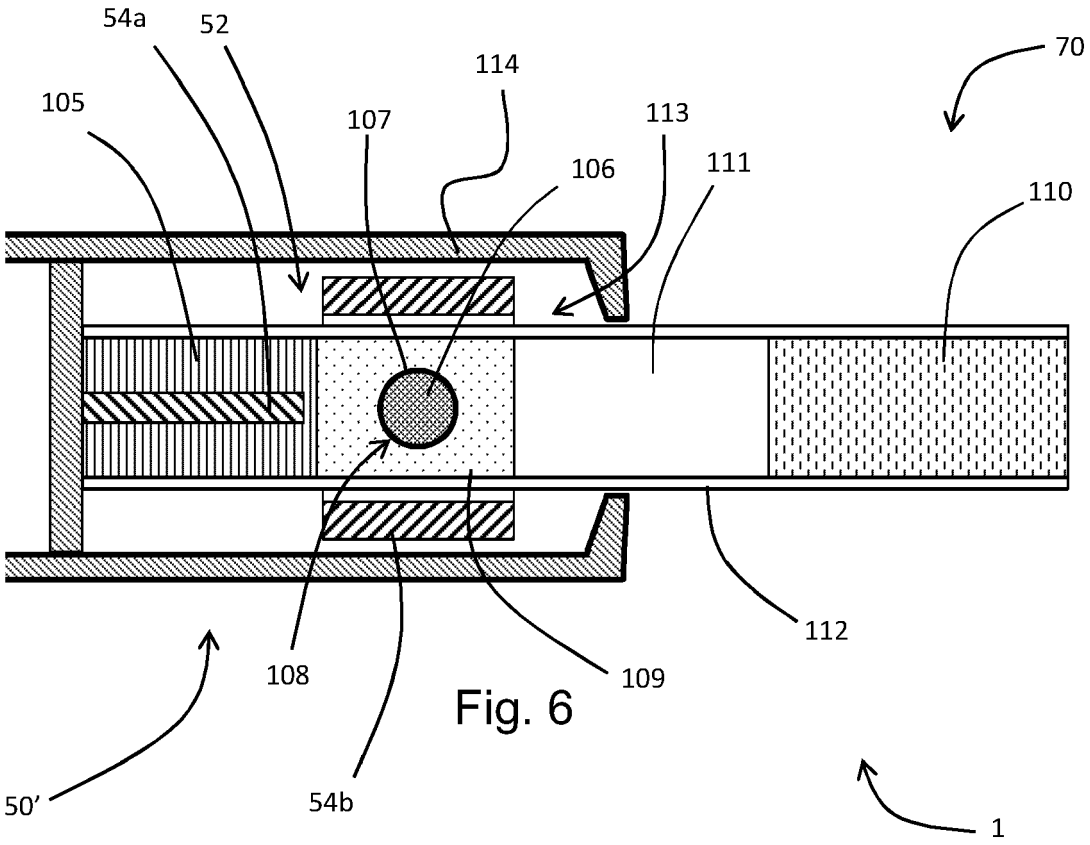

Fig. 6

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EUROPEAN SEARCH REPORT

Application Number
EP 23 18 6462

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 2020/359688 A1 (JANG YONG JOON [KR] ET AL) 19 November 2020 (2020-11-19) * figures 1B, 2, 3, 5A * * paragraph [0015] - paragraph [0016] * * paragraph [0019] - paragraph [0020] * * paragraph [0032] - paragraph [0033] * * paragraph [0037] * * paragraph [0043] * * paragraph [0045] - paragraph [0052] * * paragraph [0054] - paragraph [0057] * * paragraph [0067] * * paragraph [0084] * * paragraph [0087] - paragraph [0089] * * paragraph [0092] *	1-15	INV. A24D1/20 A24F40/46 ADD. A24F40/20 A24F40/57
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A24D
A24F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	11 January 2024	Kirchmayr, Katrin

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11-01-2024

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