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(54) AEROSOL GENERATING APPARATUS

(57) There is provided an aerosol generating apparatus comprising: a consumable (26) containing an aerosol-forming precursor (8) and an aerosol generating unit (6) comprising a heating element (28) within the consumable (26) so as to be able to heat the aerosol-forming precursor (8) that is contained therein. A barrier (30) of thermally conductive material (32) is provided between the heating element and the aerosol-forming precursor that allows heat transfer from the heating element (28) to the aerosol-forming precursor (8) through the barrier (30).

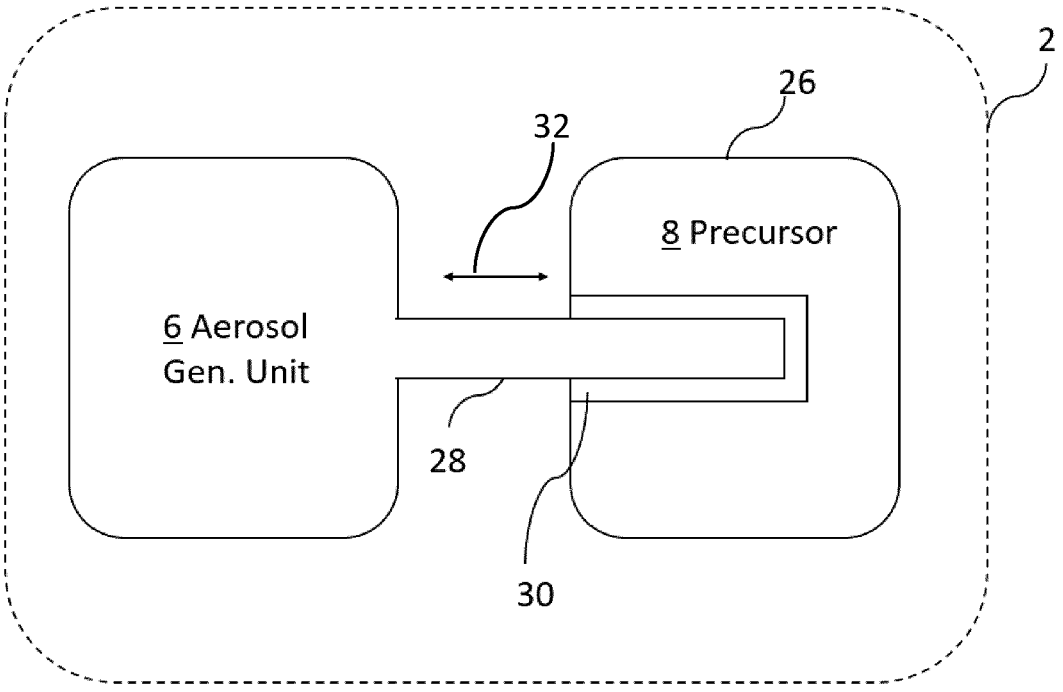

Figure 6

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Description

FIELD

[0001] The present disclosure relates to an aerosol generating apparatus, in particular an aerosol generating apparatus having a heating element that requires less cleaning.

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 is provided with 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 the heating element is located within the consumable in operative proximity to the precursor.

[0003] It is known for the heating element of an aerosol generating unit to be placed in direct contact with the precursor that is stored in the consumable, such that heat generated at the heating element can be transferred directly to the precursor by conduction. In so-called "heat-not-burn" devices that are known in the art, the precursor is in the form of a solid tobacco formulation and the heating element is configured to penetrate the consumable so that it is brought in direct contact with the tobacco formulation stored therein.

[0004] A drawback of such arrangements, however, is that a residue of the precursor will often adhere to the heating element and adversely affect its operation. A user is therefore expected to regularly clean the heating element to maintain efficient operation of the heating element and thus the aerosol generating apparatus.

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

SUMMARY

[0006] In general terms, the present disclosure provides an aerosol generating apparatus, comprising: a consumable containing an aerosol-forming precursor; an aerosol generating unit comprising a heating element located within the consumable so as to be able to heat the aerosol-forming precursor; and a barrier of thermally conductive material between the heating element and the aerosol-forming precursor.

[0007] According to a first aspect, the aerosol-generating apparatus is a heat-not burn (HNB) apparatus. The heat-not-burn apparatus comprises a consumable containing an aerosol-forming precursor; a heat-not-burn unit comprising a heating element which is insertable into the consumable so as to be able to heat the aerosol-forming precursor; and a barrier located, in use (i.e. when the heating element is inserted in the consumable), between the heating element and the aerosol-forming precursor. The barrier is configured to permit thermal interaction between the heating element and aerosol-forming precursor and to inhibit moisture transfer therebetween.

[0008] Advantageously, the barrier can therefore inhibit (e.g. prevent) moisture from the precursor or condensation reaching the heating element, and/or can prevent the material of the HNB precursor (e.g. strands of tobacco) from adhering to and discolouring the heating element, whilst still allowing heat to flow through the barrier to enable thermal interaction between the heating element and the aerosol-forming precursor. This arrangement helps to keep the heating element cleaner, thereby reducing the amount of cleaning required by a user to maintain normal operation, and helping to prevent a drop in HNB performance over time.

[0009] The barrier may be configured in any suitable manner. The barrier may be integrally formed with the consumable or heating element, or may be a separate removable element. The barrier may be configured to directly contact the aerosol-forming precursor and/or the heating element in use. In embodiments where the barrier is configured to directly contact both the aerosol-forming precursor and the heating element, the barrier may be referred to as an interfacing layer between the aerosol-forming precursor and the heating element.

[0010] Throughout this disclosure, the barrier may be referred to as being formed of "thermally conductive material". However, it will be appreciated that in some embodiments (e.g. in which the barrier is formed of paper or fabric), the barrier may have a low thermal conductivity in comparison to other embodiments (e.g. in which the barrier is formed of metal or ceramic). Thus, as used herein, the phrase "thermally conductive material" is intended to refer to a material that enables heat transfer through it (i.e. in contrast to thermally insulating materials). This term is intended to encompass materials across a range of (low, medium, or high) thermal conductivities. Preferably, the barrier may be configured to withstand temperatures of up to 300°C, preferably up to 350°C.

[0011] The barrier may be configured to fluidically isolate the heating element and the aerosol-forming precursor. Accordingly, the barrier may form a continuous (e.g. unbroken) partition between the heating element and aerosol-forming precursor, e.g. without having any apertures through the barrier that could allow moisture and/or precursor material from the aerosol-forming precursor to contact the heater. Thus, the consumable and the heater may be contained in fluidically-independent regions of the apparatus in use. This further improves upon the advantages discussed above, by preventing moisture and/or precursor material from reaching any region of the heating element in use.

[0012] The barrier may be shaped to form a cover (e.g. in the shape of a scabbard) that is (e.g. removably)

sheathed on a region of the heating element. The region may be a region of the heating element that is to be in operative proximity to the precursor in use. The scabbard may directly contact the heating element in use. This helps to form a close fit to the heater and thereby provide strong thermal interaction between the heating element and the aerosol-forming precursor.

[0013] Additionally, or alternatively, to a cover or scabbard, the barrier may be pre-formed as an integrated component of the consumable. This is in contrast to arrangements in which a barrier is provided in the form of a removable cover for the heating element itself.

[0014] The consumable may comprise an outer housing containing a storage portion (e.g. a compartment) having the aerosol-forming precursor. The storage portion may be defined, at least in part, by the barrier. The outer profile of the consumable may be defined by the outer housing. The outer housing may be substantially circular in transverse cross-section, to resemble the structure of a conventional cigarette.

[0015] The heating element (when inserted inside the consumable) may be at a position within the (outer housing of the) consumable that is adjacent to the storage portion (i.e. at a position that it is in operative proximity to heat the precursor) but separated from the aerosol-forming precursor in the storage portion by the barrier.

[0016] The barrier may be in the form of a tube that encloses the aerosol-forming precursor within (e.g. a longitudinal extent of) the tube. The tube may also be referred to as a "tubular compartment" or a "tubular storage portion". The tube may have a transverse-cross section that has any suitable shape, e.g. half-circular, circular, triangular, rectangular, etc.

[0017] The tube may extend longitudinally between an upstream end and a downstream end of the consumable. The tube may be open at one or both ends. Preferably, the tube may be closed at the upstream end. The upstream end may be closed by a wall or an end cap of the tube itself. Alternatively, the upstream end may be closed by a wall or a membrane of the consumable itself. In such cases, the wall or membrane may be pierce-able by the heating element, to allow the heating element to be received within the consumable. In some embodiments, both longitudinal ends of the tube are closed to entirely enclose the precursor. Additionally, or alternatively, the upstream end of the consumable itself is closed by a (e.g. vapour-permeable) membrane or other material that is able to be pierced by the heating element. Such arrangements may minimise leakage of the precursor from the compartment.

[0018] The barrier may be integrated with the compartment (e.g. pouch or tube), e.g. formed by the same material as the compartment. The barrier may form a pouch enclosing the aerosol-forming precursor.

[0019] The storage portion (e.g. compartment), of the thermally conductive material that forms the barrier) may entirely enclose the aerosol-forming precursor. The storage portion or pouch may have a ring-shaped or toroidal structure having a bore (e.g. central bore) within which the heating element is receivable. In embodiments having a plurality of storage portions (e.g. compartments), a bore may be pre-formed at a centre of the plurality of storage portions (along a centre of the consumable). The provision of a pre-formed bore helps to facilitate insertion of the heating element into the consumable.

[0020] The storage portion (e.g. compartment) may be in the form of a vapour-permeable pouch (sachet) that entirely encloses (envelops) the aerosol-forming precursor. The material that forms the barrier may entirely enclose (envelop) the aerosol-forming precursor.

[0021] The consumable may further comprise a plurality of said storage portions (e.g. compartments), each storage portion being defined, at least in part, by a respective barrier. Thus, the consumable may comprise a first storage portion of aerosol-forming precursor within the outer housing and a second storage portion of aerosol-forming precursor within the outer housing. The first storage portion may be defined, at least in part, by a first barrier, and the second storage portion may be defined, at least in part, by a second barrier.

[0022] The storage portions (e.g. compartments) may be configured in any suitable manner as discussed above. Preferably, the storage portions may be configured in the same or complimentary manners as each other (e.g. each being tubular, or each being pouches, etc). The second barrier may be formed of the same material or a different material as the first barrier.

[0023] The storage portions (e.g. compartments) may be separated (e.g. partially or entirely separated) by the heating element in use. In other words, the heating element may be insertable between the plurality of storage portions. For example, the heating element may be insertable along a central axis between the storage portions. The storage portions may still contact each other in use (e.g. at radially outward regions thereof). Alternatively, the storage portions may be spaced apart in use.

[0024] The storage portions (e.g. compartments) may be independent in that they keep the precursor in each storage portion separated.

[0025] The consumable may comprise two storage portions arranged in side-by-side relation for insertion of the heating element between the storage portions in use.

