



EUROPEAN PATENT APPLICATION

(43) Date of publication:
24.02.2021 Bulletin 2021/08

(51) Int Cl.:
A24F 40/42 (2020.01)

(21) Application number: **19193272.2**

(22) Date of filing: **23.08.2019**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(71) Applicant: **NERUDIA LIMITED**
Liverpool Merseyside L24 9HP (GB)

(72) Inventor: **The designation of the inventor has not yet been filed**

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

(54) **A SUBSTITUTE SMOKING CONSUMABLE**

(57) Disclosed is a heat not burn (HNB) consumable having a housing comprising an outlet aperture at a downstream end of the housing, an end wall at an opposing upstream end of the housing, the end wall com-

prising at least one inlet aperture formed therein, and a chamber housing an aerosol forming substrate, the chamber fluidly connected between the at least one inlet aperture and the outlet aperture.

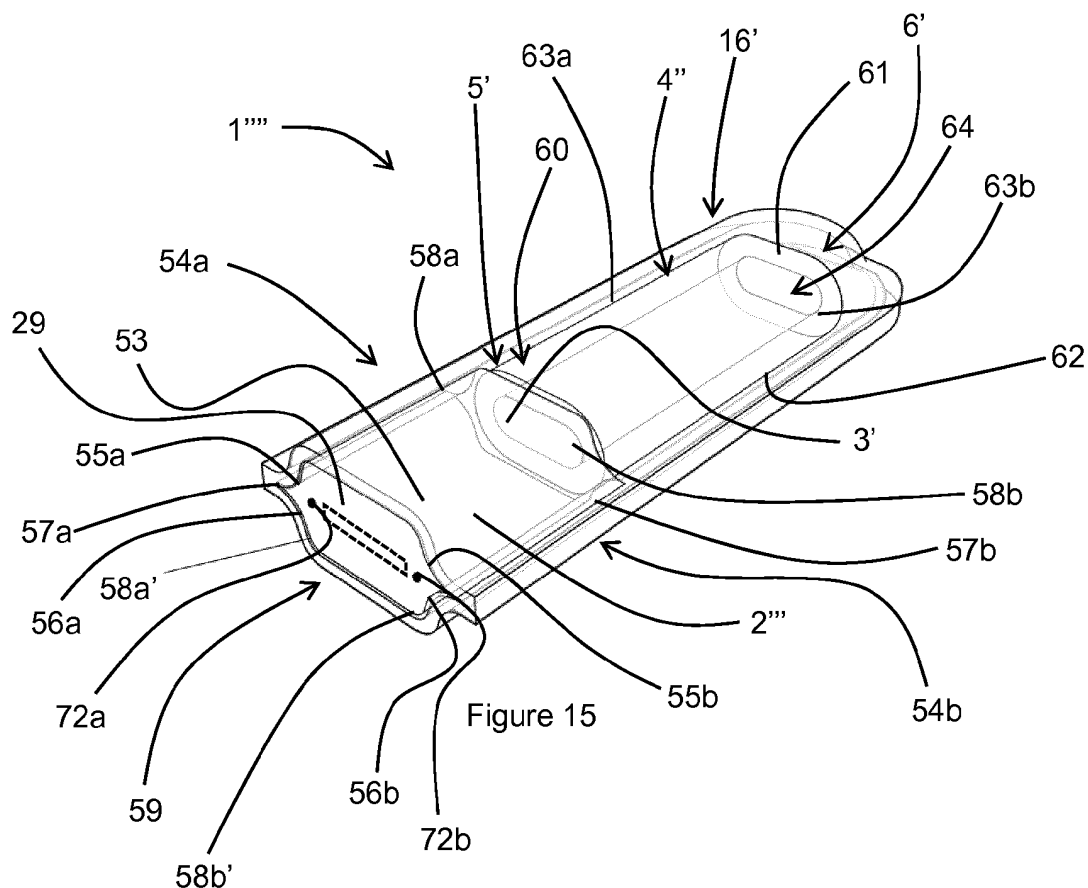


Figure 15

Description

Field of the disclosure

[0001] The present disclosure relates to a consumable for a smoking substitute device. In particular, but not exclusively, to a heat not burn consumable. It also relates to a heat not burn system comprising a consumable and a heating element, and a device for housing the system.

Background

[0002] The "smoking" of tobacco is generally considered to expose a smoker to potentially harmful substances. It is generally thought that a significant amount of the potentially harmful substances are generated through the heat caused by the burning and/or combustion of the tobacco and the constituents of the burnt tobacco in the tobacco smoke itself.

[0003] Conventional combustible smoking articles, such as cigarettes, typically comprise a cylindrical rod of tobacco comprising shreds of tobacco which is surrounded by a wrapper, and usually also a cylindrical filter axially aligned in an abutting relationship with the wrapped tobacco rod. The filter typically comprises a filtration material which is circumscribed by a plug wrap. The wrapped tobacco rod and the filter are joined together by a wrapped band of tipping paper that circumscribes the entire length of the filter and an adjacent portion of the wrapped tobacco rod. A conventional cigarette of this type is used by lighting the end opposite to the filter, and burning the tobacco rod. The smoker receives mainstream smoke into their mouth by drawing on the mouth end or filter end of the cigarette.

[0004] Combustion of organic material such as tobacco is known to produce tar and other potentially harmful by-products. There have been proposed various smoking substitute systems (or "substitute smoking systems") in order to avoid the smoking of tobacco.

[0005] Such smoking substitute systems can form part of nicotine replacement therapies aimed at people who wish to stop smoking and overcome a dependence on nicotine.

[0006] Smoking substitute systems include electronic systems that permit a user to simulate the act of smoking by producing an aerosol (also referred to as a "vapour") that is drawn into the lungs through the mouth (inhaled) and then exhaled. The inhaled aerosol typically bears nicotine and/or flavourings without, or with fewer of, the odour and health risks associated with traditional smoking.

[0007] In general, smoking substitute systems are intended to provide a substitute for the rituals of smoking, whilst providing the user with a similar experience and satisfaction to those experienced with traditional smoking and with combustible tobacco products. Some smoking substitute systems use smoking substitute articles that are designed to resemble a traditional cigarette and are

cylindrical in form with a mouthpiece at one end.

[0008] The popularity and use of smoking substitute systems has grown rapidly in the past few years. Although originally marketed as an aid to assist habitual smokers wishing to quit tobacco smoking, consumers are increasingly viewing smoking substitute systems as desirable lifestyle accessories.

[0009] There are a number of different categories of smoking substitute systems, each utilising a different smoking substitute approach.

[0010] One approach for a smoking substitute system is the so-called "heat not burn" ("HNB") approach in which tobacco (rather than an "e-liquid") is heated or warmed to release vapour. The tobacco may be leaf tobacco or reconstituted tobacco. The vapour may contain nicotine and/or flavourings. In the HNB approach the intention is that the tobacco is heated but not burned, i.e. the tobacco does not undergo combustion.

[0011] A typical HNB smoking substitute system may include a device and a consumable. The consumable may include the tobacco material. The device and consumable may be configured to be physically coupled together. In use, heat may be imparted to the tobacco material by a heating element of the device, wherein airflow through the tobacco material causes moisture in the tobacco material to be released as vapour. A vapour may also be formed from a carrier in the tobacco material (this carrier may for example include propylene glycol and/or vegetable glycerine) and additionally volatile compounds released from the tobacco. The released vapour may be entrained in the airflow drawn through the tobacco.

[0012] As the vapour passes through the consumable (entrained in the airflow) from an inlet to a mouthpiece (outlet), the vapour cools and condenses to form an aerosol for inhalation by the user. The aerosol will normally contain the volatile compounds.

[0013] In HNB smoking substitute systems, heating as opposed to burning the tobacco material is believed to cause fewer, or smaller quantities, of the more harmful compounds ordinarily produced during smoking. Consequently, the HNB approach may reduce the odour and/or health risks that can arise through the burning, combustion and pyrolytic degradation of tobacco.

[0014] A first existing implementation of the HNB approach is the IQOS™ device from Philip Morris Ltd. The IQOS™ device uses a consumable, including reconstituted tobacco contained within a metallic foil and paper wrapper. The consumable is a cylindrical, rod-shaped consumable designed to resemble a traditional cigarette which is inserted into a heater device. The heater device has a thermally conductive heating blade which penetrates the reconstituted tobacco of the consumable, when the consumable is inserted into the heating device. Activation of the heating device heats the heating element, which, in turn, heats the tobacco in the consumable. The heating of the tobacco causes it to release nicotine vapour and flavours which may be drawn through the mouthpiece by the user through inhalation.

[0015] A second existing implementation of the HNB approach is the device known as Glo™ from British American Tobacco. Glo™ also uses a rod-shaped consumable similar in appearance to a traditional cigarette. The consumable includes reconstituted tobacco in a paper wrapping which is heated in a heating device. When the consumable is placed in the heating device, the tobacco is surrounded by a heating element. Activation of the heating device heats the heating element, which, in turn, heats the tobacco in the consumable. The heating of the tobacco causes it to release nicotine vapour and flavours which may be drawn through the consumable by the user through inhalation. The tobacco, when heated by the heating device, is configured to produce vapour when heated rather than when burned (as in a traditional cigarette). The tobacco may contain high levels of aerosol formers (carrier), such as vegetable glycerine ("VG") or propylene glycol ("PG").

[0016] Common to both the IQOS™ and Glo™ systems is uneven and incomplete heating of the tobacco, or possible burning of some regions of the tobacco.

[0017] Both devices also fail to conceal the residues which remain in the consumable after heating, these residues being both aesthetically displeasing and also presenting a contamination risk to the user during removal of the consumable from the device.

[0018] Furthermore, the aerosol formers may leach from the consumable to stain and/or dampen the paper wrapping which is aesthetically unappealing and which can lead to transfer of the aerosol formers to contaminate the user.

[0019] Aspects and embodiments of the disclosure were devised with the foregoing in mind.

Summary

[0020] At its most general, the present disclosure relates to an aerosol-forming article e.g. a smoking substitute article such as an HNB consumable comprising a housing for at least partly containing an aerosol-forming substrate, the housing having an end wall with one or more apertures formed therein for airflow through the substrate.

[0021] In a first aspect, there is provided a heat not burn (HNB) consumable having a housing comprising:

an outlet aperture at a downstream end of the housing;

an end wall at an opposing upstream end of the housing, the end wall comprising at least one inlet aperture formed therein; and

a chamber housing an aerosol forming substrate, the chamber fluidly connected between the at least one inlet aperture and the outlet aperture.

[0022] The provision of a housing having a chamber

that houses the aerosol forming substrate may e.g. protect the aerosol forming substrate from the external environment. The provision of an inlet aperture may allow airflow through or past the aerosol forming substrate during use.

[0023] As used herein, the terms "upstream" and "downstream" are intended to refer to the flow direction of the vapour/aerosol i.e. with the downstream end of the consumable being the mouth end or outlet where the aerosol exits the consumable for inhalation by the user. The upstream end of the consumable is the opposing end to the downstream end.

[0024] Optional features will now be set out. These are applicable singly or in any combination with any aspect.

[0025] The end wall may be at a longitudinal end of the housing. In this respect, the end wall may be an upstream longitudinal end wall of the housing.

