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(54) **HEAT-NOT-BURN CONSUMABLE AND APPARATUS**

(57) A heat-not-burn consumable for use with a heat-not-burn unit has two storage portions arranged so that the first storage portion will be located in use between the second storage portion and a heating element of the heat-not-burn unit. Each storage portion has a substrate for generating an aerosol. The substrate of the first storage portion is formed of a different material composition from the substrate of the second storage portion. For example, the first storage portion may have a non-tobacco substrate imbued with a liquid/gel precursor, and the

second storage portion may have a tobacco substrate. In use, due to its closer proximity to the heater, the first storage portion will be heated to greater temperatures than the second storage portion and can therefore help prevent the substrate in the second storage portion from overheating and burning. Also provided is a heat-not-burn apparatus having the heat-not-burn consumable and the heat-not-burn unit having the heating element for heating the consumable.

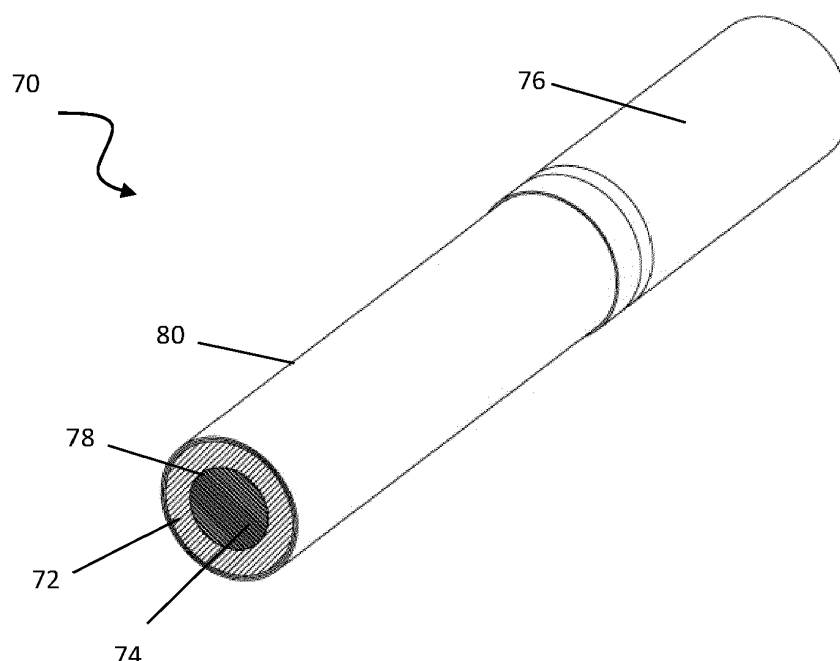


Fig. 4

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Description

Field of the Invention

[0001] The present disclosure relates to a consumable of aerosol-forming precursor that is to be used with a heat-not-burn apparatus to form an aerosol to be inhaled by a user.

Background

[0002] An aerosol generating apparatus typically comprises an aerosol generating unit operable to generate a vapour which condenses to form an aerosol to be inhaled by a user. For example, the aerosol generating unit typically comprises a heating element that is configured to generate a vapour directly from a precursor by heating the precursor to a target temperature. The precursor is usually housed within a so-called "consumable" (i.e. a unit that includes or consists of the precursor, and which may also be referred to as an "aerosol-generating article" for use with a cooperating aerosol generating unit). In use, the heating element is placed in operative proximity to the precursor in use.

[0003] A known form of aerosol generating apparatus is a so-called "heat-not-burn" apparatus, wherein the precursor is in the form of a solid, e.g. tobacco, formulation. For such apparatuses, it is known for the consumable to have a structure that is akin to a conventional cigarette which is to be removably coupled to the aerosol generating unit, in use. In particular, the consumable typically comprises a tobacco-based formulation that is wrapped in a housing (for example comprising conventional cigarette paper) that defines the outer profile of the consumable.

[0004] A drawback with known aerosol generating apparatuses is that, at the temperatures required to deliver desired volumes of aerosol to a user, the precursor can become too hot and burn over the course of a smoking session. This directly impacts user experience since this burning causes a poor taste in the user's mouth.

[0005] In spite of the effort already invested in the development of aerosol generating apparatuses/systems, further improvements are desirable.

Summary of the Invention

[0006] In general terms, the present disclosure provides a consumable for use with an aerosol generating unit to generate aerosol for inhalation by a user. In a first aspect, the consumable comprises a first storage portion comprising a first (aerosol-generating) substrate for generating a first aerosol, and a second storage portion comprising a second (aerosol-generating) substrate for generating a second aerosol. The first storage portion is positioned relative to the second storage portion to be located in use between the second storage portion and a heating element of the aerosol generating unit. The con-

sumable may be a heat-not-burn consumable, and the aerosol generating unit may be a heat-not-burn unit. The first substrate may be formed of a different material composition (e.g. different composition of solid material) to that of the second substrate.

[0007] Since the first storage portion is locatable between the second storage portion and heating element in use, the first storage portion may effectively act as a barrier to insulate (at least to a degree) the second storage portion from the high temperatures of the heating element. The first storage portion may therefore help to reduce the likelihood of the second storage portion being burned during use, thereby allowing the second aerosol to be generated without an associated burning taste.

[0008] The arrangement proposed herein differs from a conventional consumable comprising a plurality of different aerosol-forming compounds (e.g. tobacco, nicotine, flavouring, etc) within a singular substrate.

[0009] In use, the heating element provides a temperature gradient that decreases in temperature through the consumable, as the distance from the heating element increases. Conventional consumables therefore require high heater temperatures in order to aerosolise the precursor compounds throughout the consumable. However, these higher temperatures increase the risk of burning. By separating different substrate material compositions into independent storage portions at different proximities from the heating element, the arrangement of the present disclosure enables a more customisable user experience, e.g. with improved aerosol generation and/or reduced risk of burning.

[0010] The term "in use" as used herein may include that the heat-not-burn consumable is positioned close to or in contact with the heating element so that the heating element is able to heat the consumable for aerosolizing the precursor compounds in the first substrate and/or second substrate. This may include inserting the consumable into a cavity of an aerosol generating apparatus. The heating element may be located in or around the cavity for heating the consumable. Further, the term "in use" may alternatively or additionally include activation of the heating element.

[0011] The first substrate may be formed from entirely different material to that from which the second substrate is formed, e.g. with the material of the first substrate being absent from the second substrate, and vice versa. Alternatively, the first and second substrates may comprise one or more of the same materials in different proportions.

[0012] The substrate materials and/or aerosol forming compounds (precursors) of the first and second storage portions may be selected in various manners to provide further advantages. Different substrate materials and/or aerosol precursors may be arranged at different positions along a temperature gradient from the heater, based on their different temperature-dependent properties, as discussed below.