[0026] In some embodiments it is envisaged that the storage portions (e.g. two or more storage portions) may arranged in abutting relation prior to insertion of the heating element (e.g. such that they are contiguous along at least part of their extent) and may be deformable. Such an arrangement permits separation of the storage portions under an applied force arising by insertion of the heating element between the storage portions. Alternatively, the storage portions may be arranged in adjacent spaced-apart relation prior to insertion of the heating element to define an initial gap between the storage portions, and they may be deformable to permit enlargement of the gap under an applied force arising by inser-

tion of the heating element between the storage portions. In some embodiments, of either configuration, it is envisaged that the barrier may be stretched upon insertion of the heating element. However, it is also possible for the storage portion simply to deform (for example, due to a small degree of compression of the aerosol-forming precursor therein). This may provide the advantage of ensuring intimate (or at least close) contact between the barrier and the heating element, which in turn may provide effective thermal interaction between the heating element and the aerosol-forming precursor.

[0027] The consumable may comprise an inner (e.g. central) tube, and an outer tube. The aerosol-forming precursor may be retained (for example in the radially extending annular space) between the inner tube and the outer tube. The heating element may be receivable in a central bore of the inner tube such that the inner tube forms the barrier between the heating element and the precursor. The central bore may have a cross-sectional dimension (e.g. diameter) sized so as to be somewhat smaller than the cross-sectional dimension (e.g. diameter of the heating element. In such arrangements it is envisaged that the inner tube may be deformable to permit enlargement of the central bore under an applied force arising by insertion of the heater into the central bore. This may provide the advantage of ensuring intimate (cor at least close) contact between the barrier defined by the inner tube and the heating element, which in turn may provide effective thermal interaction between the heating element and the aerosol-forming precursor. The outer tube may form the housing, which may be a cylindrical housing as discussed above.

[0028] The barrier may be liquid resistant or liquid impermeable. The barrier may comprise a hydrophobic material or coating. Alternatively, or additionally, the barrier may comprise a non-porous material or coating. These arrangements help to inhibit (e.g. prevent) moisture ingress through the barrier, thereby protecting the heating element.

[0029] Optionally, the barrier may be formed from one or more of the following materials: paper; metal, fabric (e.g. woven fabric), silicone rubber; and ceramic. Non-porous materials such as metal and silicone rubber can advantageously prevent liquid ingress from the precursor to the heating element. Alternatively, materials such as paper, fabric, and ceramic can also prevent liquid ingress, e.g. by providing a hydrophobic coating thereon or by using a non-porous ceramic.

[0030] In some embodiments, the material of the barrier (which may also be the material of the storage portion (e.g. compartment)) may be configured to provide additional functionality depending on its material and construction. For example, the material of the barrier may be infused with a flavouring or an aromatic substance. This may help to impart flavour during use of the apparatus, particularly during early use of while the aerosol-precursor is initially heating up. Additionally, or alternatively, the material of the barrier may be infused with a Propylene Glycol or Vegetable Glycerine based liquid. Materials such as paper or fabric (e.g. woven fabric) may be particularly advantageous in these embodiments, by infusing the paper or fabric.

[0031] It will be appreciated that the present disclosure is not limited to the aerosol generating unit (i.e. the combination of the aerosol generating unit and the consumable).

[0032] In that regard, the Applicant considers that the consumable of the technology described herein may be novel and inventive in its own right. Thus, according to an aspect of the technology described herein, there is provided a consumable to be used as part of an aerosol generating apparatus (e.g. an aerosol generating apparatus according to any of the preceding statements) to heat an aerosol-forming precursor contained within the consumable. The consumable may have any one or more of the features described above.

[0033] For example, the consumable may be a heat-not-burn consumable to be used as part of a heat-not-burn apparatus to heat an aerosol-forming precursor contained within the consumable. The heat-not-burn consumable may comprise a storage portion (e.g. a compartment) of aerosol-forming precursor, and may be configured to receive a heating element of the heat-not-burn apparatus at a position that is adjacent to the storage portion. The storage portion may be defined, at least in part, by a barrier configured to inhibit moisture transfer from the aerosol-forming precursor to the heating element and to allow heat transfer from the heating element to the aerosol-forming precursor in the compartment through the barrier.

[0034] The storage portion (e.g. compartment) may have any form or structure described above, e.g. a pouch or ring-shaped structure etc.

[0035] The consumable may comprise a plurality of said storage portions, each storage portion being defined, at least in part, by a respective said barrier. The plurality of storage portions may be configured to receive the heating element therebetween (e.g. at a centre thereof). The consumable (e.g. with one or more compartments) may define a space (e.g. pre-formed space or bore) for receiving the heating element.

[0036] Accordingly, the consumable may comprise a first storage portion (e.g. a compartment) of aerosol-forming precursor that is defined, at least in part, by a first barrier; and a second storage portion (e.g. a compartment) of aerosol-forming precursor that is defined, at least in part, by a second barrier. The first storage portion and the second storage portion may define a space between the first storage portion and the second storage portion for receiving the heating element. In this way, the technology described herein allows heat transfer from the heating element to the aerosol-forming precursor in the first storage portion and the second storage portion through the first barrier and the second barrier, respectively. That is, the space defined between the first storage portion and the second storage portion may be located

such that, when the heating element is received in the space, the heating element will be at a position that is adjacent to both the first and second storage portions such that heat can be transferred from the heating element to the aerosol-forming precursor in both the first storage portion and the second storage portion through the first barrier and the second barrier.

[0037] The technology described herein also extends to a removable cover for a heating element. Thus, according to an aspect of the technology described herein, there is provided a removable cover for a heating element that is to be inserted within a consumable that contains an aerosol-forming precursor, e.g. a heating element of a penetrative Heat-not-Burn device. The cover may comprise a thermally conductive material suitable for forming a barrier between the heating element and the aerosol-forming precursor when the heating element is inserted in (i.e. penetrates) the consumable. The barrier of thermally conductive material may be suitable for allowing heat transfer from the heating element to the aerosol-forming precursor through the thermally conductive material.

[0038] According to an aspect of the technology described herein, there is provided a heat-not-burn apparatus comprising: a heat-not-burn unit comprising a heating element that is to be removably inserted within a heat-not-burn consumable that contains an aerosol-forming precursor, so as to be able to heat the aerosol-forming precursor that is stored therein; and a removable cover according to any one of the statements provided herein.

[0039] The removable cover (barrier) may sheathe the heating element.

[0040] According to another aspect of the present invention, there is provided a method of generating an aerosol for inhalation by a user, comprising: providing a heat-not-burn apparatus of any one of the statements provided herein; and using the heating element (of the heat-not-burn apparatus) to heat the aerosol-forming precursor through the barrier.

[0041] The preceding summary is provided for purposes of summarizing some embodiments to provide a basic understanding of aspects of the subject matter described herein. Accordingly, the above-described features are merely examples and should not be construed to narrow the scope or spirit of the subject matter described herein in anyway. Moreover, the above and/or proceeding embodiments may be combined in any suitable combination to provide further embodiments. Other features, aspects, and advantages of the subject matter described herein will become apparent from the following Detailed Description, Figures, and Claims.

BRIEF DESCRIPTION OF THE FIGURES

[0042] Aspects, features and advantages of embodiments of the present disclosure will become apparent from the following description of embodiments in reference to the appended drawings in which like numerals denote like features.

Figure 1 is a block system diagram showing embodiment componentry of an aerosol generating apparatus.

Figure 2 is a block system diagram showing embodiment componentry of the apparatus of figure 1.

Figure 3 is a schematic diagram showing an embodiment of the apparatus of figure 2.

Figure 4 is a block system diagram showing embodiment componentry of the apparatus of figure 1.

Figure 5 is a schematic diagram showing an embodiment of the apparatus of figure 4.

Figure 6 is a schematic diagram showing an aerosol generating apparatus according to the technology described herein;

Figure 7 is a schematic diagram showing a removable cover for a heating element of the aerosol generating apparatus of figure 6;

Figure 8 is a schematic diagram showing a consumable of the aerosol generating apparatus of figure 6, having independent precursor compartments according to an embodiment of the technology described herein;

Figure 9 is a schematic diagram showing the independent precursor compartments removed from the consumable of figure 8;

Figure 10 is a schematic diagram showing a consumable comprising independent precursor compartments having an alternative form to that of the independent precursor compartments shown in figures 8 and 9;

Figure 11 is a schematic diagram showing an independent precursor compartment having an alternative form to that of each of the independent precursor compartments shown in figures 8 and 9;

Figure 12 is a schematic diagram showing an independent precursor compartment for a consumable of the aerosol generating apparatus, according to an embodiment of the technology described herein; and

Figure 13 is a schematic diagram showing a consumable of the aerosol generating apparatus of figure 6, having a single independent precursor compartment according to an embodiment of the technology described herein.

DETAILED DESCRIPTION OF EMBODIMENTS

[0043] Before describing several embodiments of aerosol generating system and/or apparatus, it is to be understood that the system is not limited to the details of construction or process steps set forth in the following description. It will be apparent to those skilled in the art having the benefit of the present disclosure that the system and/or apparatus is capable of other embodiments and of being practiced or being carried out in various ways.

[0044] 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. Further, unless otherwise required by context, singular terms shall include pluralities and plural terms shall include the singular

[0045] All patents, published patent applications, and non-patent publications mentioned in the specification are indicative of the level of skill of those skilled in the art to which this presently disclosed inventive concept(s) pertains. All patents, published patent applications, and non-patent publications referenced in any portion of this application are herein expressly incorporated by reference in their entirety to the same extent as if each individual patent or publication was specifically and individually indicated to be incorporated by reference.

[0046] All of the compositions, assemblies, systems, kits, apparatus and/or methods disclosed herein can be made and executed without undue experimentation in light of the present disclosure. While the compositions, assemblies, systems, kits, apparatus and methods of the inventive concept(s) have been described in terms of particular embodiments, it will be apparent to those of skill in the art that variations may be applied to the compositions 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.

[0047] As utilized in accordance with the present disclosure, the following terms, unless otherwise indicated, shall be understood to have the following meanings:
In the claims, any reference signs placed between parentheses shall not be construed as limiting the claim. The word 'comprising' does not exclude the presence of other elements or steps then those listed in a claim.

[0048] The use of the term "a" or "an" in the claims and/or the specification may mean "one," but it is also consistent with the meaning of "one or more," "at least one," and "one or more than one." As such, the terms "a," "an," and "the" include plural referents unless the context clearly indicates otherwise. Thus, for example, reference to "a compound" may refer to one or more compounds, two or more compounds, three or more compounds, four or more compounds, or greater numbers of compounds. The term "plurality" refers to "two or more."

[0049] The use of the term "at least one" will be understood to include one as well as any quantity more than one, including but not limited to, 2, 3, 4, 5, 10, 15, 20, 30, 40, 50, 100, etc. The term "at least one" may extend up to 100 or 1000 or more, depending on the term to which it is attached; in addition, the quantities of 100/1000 are not to be considered limiting, as higher limits may also produce satisfactory results. In addition, the use of the term "at least one of X, Y, and Z" will be understood to include X alone, Y alone, and Z alone, as well as any combination of X, Y, and Z. The use of ordinal number terminology (i.e., "first," "second," "third," "fourth," etc.) is solely for the purpose of differentiating between two or more items and is not meant to imply any sequence or order or importance to one item over another or any order of addition, for example.