[0026] The housing may substantially fully enclose the aerosol forming substrate (i.e. except for the aperture formed in the end wall). In this way, the housing may obscure the aerosol forming substrate from view.

[0027] The end wall may be in the form of a pierceable membrane or may comprise a pierceable membrane. The pierceable membrane may extend across an opening formed at the upstream end of the housing.

[0028] The membrane may seal the opening prior to use and may be pierced to mount the consumable on a heating element of a heat not burn device. The provision of at least one aperture in the pierceable membrane (in addition to a piercing created upon insertion of the heating element) may allow air to flow through the membrane and into the cavity containing the aerosol forming substrate even when a heating element is received there-through. This may help to thermally manage the aerosol-forming substrate when e.g. it is heated by a heating element. That is, the air may help to distribute heat throughout the aerosol-forming substrate so as to avoid hot spots within the aerosol forming substrate in use.

[0029] In other embodiments, the end wall may be integral with the rest of the housing. Hence, the end wall may be formed of the same material as the rest of the housing.

[0030] The at least one aperture may be spaced from a centre (i.e. central point) or central region of the end wall (e.g. the membrane). The at least one aperture may be located closer to a periphery of the end wall than the centre (i.e. central point) of the end wall. The housing may be elongate so as to define a longitudinal axis extending centrally through the housing. The centre of the end wall may be aligned with the longitudinal axis of the housing.

[0031] The at least one aperture may be configured (e.g. sized and shaped) so as to substantially prevent material of the aerosol forming substrate from passing therethrough. For example, where the aerosol forming substrate is formed of e.g. shreds or granules, the at least one aperture may be sized such that it has at least one dimension (e.g. width, length, diameter) smaller than the

shreds or granules. In this way, the end wall may retain the aerosol forming substrate in the chamber, whilst the at least one aperture allows the flow of fluid (i.e. air) into and through the chamber. The at least one aperture may be circular, or e.g. may be a slot. The at least one aperture may have a diameter (or width, or length) that is less than e.g. 3 mm, or less than e.g. 2 mm or 1mm.

[0032] The end wall may comprise at least two apertures. The end wall may comprise more than two apertures (e.g. three, four, or five apertures). The at least two aperture may both be spaced from the centre (or central region) of the end wall. The at least two apertures may be spaced either side of the centre of the end wall. For example, the at least two apertures and the centre of the end wall may be aligned in a linear manner (i.e. along an axis perpendicular to the longitudinal axis of the housing).

[0033] The provision of a plurality of apertures may further provide a pressure drop within the aerosol forming substrate, so as to reduce the speed of the air flowing through the aerosol-forming substrate. This may increase the quantity of vapour/aerosol entrained in the air flow in use.

[0034] The end wall may comprise opposing upper and lower edges, and transverse edges extending between the upper and lower edges. The upper and lower edges may be substantially linear (i.e. straight) and parallel to one another. The end wall may comprise at least one curved edge portion (e.g. convex or concave edge portion). For example, at least one and preferably both of the opposing transverse edges may be a curved. The concave edge portion(s) may be spaced from the upper and edges by opposing convex edge portions such that the shape of the end wall is a modified obround where the opposing transverse edges of the shape each take the form of a curly brace/bracket i.e. "{" and "}".

[0035] The length (between the upper and lower edges) and width (between the opposing transverse edges) of the end wall may be unequal e.g. the width may be greater than the length. In such an embodiment, the at least one aperture may be equally spaced from the upper and lower edges. For example, the end wall may comprise two apertures spaced equally between the upper and lower edges. Each of the two apertures may be located proximate a respective transverse edge of the end wall.

[0036] As should be appreciated, the opening of the housing (sealed by the end wall) may have a shape that is similar to (or the same as) the shape of the end wall as described above (e.g. the opening may have a modified obround shape). The opening may be configured (e.g. sized and/or shaped) for receipt of the substrate therethrough (i.e. into the chamber), for example, during assembly of the consumable.

[0037] When the end wall is (or comprises) a pierceable membrane, the pierceable membrane may extend fully across the opening so as to substantially seal the opening (i.e. except for the at least one aperture extending therethrough). Thus, the pierceable membrane may

define an outer surface of the consumable. The pierceable seal may be formed of a foil, such as a metallic (e.g. aluminium) or plastic foil. The periphery (e.g. a peripheral edge) of the pierceable seal may be attached to the housing. The pierceable seal may be adhered to the housing (i.e. by an adhesive). The pierceable seal may be configured to be pierceable by way a heating element of a heat not burn device.

[0038] The aerosol-forming substrate is capable of being heated to release at least one volatile compound that can form an aerosol. The aerosol-forming substrate may be located at the upstream end of the consumable. An upstream end face of the aerosol-forming substrate may be adjacent to (i.e. in contact with) an inner surface of the end wall.

[0039] The cross-sectional shape of the substrate may be substantially the same as the shape of the end wall. The substrate may comprise upper and lower surfaces spaced by opposing longitudinally-extending transverse surfaces wherein the depth of the substrate (between the upper and lower surfaces) and the width of the substrate (between the opposing transverse surfaces) are unequal e.g. the width is greater than the depth.

[0040] In some embodiments, the upper and lower surfaces of the substrate are substantially planar and may be equally spaced by the transverse surfaces (i.e. the upper and lower surfaces are parallel to one another) such that the substrate is a planar substrate.

[0041] By providing the substrate as a planar substrate rather than as a cylindrical rod (having a substantially circular cross section), the substrate has a greater exposed surface area for contact with a heating element thus allowing quicker and more even heat transfer from the heating element to the plant product. In this manner, heating of the substrate can be effected using a heating element at a lower temperature (e.g. around 250 °C) which reduces the chances of burning of the plant product.

[0042] The opposing transverse surfaces may be planar and substantially parallel to one another. Where the upper and lower surfaces are planar, the planar transverse surfaces may be substantially perpendicular to the upper and lower surfaces such that the planar substrate has a substantially rectangular transverse cross section i.e. the substrate is a cuboid substrate.

[0043] The transverse cross section is defined by a face having edges defining the width and depth i.e. the term "transverse cross section" is used to denote a cross section through the consumable perpendicular to the longitudinal axis/length of the planar substrate/consumable. The substrate has opposing longitudinal end faces (an upstream end face and a downstream end face) which will each comprise a transverse cross section.

[0044] In some embodiments, the substrate has at least one curved or rounded surface but a non-circular transverse cross section.

[0045] For example, at least one and preferably both of the opposing transverse surfaces may comprise a

curved or rounded surface/surface portion e.g. at least one and preferably both of the opposing transverse surfaces comprises a convex or concave surface/surface portion.

[0046] For example, one or both of the opposing transverse surfaces may comprise a substantially convex surface (e.g. a semi-circular surface). Accordingly the planar substrate has a substantially obround transverse cross section i.e. the substrate is an obround cylindrical substrate.

[0047] In some embodiments, one or both of the opposing transverse surfaces may be concave or may comprise one or more concave portions. For example, the or each curved/rounded opposing transverse surface(s) may each comprise longitudinally-extending upper and lower concave portions which meet at a longitudinally-extending ridge.

[0048] The concave portion(s) may be spaced from the planar upper and lower surfaces by opposing convex portions such that the transverse cross-section is a modified obround where the opposing side edges of the cross-section each take the form of a curly brace/bracket i.e. "{" and "}". Hereinafter, such a substrate will be referred to as a "modified obround cylindrical substrate".

[0049] In other embodiments, the opposing transverse surfaces may be as described above (i.e. planar, convex, concave or convex and concave) and one or both of the upper/lower surfaces may be curved/rounded e.g. they may be convex rounded surfaces. Where the upper and lower surfaces are convex surfaces and the transverse surfaces are convex, the substrate may have an oval transverse cross-section. Where the upper and lower surfaces are convex surfaces and the transverse surfaces are planar, the substrate may have a truncated oval transverse cross-section. Where the upper and lower surfaces are convex surfaces and the transverse surfaces comprise two concave portions meeting at a longitudinally extending ridge, the substrate may have a modified mandorla transverse cross-section.

[0050] The substrate preferably has a greater width and length than depth. The length and width may be equal but, preferably, the length is greater than the width such that the substrate has substantially rectangular upper and lower surfaces. The length of the substrate (between the upstream and downstream end faces) may be between 10 and 20 mm e.g. between 10 and 15 mm. The width of the substrate (between opposing transverse surfaces) may be between 7 and 18 mm e.g. between 8 and 14 mm or 10 and 12 mm. The depth of the substrate (between the upper and lower surfaces) may be between 1 and 8 mm, e.g. between 2 and 7 mm e.g. around 2 mm or around 6 mm.

[0051] In some embodiments, the consumable comprises a single substrate e.g. a single planar substrate as described above. In this case, the depth of the substrate is preferably between 5 and 7 mm e.g. around 6 mm.

[0052] The substrate may have a single heating sur-

face (one of the upper and lower surfaces) for contact with/for facing a heating element (e.g. a planar heating element) or there may be two opposing surfaces (both of the upper and lower surfaces) each for contact with/for facing one of two heating elements (e.g. planar heating elements). The plant product is then heated externally and inwards from the upper and/or lower heating surfaces.

[0053] In other embodiments, the substrate is heated internally and outwards (towards the upper and lower surfaces).

[0054] This may be achieved by providing a penetrable substrate such that a heating element can be inserted into the substrate e.g. into the upstream end face of the substrate. For example, the heating element may be inserted into the substrate through an aperture in the end wall or through the end wall when it is in the form of a pierceable membrane).

[0055] Alternatively, the substrate may have a hollow core for releasably and slidably receiving the heating element. The at least one aperture may be aligned with the hollow core (i.e. axially aligned) such that air passing through the aperture enters the hollow core. In other embodiments the at least one aperture may be located so as not to be aligned with the hollow core.

[0056] In use, the hollow core receives a heating element (i.e. by insertion of the heating element into the hollow core) which can contact the internal surfaces defining the core thus allowing quicker and more even heat transfer from the heating element to the plant product. In this manner, heating of the plant product can be effected using a heating element at a lower temperature (e.g. around 250 °C) which reduces the chances of burning of the plant product.

[0057] The hollow core is defined by a longitudinally-extending recess extending from the upstream end face of the substrate. The core recess may extend from the upstream end face to the opposing downstream end face.

[0058] The core recess is defined by upper and lower inner surfaces spaced by opposing longitudinally extending inner transverse surfaces. The upper and lower inner surfaces will face the heating element in use.

[0059] The depth of the core recess (between the upper and lower inner surfaces) and the width of the recess (between the opposing inner transverse surfaces) are unequal.

[0060] In some embodiments, the upper and lower inner surfaces are substantially planar and may be equally spaced by the inner transverse surfaces (i.e. the upper and lower inner surfaces are parallel to one another).

[0061] The opposing inner transverse surfaces may be substantially parallel to one another and substantially perpendicular to the upper and lower inner surfaces such that the core recess has a substantially rectangular transverse cross section i.e. the core recess is a cuboid core recess.

[0062] In other embodiments, at least one and preferably both of the opposing inner transverse surfaces may

comprise a curved or rounded (concave or convex) surface.