[0013] In some examples, the first substrate has a

higher combustion temperature than the second substrate. As used herein, the term "combustion temperature" refers to a temperature at which a given substance (e.g. solid material of the substrate) begins to burn. This arrangement helps to further prevent a burning taste, by ensuring that the substrate which is closest to the heating element can withstand higher temperatures.

[0014] In variant examples, the first substrate may not have a higher combustion temperature than the second substrate. For example, in some examples, the first substrate may have a combustion temperature that is equal to or less than that of the second substrate, as long as the combustion temperatures of both materials are greater than the operational temperature of the heating element, e.g. greater than 300°C or greater than 350°C.

[0015] In some examples, the first aerosol may be different from the second aerosol. In other words, the first substrate may have a different precursor to that of the second substrate. The first precursor may have a different combination of active component, carrier and flavouring to that of the second precursor. The first precursor may have a different mixing ratio of active component, carrier and flavouring to that of the second precursor. The first precursor may have a different active component to that of the second precursor. The active component of the first precursor may have a different format to that of the active component of the second precursor. Any or each of these may be selected in dependence on the temperature properties, e.g. so that the precursor benefitting from higher temperatures is located within the first storage portion (closer to the heating element in use).

[0016] In some examples, the first aerosol has a higher activation temperature than that of the second aerosol. As used herein, the term "activation temperature" refers to a temperature at which an aerosol is released (aerosolised) from the substrate for inhalation by the user. Different aerosol generating compounds require different activation temperatures. By configuring the storage portions in relation to the heating element based on activation temperatures of their different aerosols, the present examples provide more efficient aerosol generation, delivering the highest temperatures to the aerosol-forming precursor(s) that require it most (within the first portion). This provides a further advantage that the heating element may be operated at lower temperatures than with a conventional consumable (that has all aerosol precursors within a singular substrate). As well as improving efficiency, the ability to operate at lower temperatures in turn further reduces the risk of burning the consumable.

[0017] In some examples, the first substrate comprises a non-tobacco material. The non-tobacco material may comprise a solid or loose leaf precursor material (e.g. a botanical material such as tea), which may generate the first aerosol in use. By providing the first storage portion (closest to the heater) with a non-tobacco material, the consumable can reduce the risk of burning, noting that tobacco can burn and/or aerosolise at relatively lower temperatures compared to other substrate/precursor

materials.

[0018] In some examples, the material composition of the first substrate consists entirely of non-tobacco material. Alternatively, in some examples, the first substrate also includes tobacco material (in addition to the non-tobacco material). For example, the first substrate may include tobacco material in a lower proportion than the non-tobacco material, and/or in a lower proportion than a tobacco material that is present in the second substrate.

[0019] In some examples, the first substrate (e.g. non-tobacco material) may be imbued with a first precursor (e.g. liquid or gel precursor) for generating the first aerosol. The first precursor may comprise at least one of: an active component, a carrier, and a flavouring (as discussed further herein). By imbuing the first substrate with a precursor (e.g. liquid or gel precursor), this arrangement takes advantage of the first substrate's close proximity to the heater, in order to generate a large amount of visible aerosol to the user.

[0020] In some examples, the first substrate may comprise a non-tobacco material (e.g. absorbent or fibrous material such as cotton or hemp) that carries the precursor. In some examples, the first substrate may comprise tobacco material imbued with the first precursor.

[0021] In some examples, the first precursor comprises any one, any two or all three of: propylene glycol, glycerin, and nicotine. Each of these precursor formulations have relatively high activation temperatures (e.g. compared to tobacco) and may therefore be particularly advantageous closer to the heating element. For example, vegetable glycerin (VG) may aerosolise at approximately 290°C. Nicotine may aerosolise at approximately 247°C. Tobacco flavours are generated at lower temperatures.

[0022] Since the first substrate is closer to the heating element in use, it may be used to deliver most of the aerosol to the user (e.g. the amount of aerosol generated by the first substrate is larger than the amount of aerosol generated by the second substrate). Therefore it may be desirable for the first substrate to have e.g. flavourings, to improve user experience.

[0023] In some examples, the second substrate comprises tobacco. The tobacco may be in solid form, e.g. loose leaf tobacco, reconstituted tobacco, or cut-rag tobacco (any of which may also be referred to herein as "tobacco material"). The second storage portion, furthest from the heater in use and therefore subject to a lower temperature, may therefore deliver tobacco flavouring and nicotine to a user. This enables a user to inhale aerosol whilst reducing the effects of burning at high temperatures close to the heating element.

[0024] In some examples, the second substrate may be imbued with a (second) precursor. The second substrate / second precursor may have any of the features discussed above in relation to the first substrate / first precursor. For example, the second substrate may comprise a non-tobacco material. The non-tobacco material may have any of the features discussed above in relation

to the first substrate.

[0025] In some examples, the second substrate comprises a higher proportion of tobacco than the first substrate. For example, the proportion of tobacco in the second substrate may be up to 100%, e.g. up to 90%, up to 80%, up to 70%, up to 60%, up to 50%, up to 40%, up to 30%, up to 20%, or up to 10% of the second substrate's solid material. The proportion of tobacco in the first substrate may be up to 90%, e.g. up to 80%, up to 70%, up to 60%, up to 50%, up to 40%, up to 30%, up to 20%, or to 10%, e.g. 5% or 0%. In some examples, the second substrate may have at least 10 wt% more tobacco than the first substrate, optionally at least 20 wt%, optionally at least 30 wt%, optionally at least 40 wt%, optionally at least 50 wt%.

[0026] As noted above, the first storage portion is positioned relative to the second storage portion to be located in use between the second storage portion and a heating element of the aerosol generating unit. Accordingly, the first storage portion may provide closer thermal contact with the heating element, and may transfer heat from the heating element through to the second storage portion. The first storage portion (e.g. the first substrate) may be considered to have an "activation surface" for thermal contact with the heater. The activation surface may form part of a flow path across the consumable in use.

[0027] The storage portions may be arranged in various manners to provide desired properties (e.g. a desired thermal distribution) in use.

[0028] In some examples, the second storage portion is formed around the first substrate. Optionally, the first storage portion is concentric with the second substrate. For example, the second storage portion may be formed concentrically around the first substrate. The first storage portion (e.g. first substrate) may be penetrable by a heating element (e.g. a rod-shaped heating element) of the aerosol-generating unit (e.g. heat-not-burn unit). Alternatively, the first storage portion (e.g. first substrate) may comprise a space (e.g. a pre-formed space or bore) for receiving the heating element. The provision of a pre-formed space allows for reduced cleaning compared to a penetrable heating element, thereby reducing the chance of solid substrate material and/or precursor formulation sticking to the heating element in use.