[0050] Also, the use of introductory phrases such as "at least one" and "one or more" in the claims should not be construed to imply that the introduction of another claim element by the indefinite articles "a" or "an" limits any particular claim containing such introduced claim element to inventions containing only one such element, even when the same claim includes the introductory phrases "one or more" or "at least one" and indefinite articles such as "a" or "an."

[0051] The same holds true for the use of definite articles. Unless stated otherwise, terms such as "first" and "second" are used to arbitrarily distinguish between the elements such terms describe. Thus, these terms are not necessarily intended to indicate temporal or other prioritization of such elements. The mere fact that certain measures are recited in mutually different claims does not indicate that a combination of these measures cannot be used to advantage.

[0052] The use of the term "or" in 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).

[0053] As may be used herein, any reference to "one embodiment," "an embodiment," "some embodiments," "one example," "for example," or "an example" means that a particular element, feature, structure, or characteristic described in connection with the embodiment is included in at least one embodiment. The appearance of the phrase "in some embodiments" or "one example" in various places in the specification is not necessarily all referring to the same embodiment, for example. Further, all references to one or more embodiments or examples are to be construed as non-limiting to the claims.

[0054] Throughout this application, the term "about" is used to indicate that a value includes the inherent variation of error for a composition/apparatus/ device, the

method being employed to determine the value, or the variation that exists among the study subjects. For example, but not by way of limitation, when the term "about" is utilized, the designated value may vary by plus or minus twenty percent, or fifteen percent, or twelve percent, or eleven percent, or ten percent, or nine percent, or eight percent, or seven percent, or six percent, or five percent, or four percent, or three percent, or two percent, or one percent from the specified value, as such variations are appropriate to perform the disclosed methods and as understood by persons having ordinary skill in the art.

[0055] As used in this specification and claim(s), the words "comprising" (and any form of comprising, such as "comprise" and "comprises"), "having" (and any form of having, such as "have" and "has"), "including" (and any form of including, such as "includes" and "include"), or "containing" (and any form of containing, such as "contains" and "contain") are inclusive or open-ended and do not exclude additional, unrecited elements or method steps.

[0056] As used in this specification, any formulation used of the style "at least one of A, B or C", and the formulation "at least one of A, B and C" means that those formulations comprise any and all joint and several permutations of A, B, C, that is, A alone, B alone, C alone, A and B in any order, A and C in any order, B and C in any order and A, B, C in any order. There may be more or less than three features used in such formulations.

[0057] The term "or combinations thereof' As may be used herein refers to all permutations and combinations of the listed items preceding the term. For example, "A, B, C, or combinations thereof" is intended to include at least one of: A, B, C, AB, AC, BC, or ABC, and if order is important in a particular context, also BA, CA, CB, CBA, BCA, ACB, BAC, or CAB. Continuing with this example, expressly included are combinations that contain repeats of one or more item or term, such as BB, AAA, AAB, BBC, AAABCCCC, CBBAAA, CABABB, and so forth. The skilled artisan will understand that typically there is no limit on the number of items or terms in any combination, unless otherwise apparent from the context.

[0058] As may be used herein, the term "substantially" means that the subsequently described event or circumstance completely occurs or that the subsequently described event or circumstance occurs to a great extent or degree. For example, when associated with a particular event or circumstance, the term "substantially" means that the subsequently described event or circumstance occurs at least 80% of the time, or at least 85% of the time, or at least 90% of the time, or at least 95% of the time. For example, the term "substantially adjacent" may mean that two items are 100% adjacent to one another, or that the two items are within close proximity to one another but not 100% adjacent to one another, or that a portion of one of the two items is not 100% adjacent to the other item but is within close proximity to the other item.

[0059] 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 may be used herein, the term "**aerosol generating apparatus**" or "**aerosol delivery apparatus**" or "**apparatus**" or "**electronic(e)-cigarette**" may include apparatus to deliver an aerosol to a user for inhalation. The apparatus may also be referred to as a "smoking substitute apparatus", which refers to apparatus used instead of a conventional combustible smoking article. As may be used herein a "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). The apparatus may include an aerosol generating unit that may generate a vapour that may subsequently condense into the aerosol before delivery to an outlet, which may be arranged as a mouthpiece. The apparatus may be configured to deliver an aerosol for inhalation, which 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 apparatus may be portable. As may be used herein, the term "Portable" may refer to the apparatus being for use when held by a user. The apparatus may be adapted to generate a variable amount of aerosol, e.g. by activating the aerosol generating unit for a variable amount of time, (as opposed to a metered dose of aerosol), which can be controlled by a trigger. The trigger may be user activated, such as a vaping button and/or inhalation sensor. The aerosol generating unit may be arranged to vary an amount of aerosol delivered to a user 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] As may be used herein, the term "**aerosol generating system**" or "**aerosol delivery system**" or "**system**" may include the apparatus and optionally other circuitry/componentry associated with the function of the apparatus, e.g. a peripheral device and/or a peripheral component. As may be used herein, the term "peripheral component" may include one or more of a: networked-based computer (e.g. a remote server); cloud-based computer; other server system.

[0061] As may be used herein, the term "**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. Aerosol herein may generally refer to/include a vapour. Aerosol may include one or more components of the precursor.

[0062] As may be used herein, the term "**aerosol-forming precursor**" or "**precursor**" or "**aerosol-forming substance**" or "**substance**" or "**substrate**" may refer to one or more of a: liquid; solid; gel; loose leaf material;

other substance. The precursor may be processable by an aerosol generating unit of the apparatus to form an aerosol as defined herein. 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. 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.

[0063] As may be used herein, the term "**electrical circuitry**" or "**electric circuitry**" or "**circuitry**" or "**control circuitry**" may refer to, be part of, or include one or more of the following or other suitable hardware or software components: 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 included entirely on the apparatus, or distributed between the apparatus and/or on one or more peripheral components/peripheral devices in communication with the apparatus, e.g. as part of the system.

[0064] As may be used herein, the term "**storage portion**" may refer to a portion of the apparatus adapted to store the precursor, it may be implemented as fluid holding reservoir or carrier for solid material depending on the implementation of the precursor as defined above. Such a storage portion may form or comprise a compartment for the precursor.

[0065] As may be used herein, the term "**flow path**" may refer to a path or enclosed passageway through the apparatus, through which the user may inhale for delivery of the aerosol. 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. the outlet is downstream of the inlet.

[0066] As may be used herein, the term "**delivery system**" may refer to a system operative to deliver an aerosol to a user. The delivery system may include a mouthpiece/a mouthpiece assembly and the flow path.

[0067] As may be used herein, the term "**flow**" may refer to a flow in the flow path. The flow may include aerosol generated from the precursor. The flow may include air, which may be induced into the flow path via a puff.

[0068] As may be used herein, the term "**inhale**" or "**puff**" or "**draw**" may refer to a user expansion of the lungs and/or oral cavity to create a pressure reduction that induces flow through the flow path.

[0069] As may be used herein, the term "**aerosol generating unit**" may refer to a device to form the aerosol from the precursor. The aerosol generating unit may include a unit to generate a vapour directly from the precursor (e.g. a heater 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 the apparatus.

[0070] As may be used herein, the term "**heating system**" may refer to an arrangement of one or more heating elements, which are operable to aerosolise the precursor once heated. The heating elements may be electrically resistive to produce heat from electrical current therethrough. The heating elements may be arranged as susceptors to produce heat when penetrated by an alternating magnetic field. The heating system may heat the precursor to below 300 or 350 degrees C, including without combustion.

[0071] As may be used herein, the term "**consumable**" may refer to a unit that includes or consists of the precursor. The consumable may include the aerosol generating unit, e.g. it is arranged as a cartomizer. The consumable may include the mouthpiece. With liquid or gel implementations of the precursor, e.g. an E-liquid, the consumable may be referred to as a "capsule" or a "pod" or "E-liquid consumable". The capsule may include the storage portion, e.g. a reservoir, for storage of the precursor. With solid material implementations of the precursor, e.g. tobacco or reconstituted tobacco formulation, the consumable may be referred to as a "stick" or "package" or "heat-not-burn consumable". In 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.

[0072] Referring to figure 1, embodiment aerosol generating apparatus 2 includes a power supply 4, for supply of electrical energy. The apparatus 2 includes an aerosol generating unit 6 that is driven by the power supply 4. The power supply 4 may include an electric power supply in the form of a battery and/or an electrical connection to an external power source. The apparatus includes precursor 8, which is aerosolised by the aerosol generating unit 6. The apparatus 2 includes a delivery system 10 for delivery of aerosolised precursor to a user (not shown in figure 1).

[0073] Electrical circuitry (not illustrated in figure 1) may be implemented to control the interoperability of the power supply 4 and aerosol generating unit 6.

[0074] In variant embodiments, which are not illustrated, the power supply may be omitted, e.g. an aerosol generating unit implemented as an atomiser with flow expansion may not require a power supply.

[0075] Referring to figure 2, the aerosol generating apparatus 2 is an implementation of the embodiment

of figure 1 and/or other embodiments disclosed herein, typically for generation of an aerosol from a liquid precursor. The delivery system 10 includes a flow path 12 that transmits flow 14 in operative proximity of a heating system 16 of the aerosol generating unit 6. By operative proximity it is meant that the flow is transmitted to carry vaporised and/or aerosolised precursor generated from aerosol generating unit 6 to the outlet of the delivery system 10. The flow path 12 includes an inlet 18, and an outlet 20, which may be arranged as a mouthpiece. The delivery system 10 includes a precursor transmission system 22 to transmit the precursor, typically in liquid form from a storage portion in the form of a reservoir, to the aerosol generating unit 6. The precursor transmission system 22 may be implemented as a wick, injector or other suitable device. In such embodiments, the precursor can be contained in a reservoir (not illustrated in figure 2) or other storage portion.

[0076] In variant embodiments, which are not illustrated, the precursor transmission system may be implemented by the aerosol generating unit, for example, as a porous heating component.

[0077] Referring to figure 3, which is a specific implementation of the embodiment of figure 2, a consumable 26 is implemented as a capsule/pod. The capsule 26 is separably connectable to a body 24 that comprises the power supply 4. The capsule 26 includes the precursor 8, the precursor transmission system 22, aerosol generating unit 6 and the mouthpiece 20 forming the outlet. A storage portion, which is implemented as a reservoir (not shown in figure 3) is arranged to carry the precursor.

[0078] In variant embodiments, which are not illustrated, one or more of the precursor, aerosol generating unit and mouthpiece, are arranged as part of the body, e.g. the mouthpiece is arranged as part of the body and the precursor and aerosol generating unit are arranged as a separable cartomizer.

[0079] Referring to figure 4, the aerosol generating apparatus 2 is an implementation of the embodiment of figure 1 and/or other embodiments disclosed herein typically for generation of an aerosol from a solid precursor. A heating system 16 of the aerosol generating unit 6 interacts with the precursor 8 to generate vaporised and/or aerosolised precursor. The precursor 8 is typically arranged as a solid and is arranged to receive thermal energy via conductive heat transfer from the aerosol generating unit 6, e.g. a heating element of the heating system 16 is arranged as a rod (not illustrated in figure 4), which is inserted into the precursor. The delivery system 10 includes a flow path 12 that transmits flow 14 through (or in operative proximity to) the precursor 8 to carry the vapour and/or aerosol to an outlet 20 of the flow path 12.