[0063] For example, one or both of the opposing inner transverse surfaces may comprise a substantially convex surface (e.g. a semi-circular surface) such that the core recess has a substantially obround transverse cross section i.e. the core recess is an obround core recess.

[0064] Where the substrate is a hollow cuboid substrate, it may comprise a cuboid core recess. Where the substrate is an obround cylindrical substrate or a modified obround cylindrical substrate, it may comprise an obround core recess.

[0065] The recess may have a depth (between the upper and lower inner surfaces) of between 0.5 and 2 mm e.g. around 1 mm. The recess may have a width (between the opposing inner transverse surfaces) of between 7 and 14 mm e.g. between 7 and 12 mm or 8 and 10 mm e.g. around 8 mm. The length of the recess may be between 10 and 20 mm e.g. between 10 and 15 mm.

[0066] In these embodiments, the depth of the hollow substrate may be between 4 and 8 mm, e.g. between 5 and 7 mm e.g. around 6 mm.

[0067] In other embodiments, the consumable comprises a plurality of substrates e.g. two planar substrates (which may be as described above). Where there are two planar substrates, the depth of each planar substrate is preferably between 1 and 8 mm, e.g. between 2 and 5 mm e.g. around 2 mm.

[0068] The planar substrates are preferably aligned and spaced from one another to define a planar recess therebetween such that the consumable has a substantially rectangular transverse cross section. The at least one aperture in the end wall may be aligned with the planar recess such that, in use, air passing through the at least one aperture enters the planar recess.

[0069] A heating element can be inserted into the planar recess so as to be releasably housed in the recess. In this way, heat can be transferred quickly and evenly to the plant product via the surfaces defining the planar recess.

[0070] In these embodiments, the substrates will each having an inner heating surface facing the planar recess and an opposing outer surface.

[0071] The two planar substrates are preferably vertically and horizontally aligned. The planar recess is also vertically and horizontally aligned with the planar substrates.

[0072] The surfaces defining the core recess or planar recess may be lined with a thermally conductive material. For example, the surface(s) defining the recess may be at least 50% or 60% covered and preferably at least 70% or 80% or 90% covered. The recess may be fully lined with the thermally conductive material.

[0073] The thermally conductive material may be provided as a foil which may be textured e.g. dimpled.

[0074] The substrate may comprise at least one channel extending into the plant product from either or both of the upstream and downstream longitudinal end faces

of the substrate. The thermally conductive material may extend into the at least one channel. For example, the thermally conductive material may extend from the recess to the at least one channel over the upstream/downstream longitudinal end face of the substrate. This helps increase heat transfer from the heating element within the recess into the substrate.

[0075] The consumable may comprise a further layer of the thermally conductive material, or of a further thermally conductive material, on an outer surface of the plant product opposing the recess.

[0076] The thermally conductive material or the further thermally conductive material may be selected from the group consisting of: carbon or metal/metal alloy such as aluminium; brass; copper; gold; steel; silver; an alloy of one of more thereof; or a mixture of two or more thereof.

[0077] In preferred embodiments, there is a constant depth of plant product between the surface that is heated and the opposing surface. Thus the substrate comprises a heating surface (e.g. a substantially planar heating surface) which, in use, faces a heating element (e.g. a planar heating element), and at least one opposing surface, wherein the depth of the plant product between the heating surface and the at least one and opposing surface is substantially constant.

[0078] By providing the substrate with a substantially planar heating surface (for thermal contact with a heating element), the plant product has a greater exposed surface area for contact with a heating element for allowing quicker heating. The constant depth of plant product between the surfaces results in more even heat transfer from the heating element to the plant product. In this manner, heating of the plant product can be effected using a heating element at a lower temperature (e.g. around 250 °C) which reduces the chances of burning of the plant product.

[0079] The depth of the plant product between the heating and opposing surfaces may be between 1 and 8 mm, e.g. between 2 and 7 mm e.g. around 2 mm or around 6 mm.

[0080] The substrate may be dosed with an e-liquid either in its entirety or in selected portions. For example, the substrate may be dosed with e-liquid at or proximal its heating surfaces.

[0081] The substrate may be dosed with e-liquid at its surfaces which face the heating element(s). For example, the substrate may be dosed with e-liquid at or proximal its upper and/or lower surfaces.

[0082] Where the substrate is a hollow substrate and comprises a hollow core defined by a core recess, the plant product at or proximal one or more of the upper/lower/transverse inner surfaces defining the core recess may be dosed with e-liquid.

[0083] Where the consumable comprises a plurality of planar substrates defining a planar recess, the plant product at or proximal one or both of the surfaces of the planar substrates facing the planar recess may be dosed with e-liquid.

[0084] The e-liquid may contain aerosol formers such as polyglycol (PG) and/or vegetable glycerine (VG). It may contain flavourings.

[0085] The substrate may comprise a hydrophobic or liquid-impermeable outer coating (e.g. on at least the upper and lower surfaces) to prevent seepage or transfer of the e-liquid from the substrate.

[0086] The consumable may further comprise a filter downstream of the substrate. The filter may have a non-circular transverse cross-section. The transverse cross-section of the filter may match the transverse cross-section of the substrate. The filter may be positioned between the downstream end of the substrate and the outlet of the housing.

[0087] The filter may comprise upper and lower surfaces spaced by opposing longitudinally-extending transverse surfaces wherein the depth of the filter (between the upper and lower surfaces) and the width of the filter (between the opposing transverse surfaces) are unequal.

[0088] In some embodiments, the upper and lower surfaces are substantially planar and may be equally spaced by the transverse surfaces (i.e. the upper and lower surfaces are parallel to one another) such that the filter is a planar filter.

[0089] The opposing transverse surfaces may be substantially parallel to one another and substantially perpendicular to the upper and lower surfaces such that the planar filter has a substantially rectangular transverse cross section i.e. the filter is a cuboid filter.

[0090] In other embodiments, at least one and preferably both of the opposing transverse surfaces may comprise a curved or rounded (concave or convex) surface.

[0091] For example, one or both of the opposing transverse surfaces may comprise a substantially convex surface (e.g. a semi-circular surface) such that the filter has a substantially obround transverse cross section i.e. the filter is an obround cylindrical filter.

[0092] In some embodiments, one or both of the opposing transverse surfaces may be concave or may comprise one or more concave portions. For example, the or each curved/rounded opposing transverse surface(s) may each comprise longitudinally-extending upper and lower concave portions which meet at a longitudinally-extending ridge.

[0093] The concave portion(s) may be spaced from the planar upper and lower surfaces by opposing convex portions such that the transverse cross-section is a modified obround where the opposing side edges of the cross-section each take the form of a curly brace/bracket i.e. "{" and "}". Hereinafter, such a filter will be referred to as a "modified obround cylindrical filter".

[0094] In other embodiments, the opposing transverse surfaces may be as described above (i.e. planar, convex, concave or convex and concave) and one or both of the upper/lower surfaces may be curved/rounded e.g. they may be convex rounded surfaces. Where the upper and lower surfaces are convex surfaces and the transverse

surfaces are planar, the filter may have a truncated oval transverse cross-section. Where the upper and lower surfaces are convex surfaces and the transverse surfaces are convex, the filter may have an oval transverse cross-section. Where the upper and lower surfaces are convex surfaces and the transverse surfaces comprise two concave portions meeting at a longitudinally extending ridge, the filter may have a modified mandorla transverse cross-section.

[0095] The filter preferably has a greater width and length than depth. The depth of the filter may be between 4 and 8 mm, e.g. between 5 and 7 mm e.g. around 6 mm. The width of the filter may be between 7 and 18 mm e.g. between 8 and 14 mm or 10 and 12 mm. The length of the filter may be between 2mm and 25 mm e.g. between 3mm and 22mm.

[0096] The filter has an upstream longitudinal end face which faces and may abut the downstream longitudinal end face of the substrate.

[0097] The downstream longitudinal end face of the filter may comprises a curved/rounded surface (e.g. a convex surface such as a semi-circular surface).

[0098] The filter may comprise a hollow bore. The hollow bore may extend from the upstream longitudinal end face of the filter to the downstream longitudinal face of the filter.

[0099] The hollow bore may have a circular, rectangular or obround transverse cross sectional area. The bore may have a uniform transverse cross-sectional area.

[0100] The filter may be comprised of cellulose acetate or polypropylene tow. The filter may be comprised of activated charcoal. The filter may be comprised of paper. The filter may be comprised of plant material e.g. extruded or pressed plant material. The filter may be circumscribed with a plug wrap e.g. a paper plug wrap.

[0101] For the avoidance of doubt, the filter may have a density/porosity/permeability that at least partly blocks the passage (filters out) at least one of the components of the aerosol/vapour or, in other embodiments, the "filter" may have a density/porosity/permeability such that it is permeable to (allows the passage of) all components of the aerosol/vapour.

[0102] In some embodiments, the filter may comprise at least one liquid release member.

[0103] The liquid release member can comprise an envelope for containing the liquid. The envelope can be rigid and fragmentable under pressure (e.g. upon contact with the heating element). Alternatively, the envelope can be meltable upon application of heat.

[0104] The liquid release member may contain an aerosol former such as vegetable glycerine and/or propylene glycol. By containing the aerosol former within a liquid release member that is configured to release the liquid (e.g. aerosol former) upon use, seepage of the liquid from the consumable to contaminate the user is avoided. The liquid release member may comprise a flavouring.

[0105] The liquid release member may positioned proximal the abutment between the filter (e.g. at the up-

stream longitudinal end face of the filter) and the substrate (i.e. the downstream longitudinal end face of the filter) so that upon release, the liquid can penetrate the plant product in the substrate.

[0106] The consumable may comprise a spacer e.g. a paper/cardboard spacer interposed between the filter and the substrate. The spacer defines a space or cavity or chamber downstream from the aerosol-forming substrate. For example, it may be provided between the aerosol-forming substrate and the filter. The spacer acts to allow both cooling and mixing of the aerosol.

[0107] The spacer may be a planar spacer e.g. having a substantially rectangular or substantially obround transverse cross section. The spacer may have a transverse cross-section matching the transverse cross section of the substrate and/or filter.

[0108] The spacer preferably has a greater width and length than depth. The length and width may be equal but, preferably, the width is greater than the length. The depth of the spacer may be between 4 and 8 mm, e.g. between 5 and 7 mm e.g. around 6 mm. The width of the spacer may be between 7 and 18 mm e.g. between 8 and 14 mm or 10 and 12 mm.

[0109] The consumable may further comprise a wrapping e.g. a paper or cardboard wrapping that encloses the upper and lower surfaces and the transverse walls of the substrate (and filter/spacer where present).

[0110] In embodiments where the substrate comprises at least one channel extending into the plant product from the upstream longitudinal end face of the substrate (as described above), the wrapping e.g. the cardboard wrapping may comprise a transverse extension which extends to cover a portion of the upstream longitudinal end face of the substrate. The transverse extension may then comprise an inwardly-depending axial extension extending inwards into the at least one channel in the substrate.

[0111] The housing may have a non-circular transverse cross-section. The transverse cross-section of the housing may match the transverse cross-section of the substrate. The transverse cross-section of the housing may match the shape of the end wall.