[0029] In other examples, the first storage portion may be formed concentrically around the second storage portion. This arrangement allows the consumable to be heated from the "outside-in", by inserting the consumable into a receiving space defined by the heating element (e.g. tubular heating element). This allows for a larger area of thermal contact between the first storage portion and the heating element in use, in turn allowing a larger amount of aerosol to be generated, especially from the first storage portion. This arrangement also has the further advantage of supporting reduced cleaning, since the heating element can heat the consumable without physically penetrating it.

[0030] In variant examples, the first storage portion and second storage portion may be non-concentric. For example, the first storage portion and the second storage portion may be stacked longitudinally within the consumable. In such an arrangement, the first substrate may be upstream (i.e. along a flow path through the consumable) of the second substrate. This arrangement may be particularly useful in combination with a planar heating element, to provide thermal interaction with an end surface (e.g. planar end surface) of the first storage portion. A planar heating element may provide similar cleaning advantages to those discussed above, as well as a larger contact area e.g. compared to a penetrable heater. The planar heating element can be is parallel or perpendicular to the airflow path.

[0031] In some examples, the consumable further comprises a third storage portion between the first storage portion and the second storage portion, the third storage portion having a third (aerosol-generating) substrate for generating a third aerosol. In some examples, the third substrate is formed of a different material composition to that of the first and/or second substrates. In some examples, the third aerosol is different from the first and/or second aerosols.

[0032] The third storage portion may comprise any of the features discussed above in relation to the first and second storage portions. For example, the third substrate and/or third aerosol may be selected to provide any of the advantages associated with the different combustion and/or activation temperatures discussed above. The third storage portion may comprise a tobacco material and/or a non-tobacco material.

[0033] The third storage portion may alternatively be referred to as an "intermediary" storage portion separating the first and second storage portions. This can further improve upon the advantages discussed above with respect to the first and second storage portions, by further separating out the different substrate materials and/or aerosol forming precursors at different positions from the heating element. For example, the combustion temperature of the storage portions may decrease with increasing distance from the heating element. Alternatively, or additionally, the activation temperature of the aerosols may decrease with increasing distance from the heating element.

[0034] Accordingly, in some examples, the third substrate may have a (third) combustion temperature which is between a (first) combustion temperature of the first substrate and a (second) combustion temperature of the second substrate. In some examples, the third aerosol may have a (third) activation temperature which is between a (first) activation temperature of the first substrate and a (second) activation temperature of the second substrate. In some examples, the third combustion temperature may be equal to the first or second combustion temperature. In some examples, third activation temperature may be equal to the first or second activation temperature.

[0035] In some examples, the consumable may comprise more than three storage portions. However, as the number of storage portions increases, the manufacture of the consumable may become more complex. Therefore, two or three storage portions may provide a good balance of improved user experience whilst minimising the complexity of operation and/or production. Accordingly, in some examples, the total number of storage portions is two. Alternatively, in some examples, the total number of storage portions is three.

[0036] Each storage portion may be independent, in that the substances of each storage portion are discrete and not combinable or mixed together within the consumable. In some examples, at least one (e.g. each) of the storage portions may comprise a compartment formed by a thermally conductive material which at least partly (e.g. entirely) encloses the substrate having the precursor formulation of the at least one storage portion. The thermally conductive material may also be referred to as a "barrier layer". The (or each) barrier layer may physically separate the substrate from that of an adjacent storage portion. The (or each) barrier layer may comprise a hydrophobic and/or non-porous material. The (or each) barrier layer may be non-combustible at typical operating temperatures of the heating element, e.g. up to 350°C for typical heat-not-burn devices.

[0037] As used herein, the phrase "thermally conductive material" refers to a material that enables heat transfer throughout it (in contrast to thermally insulating materials). This term is intended to encompass materials across a range of (low, medium, or high) thermal conductivities. Suitable materials include paper, metal (e.g. foil), fabric, silicone rubber, or ceramic.

[0038] Advantageously, such a compartment can help to prevent precursor formulation from reaching the heater, whilst enabling thermally interaction between the heater and the precursor formulation. This can therefore help to improve ease of cleaning of the heater, by preventing precursor material from adhering to the heater. The thermally conductive material may also be referred to herein as a "barrier" or "barrier layer".

[0039] In some examples, instead of (or in addition to) providing a barrier layer that physically separates the substrates into discrete storage portions, at least one (e.g. each) of the substrates themselves can be implemented as solid blocks of material that retain their shape and therefore can be separated into discrete portions within the consumable. A solid block of material can retain its shape across all heating temperatures (e.g. up to 350°C) without a barrier to physically separate the formulations in one storage portion from another storage portion.

[0040] According to another aspect, there is provided an aerosol generating apparatus comprising: a consumable as described according to any statement herein. The apparatus may further comprise an aerosol generating unit comprising the heating element for heating the consumable. The aerosol generating apparatus may be a

heat-not-burn apparatus, and the aerosol generating unit may be a heat-not-burn unit.

[0041] The heating element may be configured to be removably positioned within, around, or against the consumable in operative proximity to the first storage portion. The first storage portion may transfer heat in use from the heating element to the second storage portion (and third storage portion, if present).

[0042] The heating element may include a resistive heating element, an IR (infra-red) heating element, and/or an induction heating element (e.g. a coil for heating a susceptor which may be arranged in or close to the consumable).

[0043] In a second aspect, the present disclosure may also provide a heat-not-burn consumable for use with a heat-not-burn unit to generate aerosol for inhalation by a user. The consumable comprises a first storage portion having a first precursor for generating a first aerosol and a second storage portion having a second precursor for generating a second aerosol. Optionally, the first aerosol has a higher activation temperature than the higher activation temperature of the second aerosol. Further optionally, the first storage portion is positioned relative to the second storage portion to be located in use between the second storage portion and a heating element of the heat-not-burn unit. In some examples, the first storage portion is formed around the second storage portion.

[0044] The optional features, characteristics, and/or embodiments described in connection with the first aspect may equally apply for the second aspect if not stated otherwise. For example, with the second aspect, the substrate for the first storage portion may be the same substrate as for the second storage portion. The first storage portion and the second storage portion may differ in the number and/or type of precursors with which the substrate is imbued. For example, the first storage portion includes a substrate imbued (only) with the first precursor and the second storage portion includes the same substrate imbued (only) with the second precursor. Alternatively, the first storage portion includes a substrate imbued with the first precursor and the second precursor; and the second storage portion includes the same substrate imbued with the second precursor (but not with the first precursor and optionally with a third precursor). In general, the first storage portion and the second storage portion differ in at least one precursor.

[0045] The substrate for the first storage portion and the second storage portion may be tobacco which can be imbued or otherwise treated with different precursors.

[0046] The activation temperature of the first aerosol generated by the first precursor can be higher compared to the activation temperature of the second aerosol generated by the second precursor. This allows to position the first precursor closer to the heating element compared to the second precursor.