[0080] Referring to figure 5, which is a specific implementation of the embodiment of figure 4, a consumable 26 is implemented as a stick. The stick 26 is separably connectable to a body 24 that comprises the power supply 4 and aerosol generating unit 6. To facilitate this, the body 24 comprises a receptacle (i.e. a cavity), within which a free end of the heating element or rod (not shown) projects so that it can (and in the illustrated implementation does) penetrate the consumable 26 when the consumable 26 is received within the receptacle. The consumable stick 26 may be snugly received in the receptacle to facilitate easier insertion and predictable positioning of the heating element in the consumable 26. The stick 26 includes proximal the body 24 the precursor 8 (not shown in figure 5) as a reconstituted tobacco formulation and distal the body 24 a mouthpiece 20 arranged as a filter.

[0081] Figure 6 schematically illustrates an aerosol generating apparatus 2 in accordance with the technology described herein. The apparatus 2, which may be a specific implementation of one of the embodiments of the aerosol generating apparatus described above with respect to figures 1 to 5, comprises an aerosol generating unit 6 and a consumable 26 that contains an aerosol-forming precursor 8.

[0082] The aerosol generating unit 6 includes a heating element 28 which is operable to aerosolise the precursor 8 once heated. The heating element 28 is located within the consumable 26 at a position that is in operative proximity to the precursor 8, so as to transfer heat generated at the heating element 28 to the precursor 8. As denoted by the arrow 32 of Figure 6, the heating element 28 in this implementation is removable from the consumable 26 to facilitate cleaning or other maintenance of the heating element 28 after use.

[0083] As described above, it is known for the heating element to be in direct contact with the precursor during the heating process. This is especially (but not necessarily exclusively) the case for heat-not-burn devices. However, in contrast to such arrangements, the apparatus 2 of the technology described herein comprises a barrier 30 immediately between the heating element 28 and the precursor 8. That is, a barrier 30 physically separates the heating element 28 and the precursor 8 so that the heating element 28 is not in direct contact with the precursor 8.

[0084] By providing a barrier, the technology described herein inhibits or prevents precursor residue, moisture or debris from contacting and adhering to the heating element 28, while allowing heat transfer from the heating element 28 to the precursor 8 through the barrier 30. To prevent moisture from the precursor or condensation contacting the heater, the barrier 30 (i.e. the material of the barrier, which may be referred to as a "thermally conductive material" as discussed further above) preferably has some hydrophobic properties, is non-porous in construction or is otherwise substantially impermeable to liquid or solid. Further, the barrier 30 is non-combustible at typical operating temperatures of the heating element, e.g. up to and including 350°C for typical heat-not-burn devices. Suitable thermally conductive materials for the barrier include paper, metal (e.g. foil), fabric, silicone rubber, or ceramics.

[0085] In the manner described above, the heating

element 28 can be kept much cleaner, thereby reducing the amount of cleaning required by the user to maintain normal operation of the heating element, preventing a drop in performance of the heating element and improving the overall experience for the user. Reducing the frequency with which the heating element is cleaned also reduces the risk of breaking the heating element, because conventional heating elements are known to be brittle and prone to failure when they experience forces that exceed the levels that are typical during normal use. Additionally, the provision of a barrier may be advantageous in that it requires no alteration to the precursor formulation or heating element/system.

[0086] A physical barrier as described above can be implemented in any aerosol generating apparatus in which a heating element is to be brought (or is otherwise already located) in operative proximity to a precursor for generating a vapour or aerosol by heating. As such, the technology described herein, and its associated advantages, can be realised in both liquid precursor-based systems and solid precursor-based systems. For brevity, however, the remaining description will focus primarily on the provision of a barrier in a penetrative heat-not-burn aerosol generating apparatus, such as that described with respect to figures 4 and 5. In such cases, the aerosol forming precursor is a solid-based precursor, e.g. a tobacco type or blend manufactured according to any known process. A suitable format for the tobacco includes reconstituted tobacco, as well as granulated, powder, foam, extract or gel formats.

[0087] The barrier 30 can take any suitable and desired form that allows the precursor 8 contained within the consumable 26 to be physically separated or otherwise shielded from the heating element 28.

[0088] Figure 7 schematically illustrates one embodiment of the aerosol generating apparatus described above with respect to Figure 6, wherein the barrier 30 is in the form of a removable cover that is placed over the heating element 28 in use. As denoted by the arrow 34 of figure 7, the cover 30 is removable from the heating element 28 so that it can be disposed of, or cleaned and returned to the heating element 28, after use.

[0089] The cover 30 is shaped to define a sheath or scabbard having a central longitudinal bore 36 for receiving the heating element 28 therein. Accordingly, the cover 30 has an open end 38, through which the heating element 28 is received, and a closed end 40 (closed by an end wall that is not shown) at a longitudinally opposite side of the cover 30 to the open end 36. When the heating element is received inside the bore 36, the closed end 40 of the cover 30 may abut a distal end 42 of the heating element 28 so as to improve thermal conductivity between the distal end 42 of the heating element and the cover 30. There may be one or more openings through the cover to allow air to exit the bore 36 as the heating element 28 is received therein.

[0090] The inner surface(s) of the cover 30 is shaped to conform to the shape of the outer profile of the heating element 28. Therefore, the heating element 28 can be snugly received within the bore 36. This may be advantageous in that it increases the contact area between the heating element 28 and the cover 30, thereby increasing heat transfer between the two and onwards to the precursor. In the implementation of figure 7, the heating element 28 is in the form of a rod having a substantially circular shape in transverse cross-section and so, correspondingly, the cover 30 is in the form of a tube having a circular inner bore 30 of substantially the same (or slightly larger) diameter than that of the heating element 28. Of course, it will be appreciated that other shapes are equally possible. For example, the heating element may be blade-shaped in that it has a substantially rectangular shape in transverse cross-section, and the cover 30 may be correspondingly shaped such that the inner bore 36 has a rectangular shape in transverse cross-section.

[0091] The cover 30 conceals at least a part of the heating element 28 that is to penetrate the consumable 26, which may be less than the entire length of the heating element 28. In the illustrated embodiment, the bore 36 has a longitudinal extent that is substantially equal to that of the heating element 28, such that the cover 30 encloses the heating element 28 along its entire length.

[0092] Although not shown in figure 7, in use the heating element 28 and cover 30 will be inserted within a consumable such that the outer surface(s) of the cover 30 will be in direct contact with the precursor to be heated. In such cases, the consumable itself can be of a conventional form, wherein the precursor is held within an outer consumable wrapping only, e.g. a consumable having a structure akin to a conventional cigarette. Thus, the provision of a removable cover for the heating element is particularly advantageous for use with conventional consumables for heat-not-burn devices.

[0093] In specific embodiments, however, the technology described herein is concerned with a novel consumable in which a barrier is pre-formed as an integrated component of the consumable, e.g. during manufacture. For example, some such consumables may include a barrier similar to the cover 30 considered above but which may be formed as an integral component of the consumable itself so as to thereby define a sheath or scabbard having a central longitudinal bore for receiving the heating element 28 when the heating element 28 is inserted into the consumable. In some examples, the consumable 26 may be pre-formed to comprise a storage portion in the form of a compartment (i.e. sub-compartment) that not only stores the precursor, but also forms a barrier between the heating element and the precursor. The consumable may comprise one or more compartments of aerosol forming precursor and a space for receiving the heating element at a position that is adjacent to (and, in embodiments, contiguous to) the one or more compartments, but separated from the precursor by the outer walls of the compartments. Such a consumable can be implemented in a number of different ways, as will now be

described with respect to figures 8 to 12.

[0094] Figure 8 schematically illustrates a consumable 26 and a heating element 28 according to an embodiment of the aerosol generating apparatus described above with respect to Figure 6.

[0095] As shown, the consumable 26 comprises an outer housing 44 that forms part of the flow path of the aerosol generating apparatus described above with respect to figure 4. The outer housing 44 has an upstream end 46 and a downstream end 48 which forms an outlet of the flow path. The heating element 28 is received in the consumable 26 through the upstream end 46, and the downstream end 48 forms a mouthpiece on which the user can suck to draw a flow of air (and, correspondingly, vapour and/or aerosol) through the consumable 26.

[0096] The outer housing 44 houses two compartments: a first compartment 49 and a second compartment 50, both of which contain aerosol-forming precursor 8. In this specific implementation, the aerosol-forming precursor 8 is a reconstituted tobacco formulation. Each compartment 49, 50 comprises an outer longitudinal wall 52, 54 of thermally conductive material that encloses and retains the precursor 8 within the compartment in question. In that sense, each compartment can be thought of as a respective storage portion of the consumable 26.

[0097] Each outer longitudinal wall 52, 54 is shaped to define a tube that circumscribes a longitudinal extent (in this embodiment the entire length) of the precursor 8 like a wrap. The longitudinal ends of the compartments 49, 50 are open, but in other embodiments at least the end of the tube 49, 50 that is located at the upstream end 46 of the consumable 26 is closed, e.g. by a vapour-permeable membrane or the thermally conductive material, to prevent the precursor 8 from escaping at the upstream end 46.

[0098] The compartments 49, 50 (specifically the outer longitudinal walls 52, 54 thereof) extend from the upstream end 46 towards the downstream end 48 of the consumable. In the illustrated embodiment, the compartments extend along some but not all of the length of the outer housing 44 to allow room at the downstream end 48 of the consumable 26 for a filter 56, although that is not considered essential.

[0099] The first compartment 49 and the second compartment 50 are independent compartments in that the precursor 8 that is stored in one compartment is separated from the precursor 8 that is stored in the other compartment. However, the compartments 49, 50 are also independent in that they are spaced apart from one another and separated by the heating element 28 when the heating element 28 is received in the consumable 26.

[0100] In that regard, a space 58 between the first compartment 49 and the second compartment 50 is created upon insertion of the heating element 28 in the consumable 26. To facilitate this, the consumable 26 is pre-formed and manufactured such that the first compartment 49 and the second compartment 50 are contiguous (e.g. abutting) along the longitudinal direction of the consumable 26, but the first and second compartments 49, 50 are deformable in the transverse direction of the consumable 26, to allow the compartments 49, 50 to be separated under the applied force of the heating element 28 as it is inserted into the consumable 26 along the interface between the first compartment 49 and the second compartment 50.