[0112] The housing may be self-supporting. The term "self-supporting" is intended to refer to a housing formed of a material that does not flex or bend under its own weight.

[0113] Preferably, the housing is formed of a material that is substantially rigid or semi-rigid i.e. it is not easily flexible.

[0114] The paper wrappers provided on the prior art consumables are relatively thin and flimsy. Whilst physically containing the plant product before and after use of the consumable, they do not effectively contain residues in the spent consumable and handling of the spent consumable can result in residue transfer to the user. By providing a more structurally robust (self-supporting) housing, the consumable becomes more akin to a cartridge or "pod" that effectively contains residue after use to protect a user from contamination.

[0115] At least a portion and preferably the whole of the housing has a wall thickness in the range of 0.8 to 8.0 mm, e.g. 1.5 to 5.0 mm.

[0116] The housing may have an inner surface defining a chamber housing the substrate wherein the inner surface is textured e.g. it may have a mesh texture.

[0117] The housing may be formed at least partly and preferably entirely of a biodegradable material such as cornstarch, bamboo, wood, palm, sugarcane, cardboard or paperboard, recycled or recyclable (thermoplastic) polymer material.

[0118] It may be formed of moulded pulp material e.g. natural fibre pulp material. The housing may be at least partly formed of moulded tobacco cellulose pulp, wood pulp, bamboo pulp, palm pulp or bagasse pulp. Bagasse pulp is most preferred. As discussed above, the end wall may be formed of the same material as the rest of the housing. Thus, for example, the end wall may be formed of bagasse pulp.

[0119] The housing may comprise upper and lower walls spaced by opposing longitudinally-extending transverse walls wherein the depth of the housing (between the upper and lower walls) and the width of the housing (between the opposing transverse walls) are unequal e.g. the width is greater than the depth. Upstream ends/edges of the upper, lower, and transverse walls may define an opening of the housing. Where the end wall is in the form of a pierceable membrane, it may be attached (e.g. adhered) to the upstream ends of the upper, lower and transverse walls so as to extend across the opening.

[0120] In some embodiments, the upper and lower walls are substantially planar and may be equally spaced by the transverse walls (i.e. the upper and lower walls are parallel to one another) such that the housing is a planar housing.

[0121] The opposing transverse walls may be planar and substantially parallel to one another. Where the upper and lower walls are planar, the planar transverse walls may be substantially perpendicular to the upper and lower walls such that the planar housing has a substantially rectangular transverse cross section i.e. the housing is a cuboid housing.

[0122] In some embodiments, the housing has at least one curved or rounded wall (e.g. a concave or convex wall) but a non-circular transverse cross section.

[0123] For example, at least one and preferably both of the opposing transverse walls may be a curved or rounded wall (e.g. a concave or convex wall).

[0124] For example, one or both of the opposing transverse walls may be a substantially convex wall (e.g. a semi-circular wall). Accordingly the planar housing may have a substantially obround transverse cross section i.e. the housing is an obround cylindrical housing.

[0125] In some embodiments, one or both of the opposing transverse walls may be a concave wall or may comprise one or more concave portions. For example, the or each curved/rounded opposing transverse wall(s) may each comprise longitudinally-extending upper and

lower concave portions which meet at a longitudinally-extending ridge.

[0126] The concave portion(s) may be spaced from the planar upper and lower walls by opposing convex portions such that the transverse cross-section is a modified obround where the opposing side edges of the cross-section each take the form of a curly brace/bracket i.e. "{" and "}". Hereinafter, such a housing will be referred to as a "modified obround cylindrical substrate".

[0127] In other embodiments, the opposing transverse walls may be as described above (i.e. planar, convex, concave or convex and concave) and one or both of the upper/lower walls may be curved/rounded e.g. they may be convex rounded walls. Where the upper and lower walls are convex walls and the transverse walls are convex, the housing may have an oval transverse cross-section. Where the upper and lower walls are convex walls and the transverse walls are planar, the housing may have a truncated oval transverse cross-section. Where the upper and lower walls are convex walls and the transverse walls comprise two concave portions meeting at a longitudinally extending ridge, the housing may have a modified mandorla transverse cross-section.

[0128] The chamber within and defined by the inner surfaces of the housing walls may be a cuboid chamber, an obround cylindrical chamber, a modified obround cylindrical chamber or a modified mandorla chamber.

[0129] The chamber within the housing preferably has the same transverse cross section as the housing.

[0130] Preferably, the transverse cross-section of the housing and the chamber matches the transverse cross-section of the substrate.

[0131] The housing may have a downstream longitudinal end wall opposing the upstream longitudinal end wall. The downstream longitudinal end wall may comprise the outlet/mouthpiece aperture. The downstream longitudinal end wall may comprise a curved/rounded (e.g. a convex/semi-circular) end wall.

[0132] The inner surface of the downstream longitudinal end wall of the housing may abut the downstream longitudinal end surface of the filter.

[0133] At least one (and optionally both) of the opposing transverse walls of the housing may comprise a longitudinally-extending junction such that the housing can be opened to expose the chamber within.

[0134] The downstream longitudinal end /wall may also comprise a junction.

[0135] For example, both of the opposing transverse walls and the downstream longitudinal end wall could comprise a respective junction such that the housing can be split into two opposing parts allowing for easy insertion during manufacture of the substrate (and filter/spacer where present).

[0136] Alternatively, one of the opposing transverse walls and the upstream longitudinal end wall may contain the junctions and the other transverse wall may contain a longitudinally extending hinge portion such that the housing may be opened along the junctions by pivoting

of the two opposing parts about the hinge portion. Where the consumable comprises two planar substrates, each planar substrate may be mounted (e.g. glued) into a respective part (e.g. half) of the housing such that when the two opposing parts are brought together, the planar substrates are spaced from one another to define the planar recess therebetween (as discussed above).

[0137] The housing may have a single heating surface (an outer surface of one of the upper and lower walls) for contact with/for facing a heating element (e.g. a planar heating element) or there may be two opposing surfaces (outer surfaces of both of the upper and lower walls) each for contact with/for facing one of two heating elements (e.g. planar heating elements). The housing, and thus the aerosol-forming substrate contained in the housing, is then heated externally and inwards from the heating surface(s) of the upper and/or lower walls.

[0138] As discussed above, the downstream longitudinal end of the housing comprises a downstream longitudinal end wall. The outlet aperture may be formed in this downstream longitudinal end of the housing. The longitudinal end wall (and the outlet aperture) may define a mouthpiece of the consumable (i.e. for receipt in a user's mouth).

[0139] The filter is typically provided adjacent e.g. with its downstream longitudinal end face abutting this longitudinal end wall of the housing (i.e. adjacent the outlet). Thus the downstream longitudinal end wall at least partly (and preferably completely) obscures/conceals the filter from view by the user.

[0140] By concealing the filter from view, the user is not exposed to the residues remaining in the filter/consumable after use thus improving the aesthetic appeal of the consumable after use and avoiding transfer of residue to the user.

[0141] Although the downstream longitudinal end wall may comprise the outlet/mouthpiece aperture(s), this/these are typically small enough that visual inspection of the filter is significantly impeded compared to the prior art consumable where the end face of the filter is completely exposed. Thus whilst the downstream longitudinal wall may be discontinuous, it preferably covers (e.g. overlies or abuts) at least 20% e.g. at least 30 or 40 % and preferably at least 50%, e.g. at least 70% such as at least 80% or 90% of the surface area of the downstream longitudinal end face of the filter.

[0142] The (i.e. upstream longitudinal) end wall may substantially fully or partly obscure the substrate from view at least prior to use.

[0143] The upstream longitudinal end wall may comprise a perimeter wall i.e. it may extend only around one or more of the edges of the upstream longitudinal end face of the housing. For example, it may extend around all edges to form a frame defining the opening (into which the heating element can be inserted). The aperture may be dimensioned to match the dimensions of the hollow core recess when the substrate is a hollow core substrate.

[0144] In other embodiments, the upstream longitudinal end wall of the housing may extend along the upper and lower edges to form rails defining the opening therebetween. The opening may be dimensioned to match the dimensions of the planar recess when the consumable comprises two planar substrates.

[0145] In embodiments where the substrate comprises at least one channel extending into the plant product from the upstream longitudinal end face of the plant product (as described above), the upstream longitudinal end wall may comprise an inwardly-depending axial extension, extending inwards into the at least one channel in the substrate.

[0146] In order to generate an aerosol, the substrate comprises at least one volatile compound that is intended to be vaporised/aerosolised and that may provide the user with a recreational and/or medicinal effect when inhaled. Suitable chemical and/or physiologically active volatile compounds include the group consisting of: nicotine, cocaine, caffeine, opiates and opioids, cathine and cathinone, kavalactones, mysticin, beta-carboline alkaloids, salvinorin A together with any combinations, functional equivalents to, and/or synthetic alternatives of the foregoing.

[0147] The plant material may comprise least one plant material selected from the list including *Amaranthus dubius*, *Arctostaphylos uva-ursi* (Bearberry), *Argemone mexicana*, *Amica*, *Artemisia vulgaris*, Yellow Tees, *Galea zacatechichi*, *Canavalia maritima* (Baybean), *Cecropia mexicana* (Guamora), *Cestrum nocturnum*, *Cynoglossum virginianum* (wild comfrey), *Cytisus scoparius*, *Damiana*, *Entada rheedii*, *Eschscholzia californica* (California Poppy), *Fittonia albivenis*, *Hippobroma longiflora*, *Humulus japonica* (Japanese Hops), *Humulus lupulus* (Hops), *Lactuca virosa* (Lettuce Opium), *Lagdera alata*, *Leonotis leonurus*, *Leonurus cardiaca* (Motherwort), *Leonurus sibiricus* (Honeyweed), *Lobelia cardinalis*, *Lobelia inflata* (Indian-tobacco), *Lobelia siphilitica*, *Nepeta cataria* (Catnip), *Nicotiana species* (Tobacco), *Nymphaea alba* (White Lily), *Nymphaea caerulea* (Blue Lily), Opium poppy, *Passiflora incarnata* (Passionflower), *Pedicularis densiflora* (Indian Warrior), *Pedicularis groenlandica* (Elephant's Head), *Salvia divinorum*, *Salvia dorrii* (Tobacco Sage), *Salvia species* (Sage), *Scutellaria galericulata*, *Scutellaria lateriflora*, *Scutellaria nana*, *Scutellaria species* (Skullcap), *Sida acuta* (Wireweed), *Sida rhombifolia*, *Silene capensis*, *Syzygium aromaticum* (Clove), *Tagetes lucida* (Mexican Tarragon), *Tarhonanthus camphoratus*, *Tumera diffusa* (Damiana), *Verbascum* (Mullein), *Zamia latifolia* (Maconha Brava) together with any combinations, functional equivalents to, and/or synthetic alternatives of the foregoing.

[0148] Preferably, the plant material is tobacco. Any type of tobacco may be used. This includes, but is not limited to, flue-cured tobacco, burley tobacco, Maryland Tobacco, dark-air cured tobacco, oriental tobacco, dark-fired tobacco, perique tobacco and rustica tobacco. This also includes blends of the above mentioned tobaccos.

[0149] Any suitable parts of the tobacco plant may be used. This includes leaves, stems, roots, bark, seeds and flowers.