[0047] The present disclosure may provide a method of generating an aerosol, which may implement any one or more features disclosed herein. Thus, according to

another aspect, there is provided a method of generating an aerosol for inhalation by a user, comprising: providing an aerosol generating apparatus substantially as described above according to any preceding statement; and using the aerosol generating unit to heat the consumable (to heat the second storage portion through the first storage portion).

[0048] 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.

Summary of the Figures

[0049] 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 precursor in a solid substrate.

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

Fig. 4 is a schematic diagram showing an example implementation of a consumable for use in the apparatus of Fig. 2 or 3, wherein the consumable has two storage portions configured for outside-in heating by a tubular heating element.

Fig. 5 is a schematic diagram showing an example implementation of an alternative consumable, configured for inside-out heating.

Fig. 6 is a schematic diagram showing an example implementation of a consumable similar to that of Fig. 4, further modified to include a third storage portion.

Fig. 7 is a schematic diagram showing an example implementation of an alternative consumable, having three storage portions configured for end-on heating from an upstream end to a downstream

end of the consumable.

Detailed Description of the Invention

[0050] 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.

[0051] 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.

[0052] Any patents, published patent applications, and non-patent publications mentioned in the specification are hereby incorporated by reference in their entirety.

[0053] 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.

[0054] 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.

[0055] 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).

[0056] 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.

[0057] 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.

[0058] 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:

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 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.

[0059] 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).

[0060] 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.

[0061] 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.

[0062] As used herein, a **"precursor"** (or "aerosol-generating precursor") may include one or more of a: liquid; solid; gel; loose leaf material; other substance. The precursor may be processed by an aerosol generating unit of an aerosol generating apparatus to generate an aerosol. The precursor may include one or more of: an active component; a carrier; a flavouring. The active component may include 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 active component may be carried by the carrier, which may be a liquid, including propylene glycol and/or glycerine. The term "flavouring" may refer to 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. The precursor may be provided in a substrate, e.g. reconstituted tobacco to carry one or more of the active component; a carrier; a flavouring.

[0063] As used herein, a **"substrate"** may refer to a solid precursor (e.g. loose leaf precursor material or a "stick" of precursor material such as tobacco), or an absorbent material (e.g. fibrous non-precursor material, such as cotton or hemp) that is imbued with a precursor (e.g. liquid or gel precursor). A substrate may also be referred to as an "aerosol-generating substrate".

[0064] As used herein, a **"storage portion"** may be a portion of the apparatus adapted to store a precursor. It may be implemented as a carrier for a substrate.

[0065] As used herein, a **"material composition"** may refer to a particular composition of solid material in the substrate. A material composition may comprise a combination of different solid materials (e.g. solid precursor and absorbent material) in particular proportions, or may comprise a single solid material (e.g. solid precursor or absorbent material). As noted above, the first substrate (in the first storage portion) may be formed of a different material composition to that of the second substrate (in the second storage portion). For example, the first and second substrates may comprise one or more of the

same substrate materials (solid materials) in different proportions. Alternatively, the first and second substrates may comprise entirely different substrate materials. Similarly, the third substrate (if present) may be formed of a different material composition to that of the first and/or second substrates. Further, a single substrate (e.g. tobacco) is provided which is imbued with different precursors.

[0066] As used herein, a **"flow path"** may refer to a path or enclosed passageway through an aerosol generating apparatus, 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.

[0067] 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.

[0068] 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.

[0069] 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.

[0070] As used herein, an **"aerosol generating unit"** (or **"heat not burn 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.

[0071] 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 there-through. 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.

[0072] As used herein, a **"consumable"** may refer to a unit that includes at least one precursor. The consumable may include an aerosol generating unit, e.g. it may be arranged as a cartomizer. The consumable may include a mouthpiece. The consumable may include an information carrying medium. With solid material implementations of the substrate (e.g. a substrate consisting of a

solid precursor such as tobacco or reconstituted tobacco formulation; or a substrate comprising a solid non-precursor material carrying a liquid or gel precursor), 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 and the consumable may be arranged to carry the precursor. The consumable may be implemented as a dosage or pre-portioned amount of material, including a loose-leaf product. A consumable may also be referred to as an **"aerosol-generating article"**.

[0073] As used herein, an **"information carrying medium"** may include one or more arrangements for storage of information on any suitable medium. Examples include: a computer readable medium; a Radio Frequency Identification (RFID) transponder; codes encoding information, such as optical (e.g. a bar code or QR code) or mechanically read codes (e.g. a configuration of the absence or presents of cut-outs to encode a bit, through which pins or a reader may be inserted).

[0074] As used herein **"heat-not-burn"** (or **"HNB"** or **"heated precursor"**) may refer to the heating of a precursor, e.g. 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).

[0075] Referring to Fig. 1, an example aerosol generating apparatus 1 includes a power supply 2, for supply of electrical energy. The apparatus 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 apparatus 1 includes a precursor 6, which in use is aerosolised by the aerosol generating unit 4 to generate an aerosol. The apparatus 2 includes a delivery system 8 for delivery of the aerosol to a user.

[0076] Electrical circuitry (not shown in figure 1) may be implemented to control the interoperability of the power supply 2 and aerosol generating unit 4.

[0077] In variant examples, which are not illustrated, the power supply 2 may be omitted since, e.g. an aerosol generating unit implemented as an atomiser with flow expansion may not require a power supply.

[0078] Fig. 2 shows an implementation of the apparatus 1 of Fig. 1, where the aerosol generating apparatus 1 is configured to generate aerosol by a heat not-burn process.

[0079] In this example, the apparatus 1 includes a device body 50 and a consumable 70.

[0080] In this example, the body 50 includes the power supply 2 and a heating system 52. The heating system 52 includes at least one heating element 54. The body may additionally include any one or more of electrical circuitry 56, a memory 58, a wireless interface 60, one or more other components 62.

[0081] The electrical circuitry 56 may include a processing resource for controlling one or more operations of

the body 50, e.g. based on instructions stored in the memory 58.

[0082] The wireless interface 60 may be configured to communicate wirelessly with an external (e.g. mobile) device, e.g. via Bluetooth.

[0083] 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. 3).

[0084] The body 50 is configured to engage with the consumable 70 such that the at least one heating element 54 of the heating system 52 is in thermal contact with the solid precursor 6 of the consumable, e.g. by penetrating the solid precursor 6 or by receiving the solid precursor 6 into a tubular cavity defined by the heating element.

[0085] In use, a user may activate the aerosol generating apparatus 1 to cause the heating system 52 of the body 50 to cause the at least one heating element 54 to heat the solid precursor 6 of the consumable (without combusting it) by conductive heat transfer, to generate an aerosol which is inhaled by the user.

[0086] Fig. 3 shows an example implementation of the aerosol generating device 1 of Fig. 2.

[0087] As depicted in Fig. 3, the consumable 70 is implemented as a stick, which is engaged with the body 50 by inserting the stick into an aperture at a top end 53 of the body 50, to enable thermal interaction between the solid precursor 6 and the at least one heating element 54 of the heating system 52.