[0101] Although not shown in figure 8, the aerosol generating apparatus may comprise means for guiding the heating element 28 along the interface between the first and second compartments 49, 50 of the consumable 26, and vice versa. As mentioned above, in embodiments the aerosol generating unit comprises a receptacle for the consumable 26, wherein a free end of the heating element 28 projects into the receptacle so that it will penetrate the consumable 26 when the consumable 26 is received inside the receptacle. Further, the outer profile of the consumable 26 may be shaped to conform to the shape of the receptacle so that, when the consumable 26 is received inside the receptacle, relative movement between the heating element 28 and the consumable 26 is limited to one degree of freedom. In this way, the heating element 28 can be configured to be inserted into the consumable 26 in a single insertion direction and at a predefined position within the consumable 26. The first compartment 49 and the second compartment 50 may therefore be configured such that the interface between the two is at the predefined position within the consumable 26 and will extend in a direction that will be aligned with the insertion direction of the heating element 28, when the consumable 26 is received in the receptacle.

[0102] By receiving the heating element 28 in the space 58 immediately between the two compartments 49, 50, the heating element 28 will be in operative proximity to the precursor in both compartments, but separated from the precursor 8 by the outer longitudinal walls 52, 54 of the compartments 49, 50. As a result, the wall 52, 54 of each compartment 49, 50 forms a respective barrier between the heating element 28 and the precursor 8.

[0103] With reference to figure 9, which shows the first compartment 49 and the second compartment 50 removed from the outer housing (reference 44 of figure 8) after use, the outer walls 52, 54 of the compartments 49, 50, which in this case are formed of paper, retain structural integrity upon heating and thus serve as a suitable barrier to protect the heating element during use. The compartments 49, 50 and wider consumable can then be discarded after use.

[0104] Although the embodiment of figure 8 has been described with respect to receiving a rod-shaped heating element between two precursor compartments, a rod-shaped heating element may be particularly suitable for use with consumables that comprise three or more compartments of precursor material. For example, three compartments extend parallel in the longitudinal direction of the consumable, but are arranged in a triangular array, whereby each compartment defines an apex of the

triangle, and the heating element is received in a space at the centre of the triangle.

[0105] It will also be appreciated that, although the space 58 between the first and second compartments 49, 50 has been described above as being formed by insertion of the heating element 28 within the consumable 26, the space 58 can be formed in any other suitable and desired way. For example, the first compartment 49 and the second compartment 50 may be spaced apart by one or more spacers located between the two compartments. In some embodiments it is envisaged that the first and second compartments 49, 50 may be arranged in spaced-apart relation (for example by one or spacers) prior to insertion of the heating element 28 to define a small initial gap between the compartments, which may aid insertion of the heating element 28 therebetween. In such arrangements, the first and second compartments 49, 50 may nevertheless still be deformable in the transverse direction in manner described above to thereby allow enlargement of the gap under an applied force arising by insertion of the heating element between the compartments 49, 50. For example, the initial gap formed between the compartments 59, 50 may have an initial configuration in the form of an elongate slot having a somewhat narrow cross-sectional profile sufficient to reliably receive the pointed penetrating tip of a rod-shaped heating element 28, and the gap may be enlarged or expanded (via deformation of the first and second compartments 49, 50) during insertion of the heating element 28 to adopt an enlarged or expanded configuration in which the barriers forming the compartments 49, 50 are in intimate (or at least close) contact with the heating element 28 upon its insertion.

[0106] In some embodiments, such as the one illustrated in Figure 10, each compartment 49, 50 is shaped to comprise a recessed surface 57, 59 for receiving the heating element. As shown in Figure 10, each compartment 49, 50 comprises a curved, outwardly concave surface 57, 59 that extends in the longitudinal direction of the consumable 26. Further, the compartments 49, 50 are oriented such that their concave surfaces 57, 59 face each other such that they cooperate to define a substantially cylindrical channel within which the rod-shaped heating element (not shown) is to be received. This may be advantageous to maximise the contact area and thus heat transfer between the heating element and the compartments. The surfaces 57, 59 are also arranged such that the channel is located at a central position within the consumable 26 and will be aligned with an insertion direction of the heating element, which may be (but is not necessarily) the insertion direction governed by a receptacle of the aerosol generating unit.

[0107] It will be appreciated that although the compartments of precursor have been described above as being in the shape of a tube that circumscribes a longitudinal extent of the precursor 8 like a wrap, this is not required. In alternative embodiments, one or more of the compartments 49, 50 are implemented as a closed pouch or sachet (formed by thermally conductive material) that entirely encloses or envelops the precursor, as illustrated in figure 11.

[0108] Figure 11 schematically illustrates a first pouch or sachet 60 that can be used to form a compartment of a consumable in accordance with an embodiment. The pouch 60 may be used as the only compartment within a consumable or may form part of a group of plural compartments within the consumable. In that regard, the pouch 60 may be used instead of each tube-shaped compartment 49, 50 in the consumable 26 described above with respect to Figure 8.

[0109] The pouch 60 comprises a front wall 62 and a back wall 64 which are connected to each other at an upper transverse rim 66 and a lower transverse rim 68 of the pouch 60. The front and back walls 62, 64 are also connected by a first side wall 70 extending along a first side 72 of the pouch 60 in the longitudinal direction of the pouch 60 and a second side wall (not shown) extending in the longitudinal direction of the pouch 60 along a second side 74 opposite the first side 72 in the transverse direction. The precursor 8 is stored within the pouch 60. Further, the walls of the pouch 60 are formed of a thermally conductive material that is permeable to gases, to allow the vapour formed by heating the precursor to escape the pouch and enter the flow path of the wider apparatus.

[0110] Figure 12 schematically illustrates a second pouch or sachet 76 that can be used as a compartment of a consumable 26 in accordance with an embodiment. The pouch 76 may be used as the only compartment within a consumable or may form part of a group of plural compartments within the consumable. The pouch 76 may be used instead of the tube-shaped compartments 49, 50 of the consumable 26 described above with respect to Figure 8. The consumable may comprise an array of such pouches arranged in the longitudinal direction of the consumable.

[0111] In the illustrated embodiment of figure 12, the pouch 76 is shaped to define a substantially ring-shaped or toroidal structure having a central bore 78 that defines a space within which the heating element (not shown) is received. The pouch 76 has an annular shape in transverse cross-section. The pouch 76 may be snugly received within the outer housing 44 of the consumable 26 in an orientation at which the central bore 78 is aligned with an insertion direction of the heating element, which may be (but is not necessarily) the insertion direction governed by a receptacle of the aerosol generating unit. In that regard, a radial outer wall 79 of the pouch 76 may be wrapped by the outer housing (not shown) of the consumable. The material of the pouch 76 comprises the thermally conductive material, which will serve as a barrier between the heating element and the precursor that is stored within the pouch 76.

[0112] Figure 13 schematically illustrates a consumable 26 and a heating element 28 according to an alternative embodiment of the aerosol generating apparatus

described with respect to Figure 6.

[0113] The consumable 26 comprises a radially inner tube 80 of thermally conductive material and a radially outer tube 82 that is substantially coaxial with the inner tube 80. The inner tube 80 is located inside the outer tube 82 and the outer tube 82 has a diameter that is larger than that of the inner tube 80 so as to define a radially extending annular space 84 between the inner and outer tubes. The space 84 forms part of the flow path of the aerosol generating apparatus described above with respect to figure 4. The annular space 84 is filled with a precursor 8 and the outer tube 82 covers the precursor 8 like a wrap and defines the outer housing of the consumable 26. The annular space 84 defined between the inner tube 80 and the outer tube 82 can be considered to be a storage portion (or compartment) of the consumable.

[0114] The annular space 84 extends between an upstream end 46 and a downstream end 48 of the consumable 26, in particular from the upstream end 46 towards the downstream end 48. The space 84 extends along some but not all of the length of the outer tube 82 to allow room at the downstream end 48 of the consumable 26 for a filter (not shown), although that is not required. The longitudinal end of the annular space 46 that is located at the upstream end 46 of the consumable 26 is open to enhance the extent of airflow through the consumable 26. However, in other embodiments one or both of the longitudinal ends of the annular space 34 is closed by end walls, which may be permeable to air/vapour as may be necessary to allow the vapour to enter the airflow.

[0115] The inner tube 80 has a central longitudinal bore 86 for receiving the heating element 28 therein. Accordingly, the central longitudinal bore 86 is at a position and orientation within the consumable 26 that is configured to be aligned with an insertion direction of the heating element 28, which may be (but is not necessarily) the insertion direction governed by a receptacle of the aerosol generating unit. Further, the inner surface (not shown) of the longitudinal bore 86 has a shape that conforms to the shape of the outer profile of the heating element 28 so that the heating element 28 can be snugly received within the bore 86. In the implementation of figure 13, the heating element 28 is shaped as a rod having a substantially circular shape in transverse cross-section and so, correspondingly, the bore 86 is substantially circular in transverse cross-section and has the same (or slightly larger) diameter than that of the heating element 28. Of course, it will be appreciated that other shapes are equally possible.

[0116] By receiving the heating element within the central bore 86 of the inner tube 80 of thermally conductive material, the inner tube 80 serves as a barrier to protect the heating element from the precursor during use.

[0117] In view of all of the above, it can be seen that the technology described herein reduces the amount of residue that will adhere to or otherwise dirty the heating element of an aerosol generating apparatus. This may be advantageous to maintain efficient operation of the heating element and aerosol generating apparatus with minimal cleaning.

[0118] Although the embodiments described above focus primarily on the protective function of the barrier of thermally conductive material, in embodiments the barrier may serve an additional purpose. In particular, the barrier can be used to impart flavour or help to deliver additional vapour to the flow through the apparatus and delivered to the user. This can be achieved by using a thermally conductive material that has been pre-infused with a flavouring, an aromatic substance or a Propylene-Glycol or Vegetable-Glycerine based liquid.

[0119] Unless otherwise explicitly stated as incompatible, or the physics or otherwise of the embodiments, example or claims prevent such a combination, the features of the foregoing embodiments and examples, and of the following 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 the example(s), embodiment(s), or dependency of the 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.

[0120] The foregoing description of one or more implementations provides illustration and description, but is not intended to be exhaustive or to limit the scope of the invention to the precise form disclosed. Modifications and variations are possible in light of the above teachings or may be acquired from practice of various implementations of the present disclosure.

Claims

1. A heat-not-burn apparatus (2) comprising:

a consumable (26) containing an aerosol-forming precursor (8);

a heat-not-burn unit (6) comprising a heating element (28) which is insertable into the consumable (26) so as to be able to heat the aerosol-forming precursor (8); and

a barrier (30, 52, 54, 80) located, in use, between the heating element and the aerosol-forming precursor (8), the barrier being configured to permit thermal interaction between the heating

element and aerosol-forming precursor and to inhibit moisture transfer therebetween.

2. The heat-not-burn apparatus (2) of claim 1, wherein the barrier (30) is shaped to form a cover that is sheathed, in use, on a region of the heating element (28).

3. The heat-not-burn apparatus (2) of claim 1 or claim 2, wherein the barrier (30) is pre-formed as an integrated component of the consumable (26).

4. The heat-not-burn apparatus (2) of claim 1, 2 or 3, wherein:
the consumable (26) comprises an outer housing (44) containing a storage portion (49, 50) of aerosol-forming precursor (8), wherein the storage portion (49, 50) is defined, at least in part, by the barrier (52, 54).