[0150] The tobacco may comprise one or more of leaf tobacco, stem tobacco, tobacco powder, tobacco dust, tobacco derivatives, expanded tobacco, homogenised tobacco, shredded tobacco, extruded tobacco, cut rag tobacco and/or reconstituted tobacco (e.g. slurry recon or paper recon).

[0151] The aerosol-forming substrate may comprise reconstituted tobacco. The substrate, especially the hollow core substrate may be formed by extrusion.

[0152] Extruded tobacco can produced by forming a liquid mixture of powered tobacco and a binding agent such as a gum (e.g. xanthan, guar, arabic and/or locust bean gum). The liquid mixture is heated and then extruded through a die. The extrudate is then dried. Flavouring may be added to the liquid mixture prior to extrusion to provide a flavoured extruded substrate e.g. a flavoured extruded hollow core substrate.

[0153] The flavourant may be provided in solid or liquid form. It may include menthol, liquorice, chocolate, fruit flavour (including e.g. citrus, cherry etc.), vanilla, spice (e.g. ginger, cinnamon) and tobacco flavour.

[0154] The aerosol-forming substrate may comprise one or more additives selected from humectants, flavourants, fillers, aqueous/non-aqueous solvents and binders.

[0155] Humectants are provided as vapour generators - the resulting vapour helps carry the volatile active compounds and increases visible vapour. Suitable humectants include polyhydric alcohols (e.g. propylene glycol (PG), triethylene glycol, 1,2-butane diol and vegetable glycerine (VG)) and their esters (e.g. glycerol mono-, di- or tri-acetate). They may be present in the aerosol-forming substrate in an amount between 1 and 50 wt%.

[0156] The humectant content of the aerosol-forming substrate may have a lower limit of at least 1 % by weight of the plant material, such as at least 2 wt %, such as at least 5 wt %, such as at least 10 wt %, such as at least 20 wt %, such as at least 30 wt %, or such as at least 40 wt %.

[0157] The humectant content of the aerosol-forming substrate may have an upper limit of at most 50 % by weight of the plant material, such as at most 40 wt %, such as at most 30 wt %, or such as at most 20 wt %.

[0158] Preferably, the humectant content is 1 to 40 wt % of the aerosol-forming substrate, such as 1 to 20 wt %

[0159] Suitable binders are known in the art and may act to bind together the components forming the aerosol-forming substrate. Binders may comprise starches and/or cellulosic binders such as methyl cellulose, ethyl cellulose, hydroxypropyl cellulose, hydroxyethyl cellulose and methyl cellulose, gums such as xanthan, guar, arabic and/or locust bean gum, organic acids and their salts such as alginic acid/ sodium alginate, agar and pectins.

[0160] Preferably the binder content is 5 to 10 wt% of the aerosol-forming substrate e.g. around 6 to 8 wt%.

[0161] Suitable fillers are known in the art and may act

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

[0162] Preferably, the filler content is 5 to 10 wt% of the aerosol-forming substrate e.g. around 6 to 9 wt%.

[0163] The aerosol-forming substrate may comprise an aqueous and/or non-aqueous solvent. In some embodiments, the aerosol forming substrate has a water content of between 5 and 10 wt% e.g. between 6-9 wt% such as between 7-9 wt%.

[0164] The flavourant may be provided in solid or liquid form. It may include menthol, liquorice, chocolate, fruit flavour (including e.g. citrus, cherry etc.), vanilla, spice (e.g. ginger, cinnamon) and tobacco flavour. The flavourant may be evenly dispersed throughout the aerosol-forming substrate or may be provided in isolated locations and/or varying concentrations throughout the aerosol-forming substrate.

[0165] The consumable described above may be coupled with a heating element in a heat not burn (HNB) device.

[0166] Accordingly in a second aspect, there is provided a heat not burn (HNB) system comprising:

- a heat not burn consumable as described above in the first aspect; and
- a device comprising at least one heating element.

[0167] The device may be a HNB device i.e. a device adapted to heat but not combust the aerosol-forming substrate.

[0168] The device may comprise a device housing for housing the heating element(s). The heating element(s) may comprise an elongated e.g. rod, tube-shaped or blade heating element. The heating element(s) may project into or surround a cavity within the device housing for receiving the consumable described above.

[0169] When the upstream end wall is a pierceable membrane, the heating element may be configured to pierce the pierceable membrane when engaged with the consumable. The at least one aperture of the pierceable membrane (of the consumable) may be located such that it is spaced from the heating element when the heating element is received in the substrate. That is, the at least one aperture may be positioned at a region of the pierceable membrane that is not pierced by the heating element when inserted into the substrate for heating of the substrate. For example, the heating element may be arranged so as to pierce a central region (or e.g. the centre) of the pierceable membrane. In this way, the at least one aperture may permit airflow through the pierceable membrane when the heating element is received there-through.

[0170] The device may further comprise a PCB connected to the heating element(s) for controlling the temperature of the heating element(s). It may further comprise a battery e.g. a recyclable battery such as a

2000mAh battery.

[0171] In some embodiments, the device comprises a first heating element for facing/abutting/overlying the upper or lower surface of the substrate. The device may comprise a second heating element which, when the consumable is engaged, faces/abuts/overlies the other of the upper and lower surface of the substrate.

[0172] Alternatively, the device may comprise a first heating element for facing/abutting/overlying an outer surface of the upper or lower wall of the consumable housing. The device may comprise a second heating element which, when the consumable is engaged, faces/abuts/overlies an outer surface of other of the upper and lower walls of the consumable housing.

[0173] In some embodiments, the device comprises a core heating element for penetrating the substrate or for being received in the hollow core recess of the substrate.

[0174] The at least one heating element (e.g. first/second/core heating element) may be a planar heating element. It may have a greater width and length than depth. The length and width may be equal but, preferably, the length is greater than the width such that the planar heating element is a rectangular element i.e. has a substantially rectangular upper and lower planar surfaces. The length of the planar heating element may be between 10 and 20 mm e.g. between 10 and 15 mm. The width of the planar heating element may be between 7 and 14 mm e.g. between 7 and 12 mm or 7 and 10 mm e.g. around 8 mm. The depth of the planar heating element may be between 0.5 and 2 mm, e.g. around 1 mm.

[0175] The first/second/core heating element may be a ceramic heating element.

[0176] The heat not burn (HNB) device may comprise:

- a device housing; and
- at least one heating element, the at least one heating element being housed within a cavity at a first longitudinal end of the device housing, the device housing have a first longitudinal end face defining an aperture in communication with said cavity,

wherein the device further comprises a sealing plate movable from a first position in which the aperture is open to a second position in which the aperture is at least partially sealed by the sealing plate.

[0177] The sealing plate may be slidable (e.g. slidable in an axial direction) from the first position to the second position.

[0178] In the first position, the sealing plate forms a base of the cavity with the at least one heating element extending towards the aperture through the sealing plate. The sealing plate may be an apertured plate, so that as the sealing plate moves from the first to the second position, the at least one heating element passes through the aperture.

[0179] The device housing may comprise at least one channel and the sealing plate may comprise at least one transverse tab extending from the sealing plate through

the channel to rest on an exterior of the device housing. The device housing may comprise two opposing channels and the sealing plate may comprise two opposing transverse tabs. The transverse tab(s) may be used to manually move the sealing plate between the first and second positions.

[0180] The device housing (and the cavity) may have a substantially rectangular or obround transverse cross-section.

[0181] The device is adapted to receive a consumable (which is as described above) and which is insertable into the device housing for engagement with the at least one heating element (which may be a first/second/core heating element as described above). Where the consumable comprises a housing, the consumable is inserted with the second longitudinal end wall of the housing protruding from the device housing.

[0182] The consumable is inserted when the sealing plate is in its first position. After use, the sealing plate is moved to its second position which forces the consumable from the chamber and, ultimately blocks the aperture at the first longitudinal end face of the device housing so that the user is prevented from contacting the hot heating element.

[0183] In a third aspect, there is provided a method of using a heat not burn system according to the second aspect, the method comprising:

inserting the consumable into the device such that the heating element penetrates the aerosol-forming substrate; and
heating the consumable using the heating element.

[0184] In some embodiments, when the consumable comprises an end wall in the form of a pierceable membrane, the heating element pierces the pierceable membrane of the consumable when the consumable is inserted into the device.

[0185] The core heating element (e.g. the planar core heating element) may penetrate the aerosol-forming substrate in the consumable e.g. by being received within the hollow core recess/planar recess of the substrate.

[0186] The insertion of the consumable may be performed such that the at least one aperture in the end wall (e.g. pierceable membrane) is spaced from the heating element when the heating element is received through the end wall.

[0187] The core heating element may be received in the housing through the upstream longitudinal end face of the housing. Where there is an upstream longitudinal end wall, the core heating element may be received in the housing through the aperture.

[0188] In other embodiments, the method comprises inserting the consumable into the cavity within the device housing so that the first heating element overlies the upper surface of the substrate e.g. in abutment with the upper wall of the housing. The method may further comprise inserting the consumable into the cavity so that the

second heating element overlies the lower surface of the substrate e.g. in abutment with the lower wall of the housing.

[0189] Once consumed the consumable may be released from the or each heating element and a further consumable may subsequently be (releasably) engaged with the or each heating element of the device for heating.

[0190] The disclosure includes the combination of the aspects and preferred features described except where such a combination is clearly impermissible or expressly avoided.

Summary of the figures

[0191] So that the disclosure may be more readily understood, and so that further features thereof may be appreciated, embodiments and experiments illustrating the principles of the disclosure will now be described by way of example with reference to the accompanying figures in which:

Figure 1 shows a first embodiment of a consumable comprising a planar slab of plant product;

Figure 2 shows cuboid brick of plant product;

Figure 3 shows a housing for a consumable;

Figure 4 shows a second embodiment of a consumable comprising a planar slab of plant product;

Figures 5a - 5c show a third embodiment of a consumable;

Figures 6a and 6b show a fourth embodiment of a consumable;

Figure 7 shows the fourth embodiment with a core heating element inserted;

Figure 8 shows a lateral cross section through the third embodiment with a core heating element inserted;

Figures 9 - 11 show a device according to an embodiment;

Figure 12 shows a fifth embodiment of a consumable;

Figure 13 shows a longitudinal cross section through a sixth embodiment of a consumable;

Figure 14 shows a longitudinal cross section through a seventh embodiment of a consumable;

Figure 15 shows a perspective internal view of an eighth embodiment of a consumable; and

Figure 16 shows the downstream longitudinal end wall of the housing of the embodiment shown in Figure 15; and

Figures 17a - 17g show alternative transverse cross sections of an aerosol-forming substrate, housing or filter.

Detailed Description

[0192] Aspects and embodiments of the disclosure will now be discussed with reference to the accompanying figures. Further aspects and embodiments will be apparent to those skilled in the art.

[0193] Figure 1 shows a perspective view of a first embodiment of a heat not burn (HNB) consumable 1 comprising a planar substrate 2 of reconstituted tobacco such that the consumable 1 has a substantially rectangular transverse cross section.