[0088] The consumable 70 includes the solid precursor 6 proximal to the body 50, and a filter distal to the body 50. The filter serves as the mouthpiece of the consumable 70 and thus the apparatus 1 as a whole. The solid precursor 6 may comprise a reconstituted tobacco formulation.

[0089] In this example, the at least one heating element 54 is a rod-shaped element with a circular transverse profile. Other heating element shapes are possible, e.g. the at least one heating element may be blade-shaped (with a rectangular transverse profile), tube-shaped (e.g. with a hollow transverse profile), or substantially planar (for thermal contact with a substantially planar end surface of the consumable).

[0090] In this example, the body 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 body 50. In particular, the cap 51 is slidable and can slide along a longitudinal axis of the body 50.

[0091] The body 50 also includes an actuator 55 on an outer surface of the body 50. In this example, the actuator 55 has the form of a button.

[0092] The body 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 1 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.

[0093] The body may also include an airflow sensor which detects airflow in the aerosol generating apparatus 1 (e.g. caused by a user inhaling through the consumable 70). This may be used to count puffs, for example.

[0094] In this example, the consumable 70 includes a flow path along which aerosol generated by the at least one heating element 54 is conveyed to the mouthpiece of the consumable.

[0095] 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.

[0096] Referring to Fig. 4, a consumable 70, which may be implemented in any of the preceding examples, comprises a first storage portion 72 and a second storage portion 74. The first storage portion 72 has a first substrate for generating a first aerosol, and the second storage portion 74 has a second substrate for generating a second aerosol. The first substrate is formed of a different material composition from the second substrate.

[0097] The first storage portion 72 is positioned relative to the second storage portion 74 to be located in use between the second storage portion 74 and the heating element of a heat-not-burn unit. In this example, the consumable 70 is configured for use with a tubular heating element. Accordingly, the first storage portion 72 is formed concentrically around the second storage portion 74. The first and second storage portions 72, 74 are exposed at an end face thereof. The heating element may have a closed end (for directly heating the end face), or may have an open end (so as not to directly heat the end face).

[0098] In this example, the precursor in the first storage portion 72 is different from the precursor in the second storage portion 74. For example, the first storage portion 72 may comprise a carrier substrate imbued with a liquid or gel precursor, and the second storage portion 74 may comprise a tobacco substrate. Accordingly, the first aerosol is different from the second aerosol.

[0099] In other examples, the first aerosol and second aerosol may be the same. For example, the storage portions 72, 74 may have the same liquid/gel precursor, carried by different non-precursor substrates (e.g. cotton in one storage portion and hemp in the other).

[0100] In the example illustrated in Fig. 4, the first and second storage portions 72, 74 are both located at an upstream end of the consumable which is near the heating element in use. A mouthpiece 76 having a filter element is provided at the opposite (downstream) end of the consumable.

[0101] The first and second storage portions 72, 74 are separated by a barrier layer 78 e.g. paper or foil. This prevents substrate and/or precursor in one storage portion from mixing with substrate and/or precursor in the other storage portion. A peripheral (e.g. outer) surface of the consumable 70 may also be defined by a barrier layer or housing 80. The housing 80 physically separates the

first substrate from the heating element in use, as well as providing a substantially liquid-impermeable membrane to allow a user to insert/remove the consumable from the aerosol generating unit without getting precursor material on their fingers.

[0102] In a variant of Fig. 4, the consumable 70, which may be implemented according to any of the preceding examples, comprises the first storage portion 72 and the second storage portion 74. However, the first storage portion 72 includes the first precursor for generating a first aerosol, and the second storage portion 74 has the second precursor for generating a second aerosol. The substrate for the first storage portion 72 and the second storage portion 74 is the same. All other features of the variant may be the same as described with the example of Fig. 4. Referring to Fig. 5, a consumable 70' is shown according to another example. The consumable 70' has similar features to those discussed above in relation to the consumable 70, but differs in the manner in which it is configured to engage a heater. Whereas the consumable 70 illustrated in Fig. 4 is configured for outside-in heating, with the first storage portion 72 being formed concentrically around the second storage portion 74, the consumable 70' illustrated in Fig. 5 is configured for inside-out heating, with the *second* storage portion 74' now being formed concentrically around the *first* storage portion 72'.

[0103] In this example, the first storage portion 72' has a preformed bore extending axially therethrough for receiving a rod-shaped heating element. The first storage portion 72' may have a barrier layer 78' along the preformed bore to prevent substrate/precursor material sticking to the heating element. In this example, there is no barrier layer between the two storage portions 72', 74'.

[0104] Referring to Fig. 6, a consumable 70" is shown according to another example. The consumable 70" is similar to the consumable 70 of Fig. 4, but differs in that the consumable 70" further includes a third storage portion 84 between the first storage portion 72 and the second storage portion 74. The third storage portion 84 has a third substrate for generating a third aerosol.

[0105] In this example, the third substrate is different from the first and second substrates, and the third aerosol (third precursor) is different from the first and second aerosols (precursors). In this example, the first storage portion 72 (closest to the heating element) comprises a non-tobacco substrate imbued with a first liquid/gel precursor. The second storage portion 74 (furthest from the heating element) comprises a tobacco substrate. The third (intermediate) storage portion 76 comprises a substrate (e.g. non-tobacco or tobacco substrate) imbued with a liquid/gel precursor. The liquid/gel precursor in the first storage portion 72 may have a higher activation temperature than the liquid/gel precursor in the third storage portion 84, with each of these having a higher activation temperature than the tobacco in the second storage portion 74. For example, the consumable may carry vegetable glycerin in the first storage portion 72,

tobacco in the second storage portion 74, and nicotine in the third (intermediate) storage portion 84.

[0106] One or more barrier layers 78' may be provided to physically separate the substances in adjacent storage portions.

[0107] Referring to Fig. 7, a consumable 70''' is shown according to a further example. The consumable 70''' of Fig. 7 differs from the consumables of Figs. 4 to 6 in that the storage portions of the consumable 70''' are longitudinally stacked along the consumable, rather than being arranged concentrically around a central axis of the consumable.

[0108] The consumable 70''' comprises a first (upstream) storage portion 86, second (downstream) storage portion 88, and third (intermediate) storage portion 90. The storage portions may have any of the substrates discussed above. Barrier layers 78" separate the substrates in adjacent storage portions from each other.

[0109] The first storage portion 86 has a substantially planar end face 92 configured for thermal contact with a substantially planar heating element of a heat not burn unit in use. The end face 92 may optionally be provided with a barrier layer to prevent substrate material contacting the heating element.