5. The heat-not-burn apparatus (2) of claim 4, wherein the barrier is in the form of a tube (52, 54) enclosing the aerosol-forming precursor (8);

optionally wherein the tube (52) extends between an upstream end (46) and a downstream end (48) of the consumable (26) and is closed at the upstream end (46);
optionally wherein the upstream end (46) of the consumable is closed by a pierce-able membrane configured to be pierced in use by the heating element (28).

6. The heat-not-burn apparatus (2) of claim 4 or 5, wherein:

the barrier forms a pouch (76) entirely enclosing the aerosol-forming precursor (8); and
the pouch (76) has a ring-shaped or toroidal structure having a central bore (78) within which the heating element (28) is received.

7. The heat-not-burn apparatus (2) of claim 4, wherein the storage portion (52) is in the form of a vapour-permeable pouch (60) that entirely encloses the aerosol-forming precursor (8).

8. The heat-not-burn apparatus (2) of any one of claims 4 to 7, wherein:
the consumable (26) comprises a plurality of said storage portions (49, 50), each storage portion (49, 50) being defined, at least in part, by a respective barrier (52, 54).

9. The heat-not-burn apparatus (2) of claim 8, wherein the plurality of storage portions (49, 50) are separated by the heating element (28) in use.

10. The heat-not-burn apparatus (2) of claim 8 or claim 9, wherein said plurality of storage portions comprises two said storage portions (49, 50) arranged in side-by-side relation for insertion of the heating element (28) between the storage portions (49, 50) in use.

11. The heat-not-burn apparatus (2) of claim 9, or claim 10 as dependent on claim 9, wherein said storage portions (49, 50) are arranged in abutting relation prior to insertion of the heating element (28) and are deformable to thereby permit their separation under an applied force arising by insertion of the heating element (28) between the storage portions (49, 50).

12. The heat-not-burn apparatus (2) of claim 9, or claim 10 as dependent on claim 9, wherein said storage portions (49, 50) are arranged in adjacent spaced-apart relation prior to insertion of the heating element (28) to define an initial gap between the storage portions (49, 50), the storage portions (49, 50) being deformable to thereby permit enlargement of the gap under an applied force arising by insertion of the heating element (28) between the storage portions (49, 50).

13. The heat-not-burn apparatus (2) of any one of claims 1 to 4, wherein:

the consumable (26) comprises an inner tube (80), and an outer tube (82);
the aerosol-forming precursor (8) is retained between the inner tube (80) and the outer tube (82); and
the heating element (28) is receivable in a central bore (86) of the inner tube (80) such that the inner tube (80) forms the barrier between the heating element (28) and the precursor (8).

14. The heat-not-burn apparatus (2) of any preceding claim, wherein the barrier is formed from one or more of the following materials: paper; metal, fabric, silicone rubber; and ceramic.

15. The heat-not-burn apparatus (2) of any preceding claim, wherein the barrier is infused with one or more of: a flavouring, an aromatic substance, a Propylene Glycol based liquid, or a Vegetable Glycerine based liquid.

16. A heat-not-burn consumable (26) to be used as part of a heat-not-burn apparatus (2) to heat an aerosol-forming precursor (8) contained within the consumable (26), the consumable (26) comprising:

a storage portion (49, 84) of aerosol-forming precursor (8);
wherein the consumable is configured to receive a heating element (28) of the heat-not-burn ap-

paratus (2) at a position that is adjacent to the storage portion (49, 84);
wherein the storage portion is defined, at least in part, by a barrier configured to inhibit moisture transfer from the aerosol-forming precursor (8) to the heating element (28) and to allow heat transfer from the heating element (28) to the aerosol-forming precursor (8) in the storage portion (49, 84) through the barrier (52, 80);
optionally wherein the consumable comprises a plurality of said storage portions (49, 50), each storage portion being defined, at least in part, by a respective said barrier (52, 54); and
optionally wherein the plurality of storage portions (49, 50) defines a space (58) therebetween for receiving the heating element (28).

17. A heat-not-burn apparatus (2) comprising:

a heat-not burn unit (6) comprising a heating element (28) that is to be removably inserted within a heat-not-burn consumable (26) that contains an aerosol-forming precursor (8), so as to be able to heat the aerosol-forming precursor (8) that is stored therein; and
a removable cover (30) for the heating element (28), the removable cover being configured to form a barrier between the heating element (28) and the aerosol forming precursor (8) when the heating element (28) is inserted in the consumable (26);
wherein the removable barrier is configured to inhibit moisture transfer from the aerosol-forming precursor (8) to the heating element (28) and to allow heat transfer from the heating element (28) to the aerosol-forming precursor (8) in use;
optionally wherein the removable cover (30) sheathes the heating element (28).

18. A method of generating an aerosol for inhalation by a user, comprising;

providing the heat-not-burn apparatus of any one of claims 1 to 15 or 17; and
using the heating element (28) to heat the aerosol-forming precursor (8) through the barrier (30, 52, 54, 80).

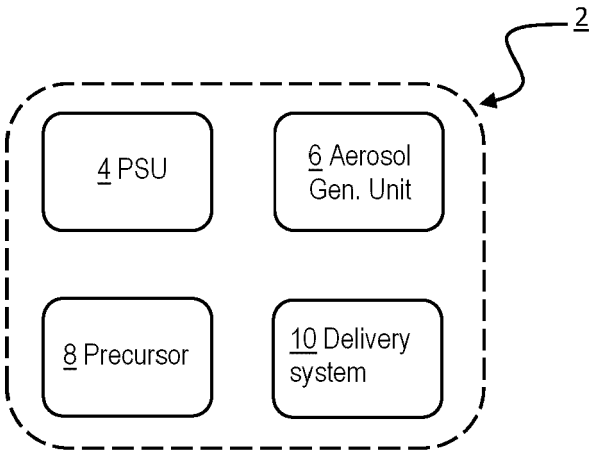


Figure 1

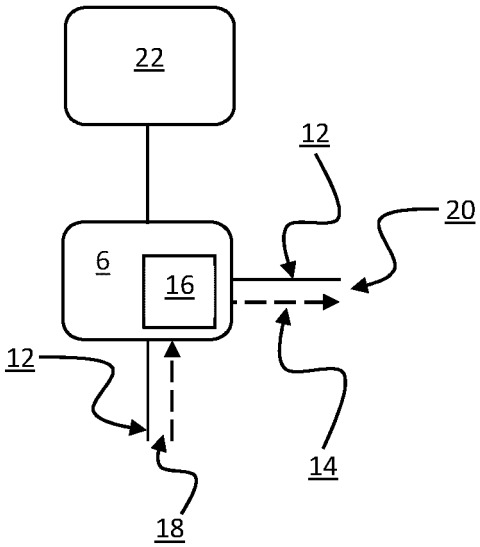


Figure 2

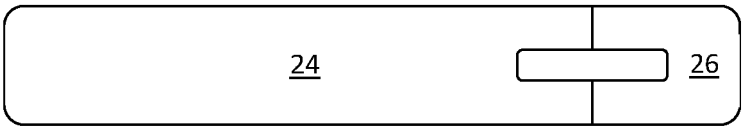


Figure 3

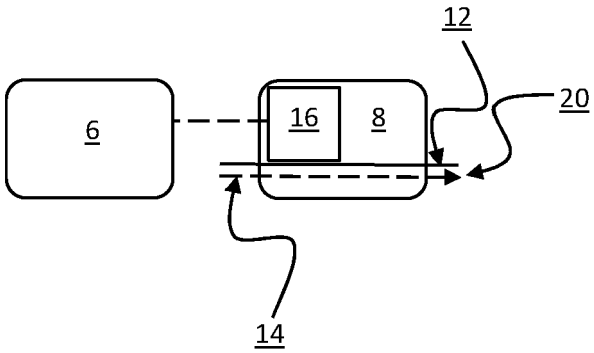


Figure 4

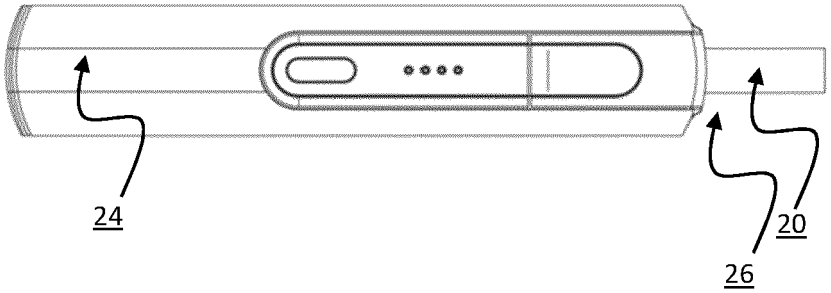
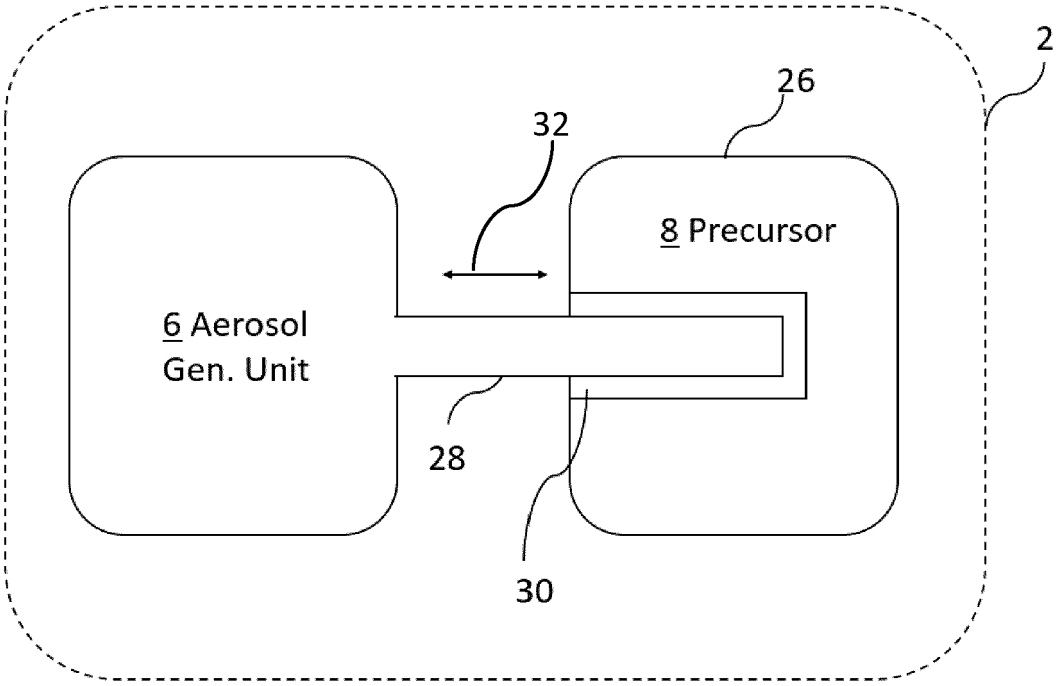