[0194] By providing the reconstituted tobacco as a planar substrate (having a substantially rectangular transverse cross section) rather than as a cylindrical rod (having a substantially circular cross section), the reconstituted tobacco has a greater exposed surface area for contact with a heating element thus allowing quicker and more even heat transfer from the heating element to the reconstituted tobacco. In this manner, heating of the reconstituted tobacco can be effected using a heating element at a lower temperature (e.g. around 250 °C) which reduces the chances of burning of the reconstituted tobacco.

[0195] The planar substrate 2 has a substantially rectangular upper surface 3, and has a length of around 12 mm, a width of around 8 mm and a depth of around 6 mm.

[0196] The consumable further comprises a filter 4. The filter 4 is also formed as a planar slab having a substantially rectangular transverse cross section. The filter 4 typically has a width of around 8 mm, a depth of around 6 mm and a length of around 3 mm.

[0197] The filter 4 has an upstream longitudinal end face 5 which faces (but is spaced from) the downstream longitudinal end face 6 of the planar slab 2 of reconstituted tobacco.

[0198] The consumable 1 further comprises a paper spacer 7 interposed between the filter 4 and the substrate 2. The spacer 7 typically has a width of around 8 mm, a depth of around 6 mm and a length of around 5 mm.

[0199] The consumable 1 further comprises a paper wrapper 8 which is shown open in Figure 1 but which is wrapped around to fully enclose the upper surface 3, lower surface and the opposing transverse surfaces of the consumable 1.

[0200] This consumable 1 of Figure 1 may be heated using a first heating element in abutment with the upper surface 3 and/or a second heating element in abutment with the lower surface. The planar slab 2 is then heated and externally and inwards from the upper and/or lower surfaces.

[0201] Figure 2 shows a portion of reconstituted tobacco extruded into a cuboid brick 9. The cuboid brick has an upper surface 3' and a lower surface (not visible) spaced by opposing transverse surfaces 15 (only one visible). The outer surfaces of the cuboid brick 9 are coated with a hydrophobic/liquid impermeable coating.

[0202] The length of the cuboid brick is typically around 12 mm, with a depth of around 6 mm and width of around 10 mm.

[0203] The cuboid brick 9 has a hollow core defined by a cuboid recess 10 extending in a length direction from the upstream longitudinal end face 11 of the cuboid brick 9 to the opposing downstream longitudinal end face 12.

[0204] The cuboid recess 10 is defined by upper and lower inner surfaces 13a, 13b and opposing inner transverse surfaces 14a, 14b. The cuboid recess has a depth of around 1 mm, a width of around 8 mm and a length of around 12 mm.

[0205] The reconstituted tobacco at or proximal one or more of the upper/lower/transverse inner surfaces 13a, 13b, 14a, 14b defining the cuboid recess 10 may be dosed with an e-liquid which may contain aerosol formers such as polyglycol (PG) and/or vegetable glycerine (VG).

[0206] As can be seen in Figures 5a-5c, the cuboid brick 9 can be inserted and glued into a substantially rigid, self-supporting housing 16 having walls of a uniform thickness of around 2 mm formed of moulded bagasse pulp to form the consumable 1'. The housing 16 has a textured e.g. meshed inner surface 17 facing the reconstituted tobacco. The outer surface 18 (visible in Figure 3) of the housing 16 is substantially smooth.

[0207] As also seen in Figure 3, the housing 16 is a hollow cuboid housing defining a cuboid chamber 20 which is dimensioned to receive the cuboid brick 9 of reconstituted tobacco.

[0208] The housing 16 has an upstream longitudinal end having an opening 70 (see e.g. Figure 5a-5b) with a rectangular transverse cross-section. As is also apparent from Figure 3, the opening 70 is substantially sealed by an upstream longitudinal end wall in the form of a pierceable membrane 29 that extends across the opening 70. This pierceable membrane 29 retains the substrate 2 within the housing 16 prior to use.

[0209] The pierceable membrane 29 comprises two apertures 72a, 72b that are spaced laterally from one another so as to be located either side of a centre of the pierceable membrane 29. In particular, the apertures 72a, 72b are located such that when a heating element (discussed further below) is received therethrough (and into the substrate 2), the apertures 72a, 72b are spaced from the heating element. In this way, the apertures 72a, 72b permit airflow through the substrate 2, even when the heating element is received therein.

[0210] The housing 16 also has a rounded opposing downstream longitudinal end wall 21 which has at least one mouthpiece aperture (not visible).

[0211] The consumable 1' has a filter 4' having a rounded downstream longitudinal end face for abutment with

the inside surface of the downstream longitudinal end wall 21 of the housing 16.

[0212] The downstream longitudinal end wall 21 at least partly (and preferably completely) obscures the filter 4' from view by a user.

[0213] By concealing the filter 4' from view, the user is not exposed to the residues remaining in the filter 4'/consumable 1' after use thus improving the aesthetic appeal of the consumable after use and avoiding transfer of residue to the user.

[0214] The housing 16 comprises an upper wall 22 and lower wall 23 spaced by opposing transverse walls 24. One of the opposing transverse walls 24 comprises a longitudinally extending junction 25 and the downstream longitudinal end wall 21 also comprises a junction such that the housing can be opened to expose the cuboid chamber as shown in figures 5a-5c.

[0215] The other opposing transverse wall 24' comprises a longitudinally extending hinge portion 26 such that the housing 16 may be opened along the junctions by pivoting of the upper wall 22 and lower wall 23 about the hinge portion 26.

[0216] In this way, the cuboid brick 9 and the filter 4' can be fitted (and glued) into the opened housing 16 and then the housing closed (by pivoting about the hinge portion 26 as shown in Figure 5c). The junctions can be sealed e.g. with glue.

[0217] The opening 70 is then sealed with the pierceable seal 29 (i.e. by adhering the pierceable seal 29 to the upper 22, lower 23 and transverse 24, 24' walls). In this way, the closed housing 16 has the shape shown in Figure 3 and, with such a housing 16, the consumable 1' becomes more akin to a cartridge or "pod" that effectively contains residue after use to protect a user from contamination.

[0218] Figures 6a-6b shown another embodiment in which the consumable 1" comprises two planar substrates 2', 2" of reconstituted tobacco, each having a depth of around 2 mm, a length of around 12 mm and a width of around 10 mm.

[0219] The two planar substrates 2', 2" are vertically and horizontally aligned and spaced from one another to define a planar recess 27 (visible in Figure 7). The housing 16 is as described previously and the two planar substrates 2', 2" are each glued into a respective half of the housing 16 (see Figure 6b) before closing the housing 16 by pivoting along the hinge portion 26 to form the planar recess 27. The tobacco at or proximal the inner surface (facing the planar recess 27) on one or both of the planar slabs 2', 2" is dosed with e-liquid as described above. The junctions around the housing 16 are sealed using glue.

[0220] Figure 12 shows a variation (one planar substrate omitted from view) where the filter 4' (shown in cross-section) comprises a liquid release member 41 containing an aerosol former such as vegetable glycerine and/or propylene glycol at its first longitudinal end face. The release member 41 is configured to release the aer-

osol former during use (e.g. by providing an envelope that is breakable upon abutment with the heating element 28 or that melts during heating) so that upon release, the aerosol former can penetrate the plant product.

[0221] The closed housing 16 is seen in Figure 7 with a planar, ceramic heating element 28 inserted into the planar recess. As is apparent from this figure, the apertures 72a, 72b of the pierceable membrane 29 are laterally spaced from the heating element 28 when the heating element is inserted into the recess (not visible in the figure).

[0222] Figure 8 shows a longitudinal cross section of the housing 16 containing the cuboid brick 9 of reconstituted tobacco. The pierceable membrane 29 is not shown in the figure.

[0223] As can be seen, when inserted into the recess, the heating element 28 can contact the surfaces of the cuboid recess 10 or planar recess thus allowing quicker heating. It can also be seen that, in all embodiments, the depth of the reconstituted tobacco between the heating surface(s) and the opposing surfaces is substantially constant in the depth direction which results in a more even heat transfer from the heating element 28 to the reconstituted tobacco. In this manner, heating of the tobacco can be effected using a heating element 28 at a lower temperature (e.g. around 250 °C) which reduces the chances of burning of the plant product.

[0224] Figures 13 and 14 show further embodiments where the planar recess 27 or cuboid recess 10 is fully lined with a thermally conductive material such as aluminium foil 47. The aluminium foil 47 fully lines the recess 10, 27 and overlies the plant product which may be in the form of two planar substrates 2', 2" (as shown in Figure 13) or may be a cuboid brick 9 (as shown in Figure 14).

[0225] In the embodiment shown in Figure 13, the opposing outer surfaces of the planar substrates 2', 2" are further lined with a dimpled foil 42 (which is liquid impermeable). The plant product and foil layers 47, 42 are enclosed with cardboard wrapper 43 (although it may also be formed of moulded pulp, e.g. moulded bagasse pulp).

[0226] The heating element 28 is received within the planar recess 27 and the aluminium foil 47 increases heat transfer to the plant product. The dimpled foil 42 forms a liquid impermeable barrier to prevent seepage of any e-liquid dosed into the plant product into the cardboard wrapper, the dimples acting to increase air flow through the consumable upon inhalation by the user.

[0227] In Figure 14, the aluminium foil 47 fully lines the cuboid recess 10 and then extends over the downstream longitudinal end face 12 of the cuboid brick and axially into channels 44a, 44b formed within the downstream longitudinal end face 12. Thus the aluminium foil 47 partly covers the downstream longitudinal end face 12 of the cuboid brick.

[0228] The cuboid brick 9 and foil layers 47, 42 are enclosed with a cardboard wrapper 43 (although it may also be formed of moulded pulp, e.g. moulded bagasse pulp). The wrapper 43 comprises a transverse extension

45 which extends to cover a portion of the downstream longitudinal end face 19 of the cuboid brick 9. The transverse extension 45 comprises an inwardly-depending axial extension 46 extending inwards into the channels 44a, 44b in the plant product in abutment with the aluminium foil 47.

[0229] The heating element 28 is received within the cuboid recess 10 and the aluminium foil 47 increases heat transfer to the plant product.

[0230] A further embodiment of a consumable 1''' is shown in Figure 4 where the housing 16 and filter 4' are as previously described. The reconstituted tobacco is formed as single planar substrate 2 having a substantially rectangular upper surface 3. The substrate 2 has a length of around 12 mm, a width of around 8 mm and a depth of around 6 mm.

[0231] The upstream longitudinal end of the housing 16 is again provided with an end wall in the form of a pierceable membrane such as a metallic foil or plastic membrane 29. The membrane 29 comprises apertures 72a, 72b that are centrally located between the upper 22 and lower 23 walls and that are laterally spaced either side of the centre of the membrane 29. The membrane obscures the reconstituted tobacco from view by a user prior to use and retains the tobacco within the housing 16. When the consumable 1''' is used, the membrane is pierced by the insertion of the heating element 28. When inserted, the apertures 72a, 72b are laterally spaced from the heating element 28 so as to permit airflow through the substrate. The apertures 72a, 72b are sized and shaped so as to retain the substrate 2 within the housing 16, but allow the passage of air through the pierceable membrane 29.

[0232] For this embodiment, the heating element could be a heating blade that pierces the planar substrate 2.