[0110] In use, the first (upstream) storage portion 86 will be heated to the highest temperature. Therefore the first (upstream) storage portion may be provided with a substrate that has the highest combustion temperature and/or a precursor that has the higher activation temperature. The first storage portion 86 will convey heat to the third (intermediate) storage portion 90 (if present), which may have a substrate having a lower combustion temperature and/or a precursor that has a lower activation temperature. The third (intermediate) storage portion 90 may further convey heat to the second (downstream) storage portion 88, which may have a substrate having the lowest combustion temperature and/or a precursor having the lowest activation temperature, as this storage portion will be at the lowest temperature in use due to its distance from the heating element.

[0111] Each of these examples may allow for improved aerosol generation and an improved user experience, by separating different substrates/precursors into different portions of the consumable, based on the temperature requirements of the different substrates/precursors.

[0112] The features disclosed in the foregoing description, or in the following claims, or in the accompanying drawings, expressed in their specific forms or in terms of a means for performing the disclosed function, or a method or process for obtaining the disclosed results, as appropriate, may, separately, or in any combination of such features, be utilised for realising the invention in diverse forms thereof.

[0113] While the invention has been described in conjunction with the exemplary embodiments described above, many equivalent modifications and variations will be apparent to those skilled in the art when given this disclosure. Accordingly, the exemplary embodiments of

the invention set forth above are considered to be illustrative and not limiting. Various changes to the described embodiments may be made without departing from the spirit and scope of the invention.

[0114] For the avoidance of any doubt, any theoretical explanations provided herein are provided for the purposes of improving the understanding of a reader. The inventors do not wish to be bound by any of these theoretical explanations.

[0115] Any section headings used herein are for organizational purposes only and are not to be construed as limiting the subject matter described.

[0116] Throughout this specification, including the claims which follow, unless the context requires otherwise, the word "comprise" and "include", and variations such as "comprises", "comprising", and "including" will be understood to imply the inclusion of a stated integer or step or group of integers or steps but not the exclusion of any other integer or step or group of integers or steps.

[0117] It must be noted that, as used in the specification and the appended claims, the singular forms "a," "an," and "the" include plural referents unless the context clearly dictates otherwise. Ranges may be expressed herein as from "about" one particular value, and/or to "about" another particular value. When such a range is expressed, another embodiment includes from the one particular value and/or to the other particular value. Similarly, when values are expressed as approximations, by the use of the antecedent "about," it will be understood that the particular value forms another embodiment. The term "about" in relation to a numerical value is optional and means for example +/- 10%.

Reference numerals

[0118]

- 1 Aerosol generating apparatus
 - 50 Body
 - 2 Power supply
 - 4 Aerosol generating unit / heat-not-burn unit
 - 52 Heating system
 - 54 Heating element
 - 8 Delivery system
 - 56 Electrical circuitry
 - 58 Memory
 - 60 Wireless interface
 - 62 Other component(s)
 - 51 Cap
 - 53 Top end
 - 55 Actuator
 - 57 User interface (e.g. plurality of lights)
 - 70 Consumable
 - 6 Precursor
 - 76 Mouthpiece
 - 78 Barrier layer
 - 80 Barrier layer / housing

Concentric portions:

- 72 First storage portion
- 82 Bore
- 74 Second storage portion
- 84 Third storage portion

Longitudinally stacked storage portions:

- 86 First/upstream storage portion
- 88 Second/downstream storage portion
- 90 Third/intermediate storage portion

Claims

1. A heat-not-burn consumable (70) for use with a heat-not-burn unit (4) to generate aerosol for inhalation by a user, the consumable comprising:
 - a first storage portion (72) having a first substrate for generating a first aerosol; and
 - a second storage portion (74) having a second substrate for generating a second aerosol; wherein the first storage portion (72) is positioned relative to the second storage portion (74) to be located in use between the second storage portion (74) and a heating element (54) of the heat-not-burn unit (4); and wherein the first substrate (72) is formed of a different material composition to that of the second substrate.
2. The heat-not burn consumable (70) of claim 1, wherein the first substrate has a higher combustion temperature than that of the second substrate.
3. The heat-not-burn consumable (70) of claim 1 or 2, wherein the first aerosol has a higher activation temperature than that of the second aerosol.
4. The heat-not-burn consumable (70) of any preceding claim, wherein the first substrate comprises a non-tobacco material.
5. The heat-not-burn consumable (70) of any preceding claim, wherein the first substrate is imbued with a first precursor for generating the first aerosol.
6. The heat-not-burn consumable (70) of claim 5, wherein the first precursor comprises any one, any two or all three of: propylene glycol, glycerin, and nicotine.
7. The heat-not-burn consumable (70) of any preceding claim, wherein the second substrate comprises tobacco.
8. The heat-not-burn consumable (70) of any preceding claim, wherein the second substrate comprises a higher proportion of tobacco than the first substrate.

9. The heat-not-burn consumable (70) of any preceding claim, wherein the first storage portion (72) is formed, optionally concentrically, around the second storage portion (74). 5
10. The heat-not-burn consumable (70) of any one of claims 1 to 8, wherein the first storage portion (72) and second storage portion (74) are stacked longitudinally within the consumable (70). 10
11. The heat-not-burn consumable (70) of any preceding claim, further comprising a third storage portion (84) between the first storage portion (72) and the second storage portion (74), the third storage portion (84) having a third substrate for generating a third aerosol; 15
wherein either:
- the third substrate is formed of a different material composition to that of the first and/or second substrates; and/or 20
the third aerosol is different to the first and/or second aerosols.
12. The heat-not-burn consumable (70) of claim 11, 25
when dependent on claim 2 or 3, wherein:
- the third substrate has a combustion temperature which is between that of the first and second substrates; and/or 30
the third aerosol has an activation temperature which is between that of the first and second aerosols.
13. A heat-not-burn consumable (70) for use with a heat-not-burn unit (4) to generate aerosol for inhalation by a user, the consumable comprising: 35
- a first storage portion (72) having a first precursor for generating a first aerosol; and 40
a second storage portion (74) having a second precursor for generating a second aerosol;
wherein the first aerosol has a higher activation temperature than that of the second aerosol; 45
and
- wherein the first storage portion (72) is positioned relative to the second storage portion (74) to be located in use between the second storage portion (74) and a heating element (54) of the heat-not-burn unit (4). 50
14. A heat-not-burn apparatus (1) comprising:
- the consumable (70) of any preceding claim; 55
and
the heat-not-burn unit (4) comprising the heating element (54) for heating the consumable (70).
15. A method of generating an aerosol for inhalation by a user, comprising:
- providing the heat-not-burn apparatus (1) of claim 14; and
using the heat-not-burn unit (4) to heat the consumable (70).