Figure 5



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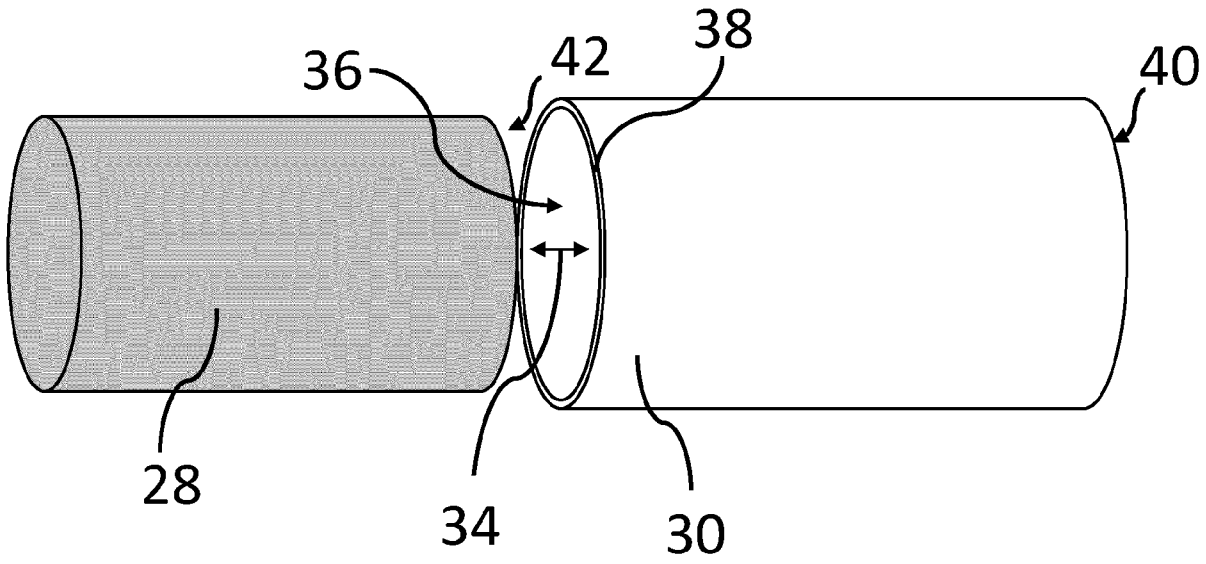