[0233] Figure 9 shows a heat not burn (HNB) device 30 comprising the heating element 28 which is mounted on and controlled by a PCB 31 connected to a battery 32, the PCB 31 and battery 32 being housed within an electrical sleeve 33. In turn electrical sleeve 33 and heating element 28 are housed within (and fully enclosed by) a device housing 34. The device housing 34 has a chamber 35 at its first longitudinal end which has an aperture at its first longitudinal end face and which houses the heating element 28.

[0234] The consumable 1'/1"/1''' is insertable into the chamber 35 within the device housing 34 such that the heating element 28 is received in the housing 16 (e.g. within the planar recess 26 or cuboid recess 10 within the reconstituted tobacco) via the upstream longitudinal end face 19 of the housing 16. The downstream longitudinal end wall 21 of the housing 16 protrudes from the device housing 34.

[0235] The device 30 further comprises a sealing plate 36 movable (slidable in a axial direction) from a first position (shown in figure 10) in which the aperture at the upstream longitudinal end face of the device housing 34 is open, to a second position (shown in Figure 11) in

which the aperture is at least partially sealed by the sealing plate 36.

[0236] In the first position, the sealing plate 36 forms a base of the chamber 35 with the heating element 28 extending towards the aperture through the sealing plate 36. The sealing plate 36 has a slit 37, so that as it moves from the first to the second position, the heating element 28 passes through the slit.

[0237] The device housing 34 has two opposing channels 38, 38' and the sealing plate 36 comprises two opposing transverse tabs 39, 39' extending from the sealing plate 36 through the channels 38, 38' to rest on an exterior of the device housing 34. The transverse tabs 39, 39' may be used to manually move the sealing plate 36 between the first and second positions.

[0238] The consumable 1'/1"/1''' is inserted when the sealing plate 36 is in its first position. The heating element 28 lies within the cuboid recess 10 or the planar recess 27 and the user activates the heating element e.g. by an actuator button located on the device housing 34. The device housing 34 may also comprise an indicator showing when the heating element 28 had reached the correct temperature (250°C).

[0239] The user then places the downstream longitudinal end wall 21 of the consumable 1'/1"/1''' into their mouth and draws on the consumable 1'/1"/1''' in order to inhale an aerosol containing nicotine.

[0240] After use, the sealing plate 36 is moved to its second position which forces the consumable 1'/1"/1''' from the chamber 35 and ultimately blocks the aperture at the upstream longitudinal end face of the device housing 34 so that the user is prevented from contacting the hot heating element 28.

[0241] The device 30 may further comprise a cap 40 e.g. a magnetic cap for sealing the aperture at the upstream longitudinal end face of the device housing e.g. when the device is not in use for an extended period. The cap 40 may have a recess on its underside such that the aperture can be sealed with a consumable 1'/1"/1''' in situ.

[0242] Figure 15 shows a perspective internal view of an eighth embodiment of a consumable 1'''.

[0243] The planar substrate 2''' comprises a planar upper surface 3' and a planar lower surface 53 spaced by opposing longitudinally-extending transverse surfaces 54a, 54b. The depth of the substrate 2''' (between the upper and lower surfaces, 3', 53) and the width of the substrate 2''' (between the opposing transverse surfaces 54a, 54b) are unequal with the width being greater than the depth.

[0244] The opposing transverse surfaces 54a, 54b each comprise a longitudinally-extending upper concave portion 55a, 55b and lower concave portion 56a, 56b which meet at a longitudinally-extending ridge 57a, 57b.

[0245] The concave portions are spaced from the upper surface 3' and lower surface 53 by opposing convex portions 58a, 58a', 58b, 58b' such that the transverse cross-section through the substrate 2''' is a modified

obround where the opposing transverse surfaces 54a, 54b each take the form of a curly brace/bracket i.e. "{" and "}".

[0246] The length of the substrate 2''' (between the upstream end face 59 and downstream end face 60) is around 12 mm long. The width of the substrate 2''' (between opposing transverse surfaces 54a, 54b) may be around 12 mm. The depth of the substrate 2''' (between the upper and lower surfaces) may be around 6 mm.

[0247] The substrate 2''' is formed of cast leaf slurry recon tobacco. It may alternatively be formed as extruded tobacco e.g. with added flavouring.

[0248] The consumable further comprises a planar filter 4''. The filter 4'' comprises a substantially planar upper surface 61 and a substantially planar lower surface 62 equally spaced by opposing longitudinally-extending transverse surfaces 63a, 63b.

[0249] The opposing transverse surfaces 63a, 63b each comprise a substantially convex surface (a semi-circular surface) such that the planar filter 4'' has a substantially obround transverse cross section i.e. the filter 4'' is an obround cylindrical filter.

[0250] The filter 4'' has greater width and length than depth. The length is around 22mm and the width is around 12 mm. The depth is around 6mm.

[0251] The filter 4'' has a hollow bore 64. The hollow bore 64 extends from the upstream longitudinal end face 5' of the filter 4'' to the downstream longitudinal end face 6' of the filter 4''.

[0252] The hollow bore 64 has an obround transverse cross sectional area. The bore 64 has a uniform transverse cross-sectional area. The bore is 64 dimensioned such that there is a thickness of filter material of around 1.5mm from the bore to the upper lower surfaces 61, 62 and the opposing transverse surfaces 63a, 63b.

[0253] The upstream longitudinal end face 5' of the filter 4'' faces and abuts the downstream longitudinal end face 65 of the substrate 2'''.

[0254] The filter 4'' is comprised of cellulose acetate or polypropylene tow. The filter 4'' is circumscribed with a paper plug wrap (not shown).

[0255] The substrate 2''' and filter 4'' are contained within a rigid bagasse housing 16'.

[0256] The housing 16' comprises upper and lower walls 22', 23' (see Figure 16) spaced by opposing longitudinally-extending transverse surfaces 24a', 24b'. The housing 16' has a wall thickness in the range of around 0.8 mm.

[0257] The upper and lower walls 22', 23' are substantially planar and equally spaced by the transverse surfaces 24a', 24b', (i.e. the upper and lower walls 22', 23' are parallel to one another).

[0258] The opposing transverse surfaces 24a', 24b' each comprise upper and lower concave portions 66a, 66a', 66b, 66b' which meet at a longitudinally-extending ridge 67.

[0259] The concave portions 66a, 66a', 66b, 66b' are spaced from the upper and lower surfaces by opposing

convex portions 68a, 68a', 68b, 68b' such that the transverse cross-section of the housing 16' is a modified obround.

[0260] The chamber within and defined by the inner surfaces of the housing walls 22', 23', 24a', 24b' is a modified obround cylindrical chamber, i.e. the transverse cross-section of the chamber within the housing 16' matches the transverse cross section of the substrate 2'''.

[0261] The housing 16' may have a length of around 42 mm, a height of around 6 mm and a width of around 15mm.

[0262] The housing 16' has open upstream longitudinal end which is sealed by an end wall in the form of a pierceable membrane 29 in the form of a metallic foil or a plastic membrane. This pierceable membrane 29 has the same shape as the housing 16'. The pierceable membrane 29 obscures the substrate 2''' from view and retains the substrate 2''' within the housing 16'. To permit airflow through the substrate 2''', the pierceable membrane 29 comprises two apertures 72a, 72b that are laterally spaced either side of a centre of the membrane 29 so as to be proximate the longitudinally-extending ridges 67 of the housing 16'. The spacing of these apertures 72a, 72b is such that, when the membrane 29 is pierced by a heating element (the profile of which is indicated by dashed lines), the apertures 72a, 72b are laterally spaced from the heating element.

[0263] The downstream longitudinal end of the housing 16' is shown in Figure 16. The downstream longitudinal end wall 21' conceals the filter 4'' from view by the user.

[0264] Although the downstream longitudinal end wall 21' comprises a mouthpiece aperture 69, this is small enough (with a maximum depth of 0.6 mm and a width of 7.3 mm) that visual inspection of the filter 4'' is significantly impeded.

[0265] The consumable 1''' is heated in a heat not burn device. The device may comprise a heating element e.g. a planar heating element, for penetrating the substrate 2''' through the upstream longitudinal end face 59. For example, the device may be as described in relation to figures 9-11.

[0266] In other embodiments, the device may comprise one or more (e.g. two) external heating elements e.g. planar external heating elements for abutment against and heating of the substrate through the upper and lower walls 22', 23' of the housing 16'.

[0267] Figures 17a-17g shows various alternative transverse cross sections of the substrate. Although they are shown without a hollow core recess, they could each comprise a hollow core recess which could have the same or different transverse cross section.

[0268] Figure 17a shows a substrate with planar upper and lower surfaces and convex (semi-circular) transverse surfaces such that the substrate has an obround transverse cross-section. The housing and/or filter may have the same shape.

[0269] Figure 17b shows a substrate with planar upper

and lower surfaces and concave (semi-circular) transverse surfaces. The housing and/or filter may have the same shape.

[0270] Figure 17c shows a substrate which is similar to the substrate shown in Figure 15 except that there are no convex portions joining the upper and lower surfaces and the concave portions. The housing and/or filter may have the same shape.

[0271] Figure 17d shows a substrate which has an oval transverse cross-sectional area. The housing and/or filter may have the same shape.

[0272] Figure 17e shows a substrate with curved (convex) upper and lower surfaces and planar transverse surfaces such that the substrate has a truncated oval transverse cross-sectional area. The housing and/or filter may have the same shape.

[0273] Figure 17f shows a substrate the same as Figure 17c except with curved (convex) upper and lower surfaces. The housing and/or filter may have the same shape.

[0274] Figure 17g shows a substrate the same as Figure 17b except with curved (convex) upper and lower surfaces. The housing and/or filter may have the same shape.

[0275] As should be appreciated, the end wall (e.g. pierceable membrane) may also have a shape that is the same as that shown in any of figures 17a-17g.

[0276] 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 scope of the invention.

[0277] 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.

Claims

1. A heat not burn (HNB) consumable having a housing comprising:

an outlet aperture at a downstream end of the housing;
an end wall at an opposing upstream end of the housing, the end wall comprising at least one inlet aperture formed therein; and
a chamber housing an aerosol forming substrate, the chamber fluidly connected between the at least one inlet aperture and the outlet ap-

erture.

2. A heat not burn consumable according to claim 1 wherein the end wall comprises a pierceable membrane.
3. A heat not burn consumable according to claim 1 or 2 wherein the at least one inlet aperture is spaced from a centre of the end wall.
4. A heat not burn consumable according to any one of the preceding claims comprising two inlet apertures, the two inlet apertures laterally spaced either side of the centre of the end wall.
5. A heat not burn consumable according to any one of the preceding claims wherein the at least one inlet aperture is configured so as to substantially prevent material of the aerosol forming substrate from passing therethrough.
6. A heat not burn consumable according to any one of the preceding claims wherein the end wall is in contact with the substrate.
7. A heat not burn consumable according to any one of the preceding claims wherein the end wall defines an outer surface of the consumable.
8. A heat not burn consumable according to any one of the preceding claims wherein the end wall comprises parallel upper and lower edges, and transverse edges extending therebetween, a width of the end wall between the transverse edges being greater than a length of the end wall between the upper and lower edges.
9. A heat not burn (HNB) system comprising:
 - a heat not burn consumable according to any one of the preceding claims; and
 - a device comprising at least one heating element.
10. A heat not burn system according to claim 9 wherein the end wall of the consumable comprises a pierceable membrane and the heating element is configured to pierce the pierceable membrane upon insertion into the consumable.
11. A heat not burn system according to claim 10 wherein the at least one inlet aperture of the pierceable membrane of the heat not burn consumable are located so as to be spaced from the heating element when received in the consumable.
12. A heat not burn system according to claim 11 wherein the pierceable membrane comprises two inlet ap-

tures located so as to be spaced laterally either side of the heating element when received in the consumable.