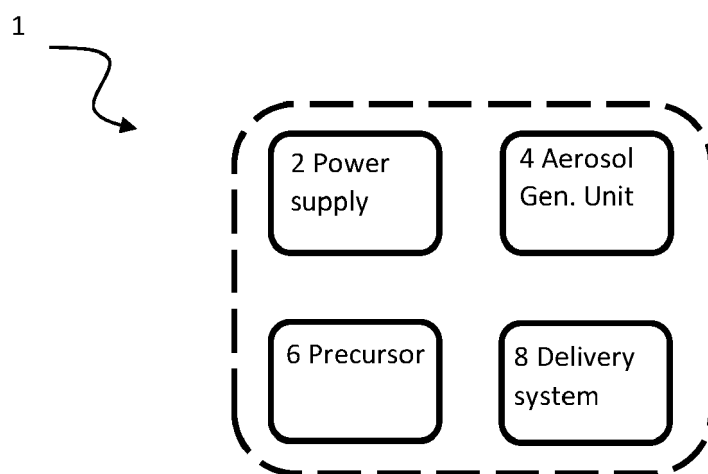


Fig. 1

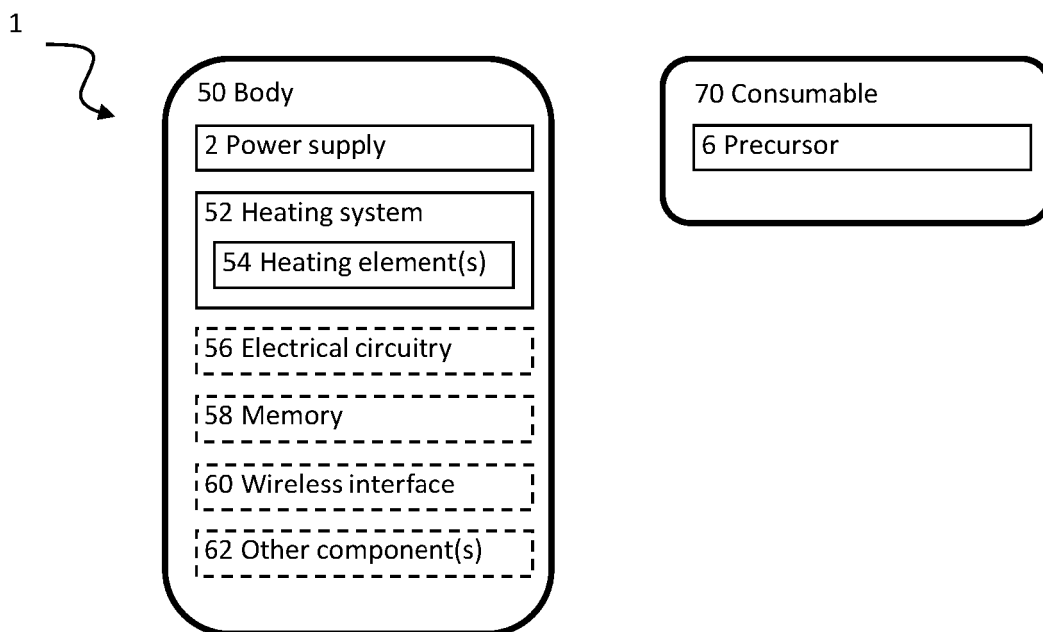


Fig. 2

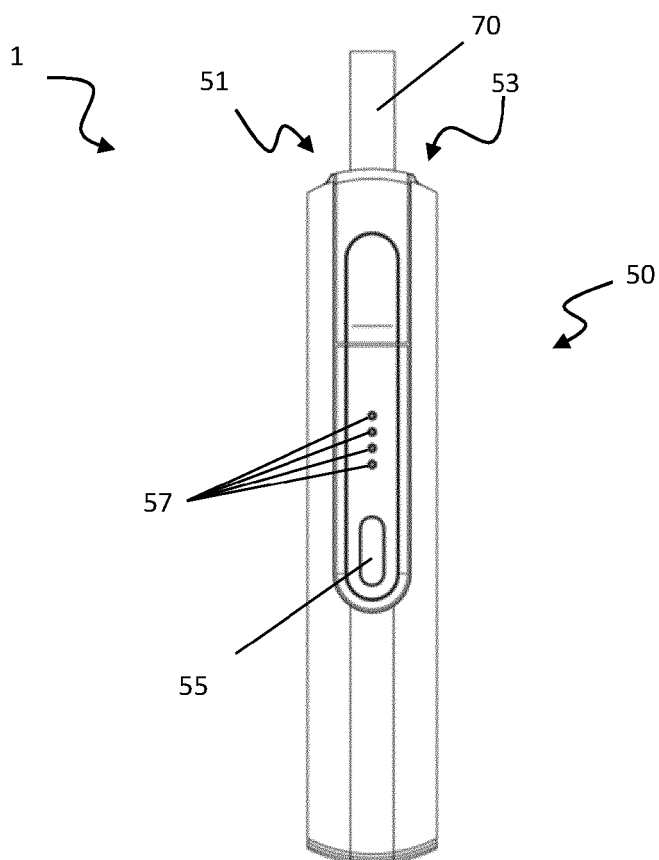


Fig. 3

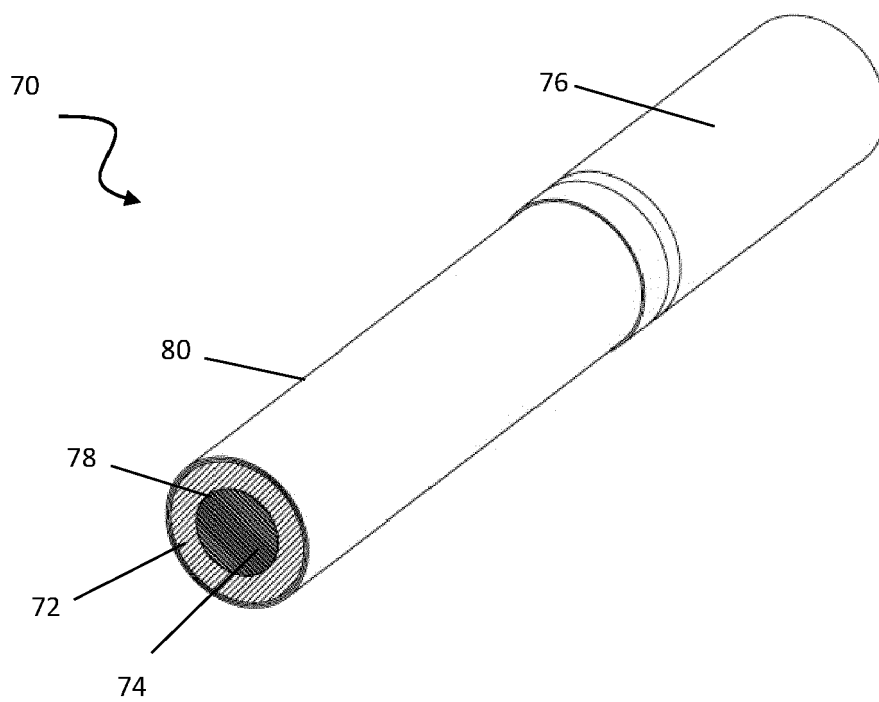


Fig. 4

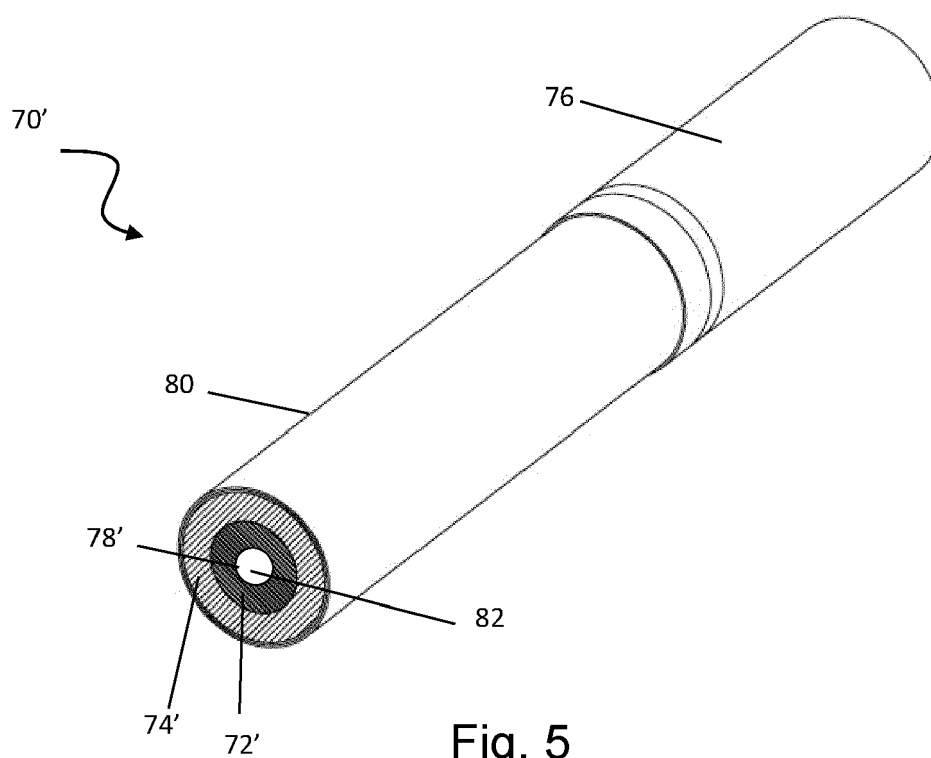


Fig. 5

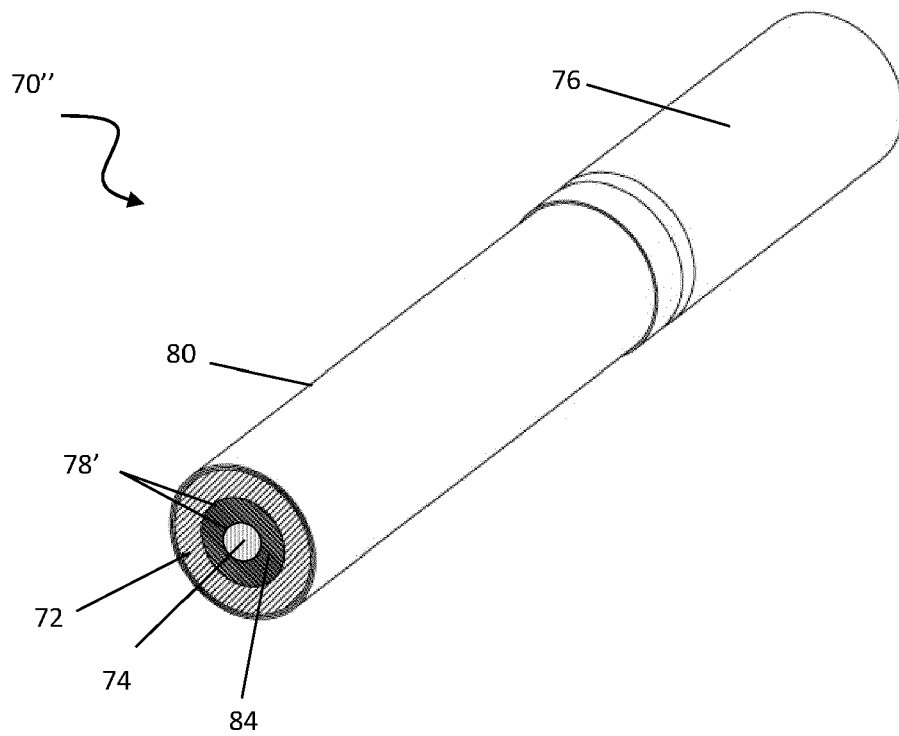


Fig. 6

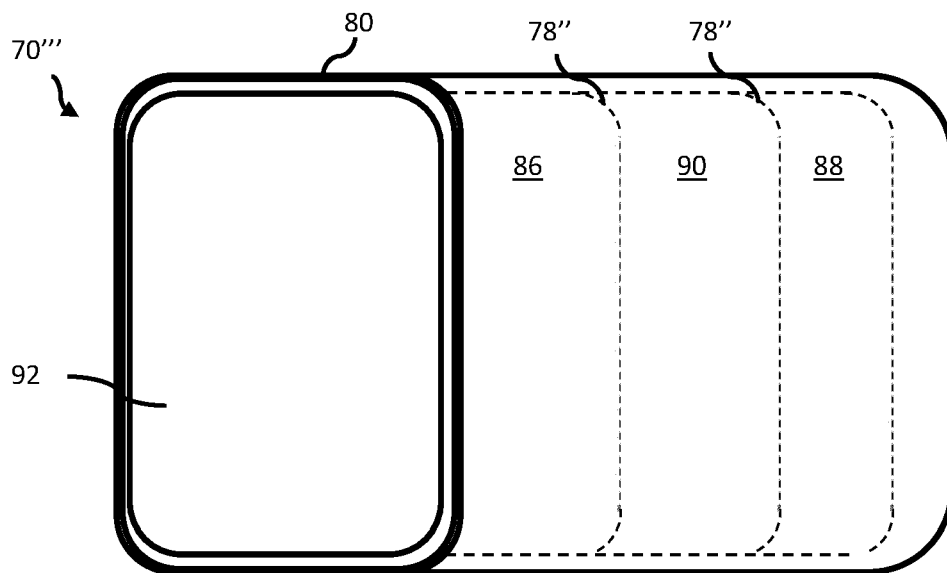


Fig. 7



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Application Number

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The present search report has been drawn up for all claims

1

Place of search	Date of completion of the search	Examiner
Munich	25 April 2024	Schäfer, Lucas
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EUROPEAN SEARCH REPORT

Application Number

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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 25 April 2024	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			

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25-04-2024

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