Figure 7

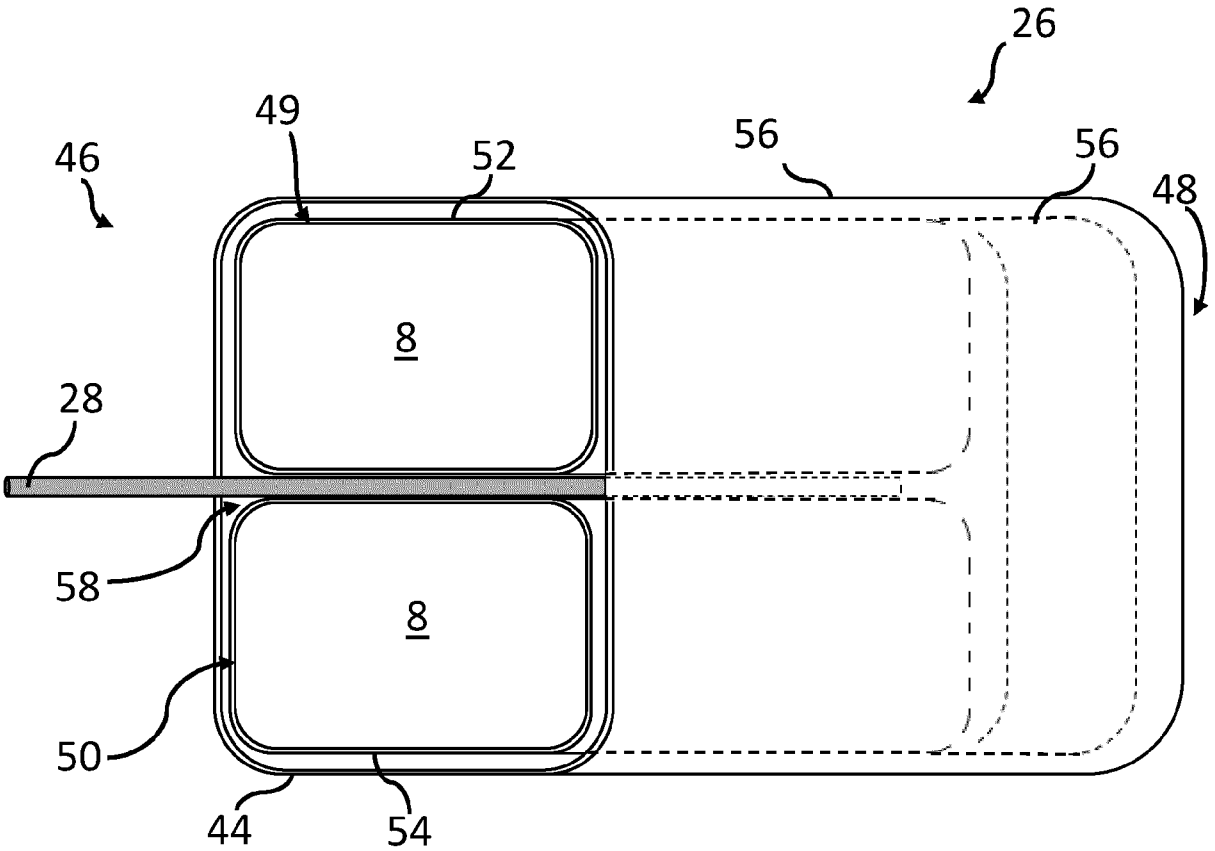

Figure 8

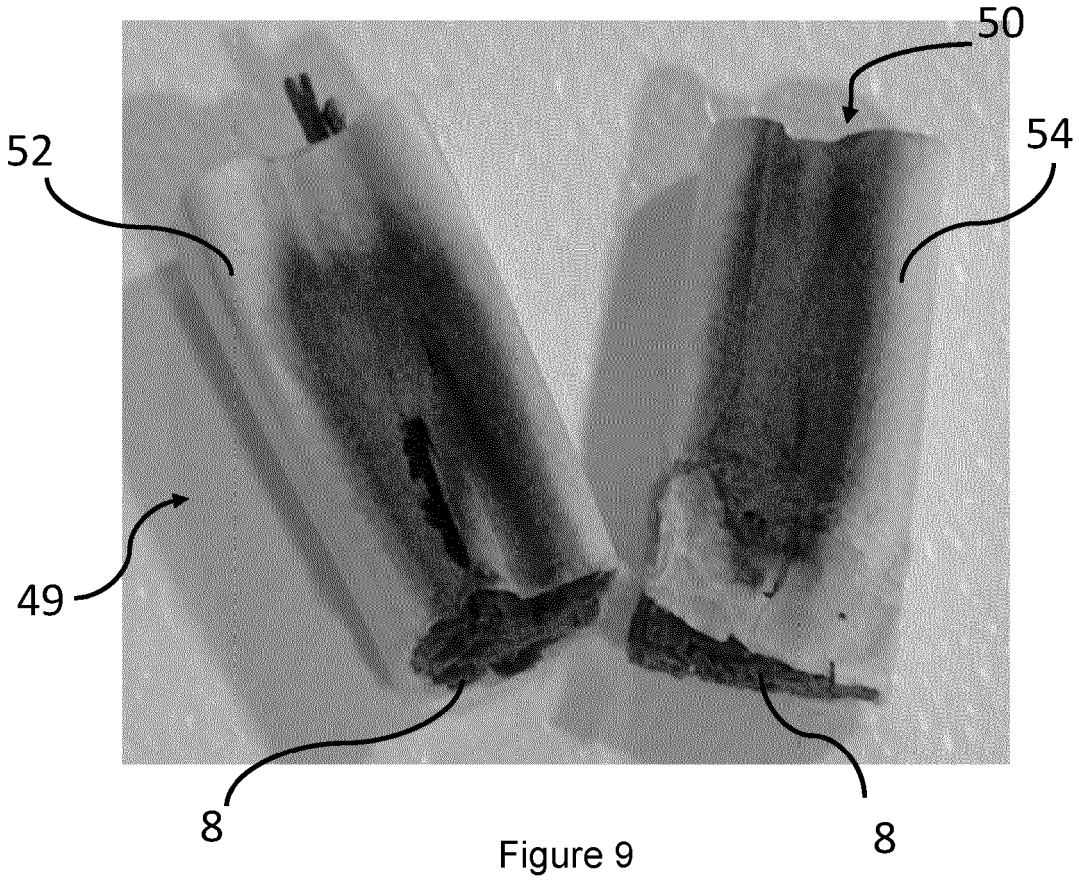

Figure 9

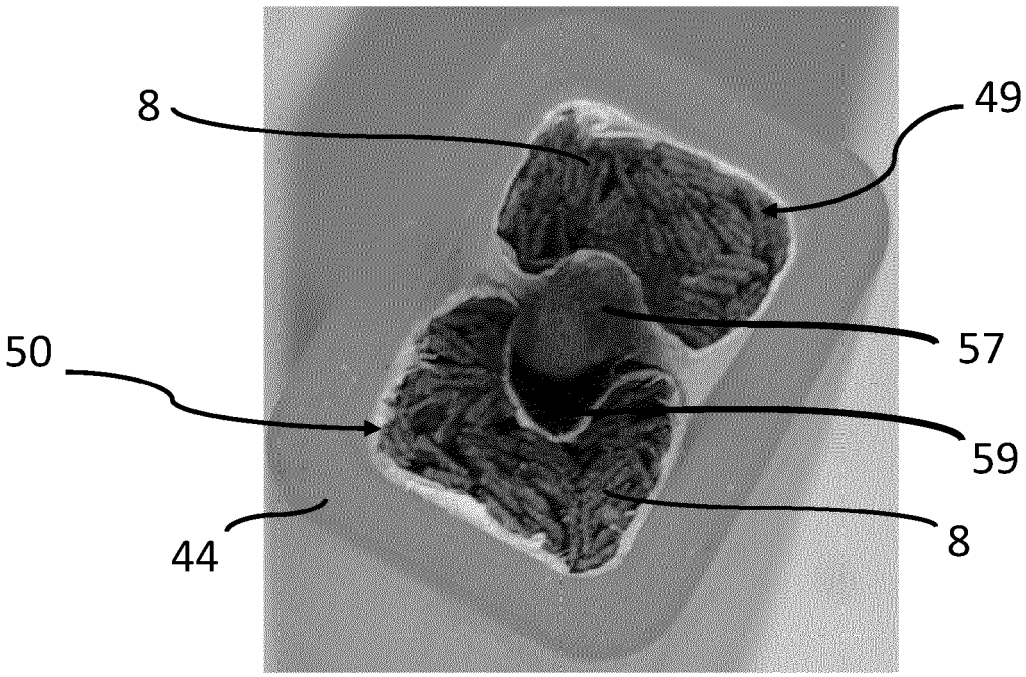

Figure 10

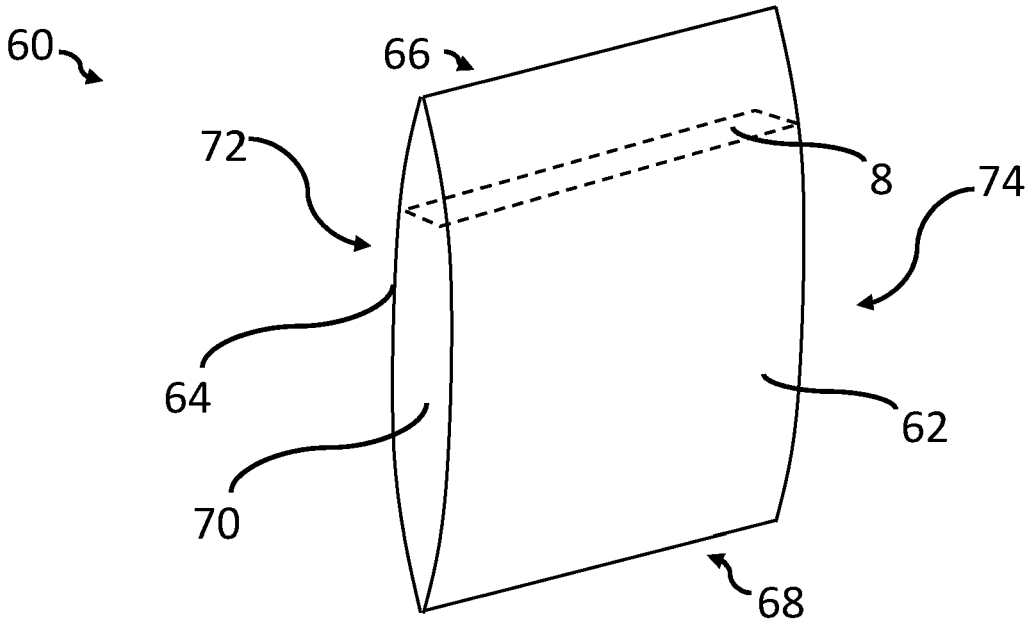

Figure 11

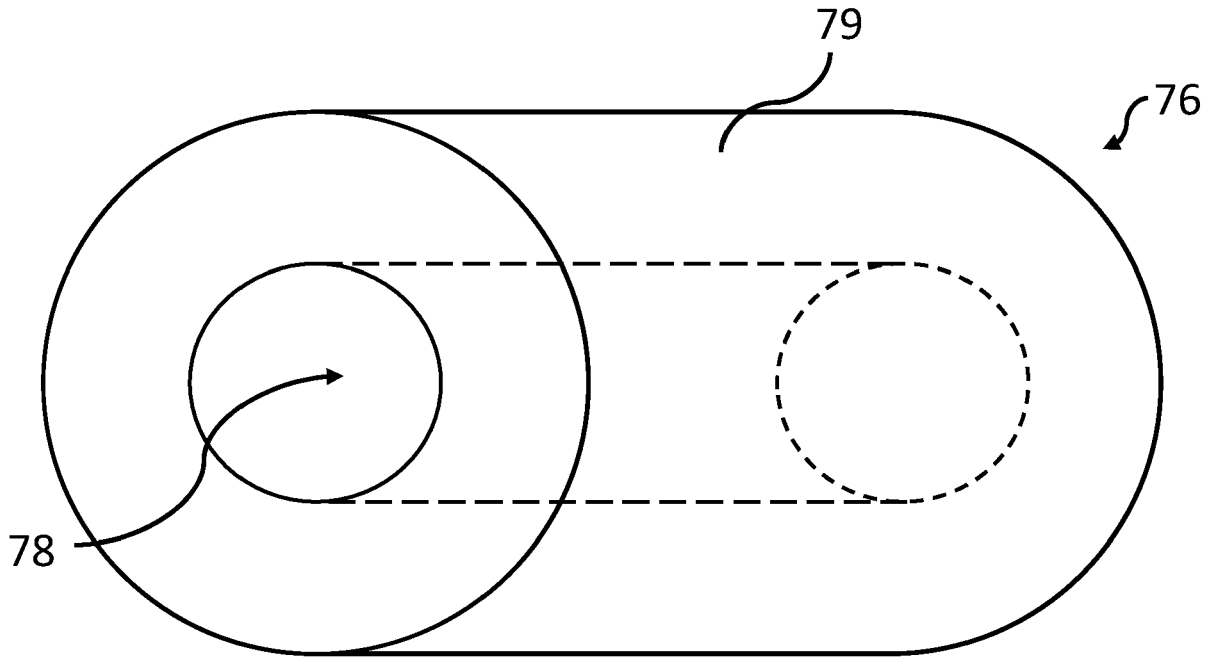

Figure 12

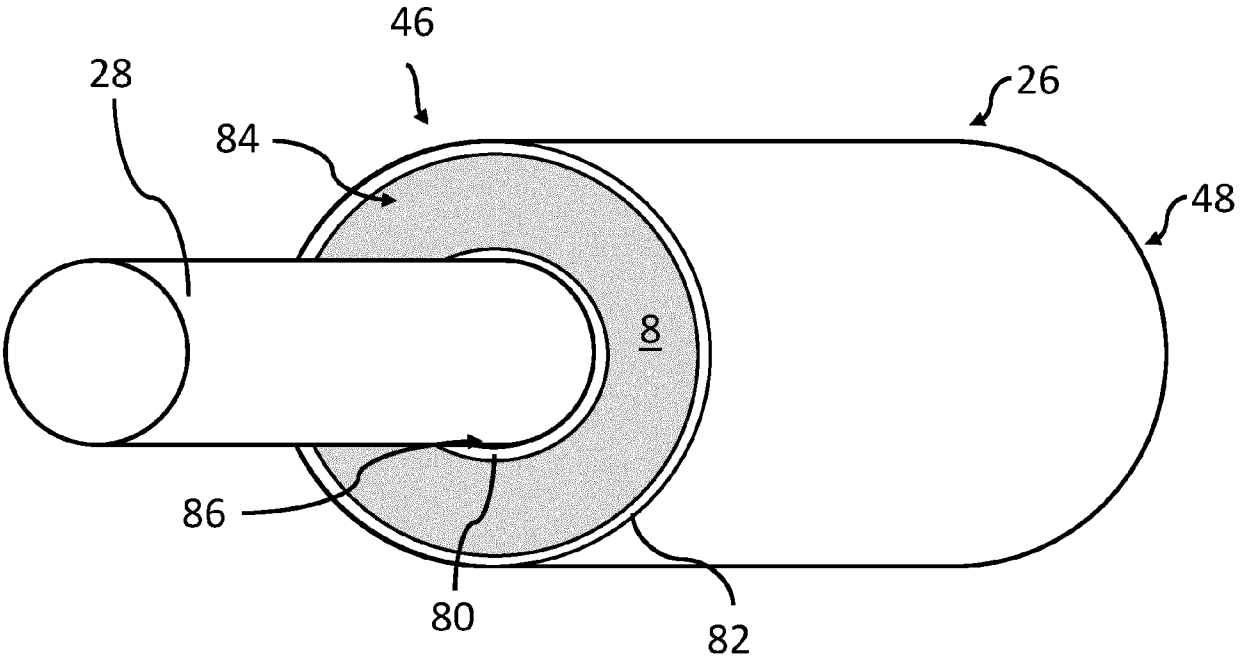

Figure 13

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EUROPEAN SEARCH REPORT

Application Number
EP 23 21 7705

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 2022/240574 A1 (MURRAY SAMANTHA [GB] ET AL) 4 August 2022 (2022-08-04) * paragraphs [0002], [0021], [0083] - [0085], [0096], [0098] - [0101], [0113] - [0119], [0215] - [0217], [3072] - [0377]; figures 2, 5A-6B *	1-6,13, 14,16,18	INV. A24D1/20 A24F40/42 A24F40/46
X A	US 2018/343920 A1 (SUTTON JOSEPH [GB] ET AL) 6 December 2018 (2018-12-06) * paragraphs [0002], [0004], [0007], [0050], [0052], [0054], [0069]; figures 2-7 *	1,3-5, 7-10,12, 16,18 11	
X	US 2021/307383 A1 (DAVIS ANDREW [GB] ET AL) 7 October 2021 (2021-10-07) * paragraphs [0001], [0003] - [0005], [0106], [0107], [0181], [0182], [0223]; figures 5, 6 *	1,13,15, 16,18	
X	US 2021/368851 A1 (KALJURA KARL [GB] ET AL) 2 December 2021 (2021-12-02) * paragraphs [0002], [0004], [0029], [0096] - [0098], [0154], [0159], [0223], [0224]; figures 3-5 *	1,13,15, 16,18	TECHNICAL FIELDS SEARCHED (IPC) A24D A24F
X	KR 102 542 598 B1 (KT & G CORP [KR]) 12 June 2023 (2023-06-12) * paragraphs [0001], [0006], [0009], [0022], [0023], [0029], [0030], [0040]; figures 1, 3 *	1,16-18	

-/--

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	29 April 2024	Schäfer, Lucas

CATEGORY OF CITED DOCUMENTS

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EUROPEAN SEARCH REPORT

Application Number
EP 23 21 7705

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	WO 2023/275318 A1 (JT INT SA [CH]) 5 January 2023 (2023-01-05) * page 2, line 12 - line 15 * * Claims 1, 10, 13 * * page 8, line 33 - line 34 * * page 12, line 29 - line 36; figures 4,5 * -----	1,4, 8-12,16, 18	

TECHNICAL FIELDS SEARCHED (IPC)

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	29 April 2024	Schäfer, Lucas

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& : member of the same patent family, corresponding document

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29-04-2024

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2022240574 A1	04-08-2022	EP 4017291 A1	29-06-2022
		US 2022240574 A1	04-08-2022
		WO 2021037694 A1	04-03-2021
US 2018343920 A1	06-12-2018	CN 107427087 A	01-12-2017
		EP 3277112 A2	07-02-2018
		EP 3569080 A2	20-11-2019
		JP 6709231 B2	10-06-2020
		JP 2018512143 A	17-05-2018
		RU 2670043 C1	17-10-2018
		RU 2018135021 A	06-11-2018
		US 2018343920 A1	06-12-2018
		US 2023337720 A1	26-10-2023
		WO 2016156493 A2	06-10-2016
US 2021307383 A1	07-10-2021	EP 3829365 A2	09-06-2021
		JP 7459052 B2	01-04-2024
		JP 2021532788 A	02-12-2021
		JP 2024020223 A	14-02-2024
		KR 20210030386 A	17-03-2021
		RU 2768782 C1	24-03-2022
		US 2021307383 A1	07-10-2021
		WO 2020025738 A2	06-02-2020
US 2021368851 A1	02-12-2021	EP 3829364 A1	09-06-2021
		JP 7294700 B2	20-06-2023
		JP 2021532754 A	02-12-2021
		KR 20210035282 A	31-03-2021
		KR 20240013277 A	30-01-2024
		US 2021368851 A1	02-12-2021
		WO 2020025737 A1	06-02-2020
KR 102542598 B1	12-06-2023	NONE	
WO 2023275318 A1	05-01-2023	EP 4362717 A1	08-05-2024
		KR 20240027610 A	04-03-2024
		WO 2023275318 A1	05-01-2023

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