13. A system according to claim 12 wherein the device comprises a device housing having a cavity for receiving the consumable wherein the at least one heating element projects into or surrounds the cavity. 5

14. A method of using a heat not burn system according to any one of claims 10 to 13, the method comprising: 10

inserting the consumable into the device such that the heating element pierces the pierceable membrane of the consumable; and 15
heating the consumable using the heating element.

15. A method according to claim 14 wherein the insertion of the consumable is performed such that the at least one inlet aperture of the pierceable membrane is spaced from the heating element when the heating element is received through the pierceable membrane. 20

25

30

35

40

45

50

55

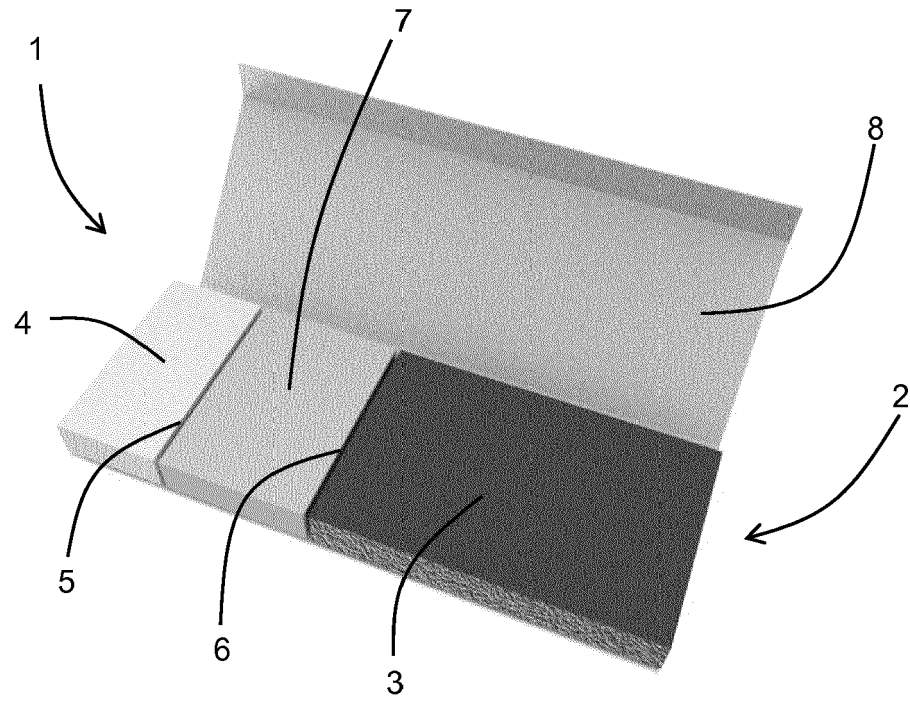


Figure 1

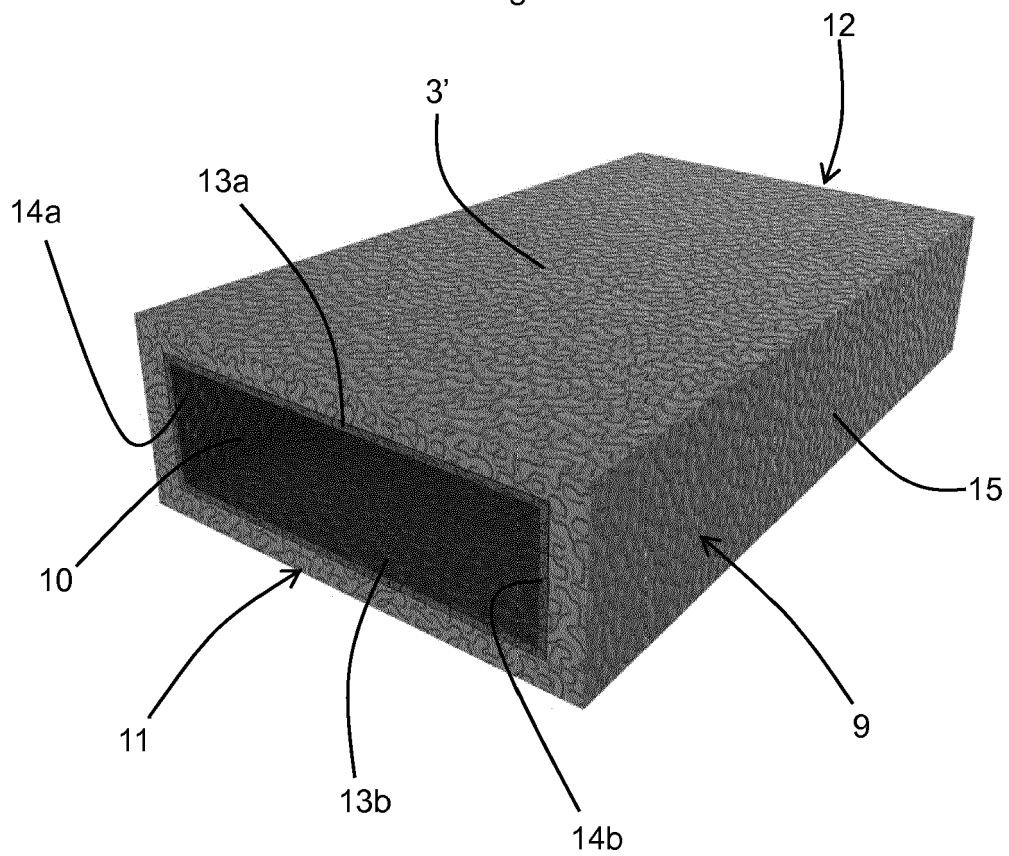
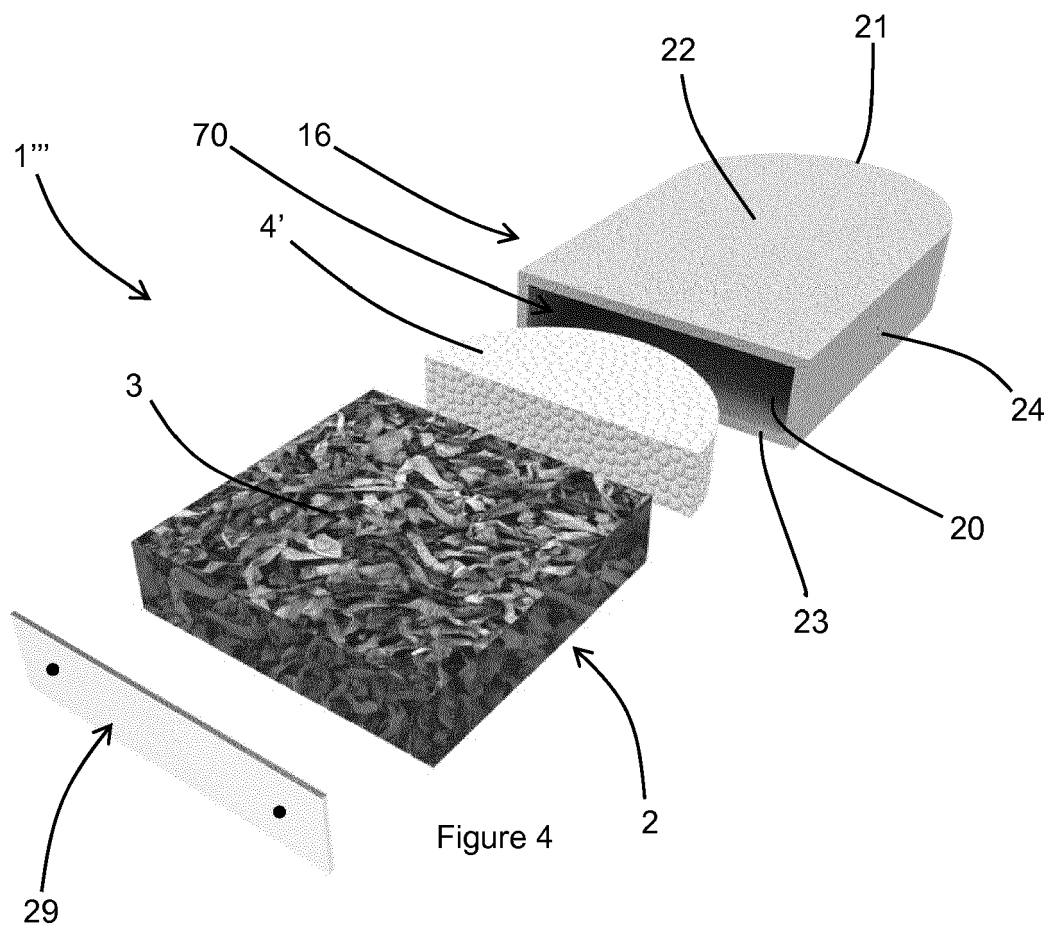
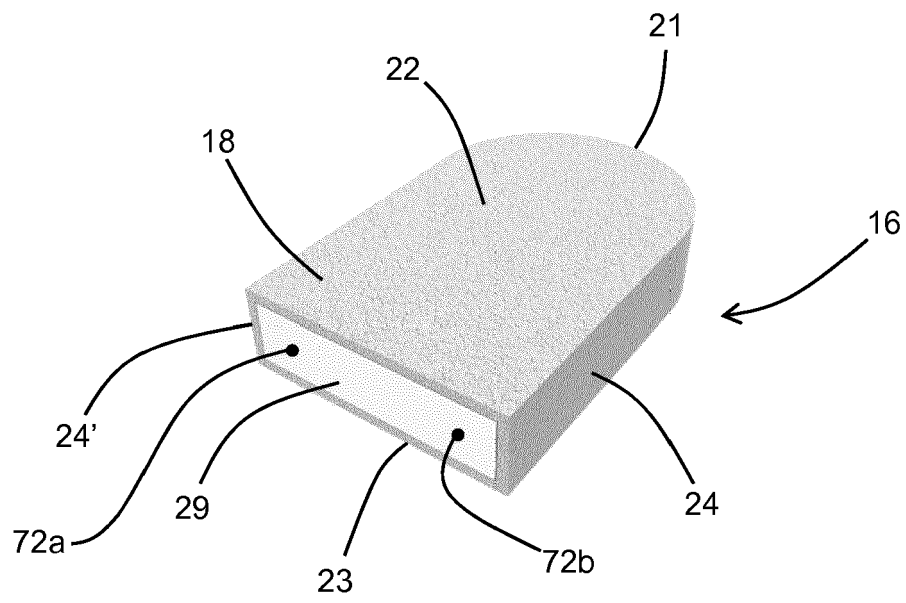
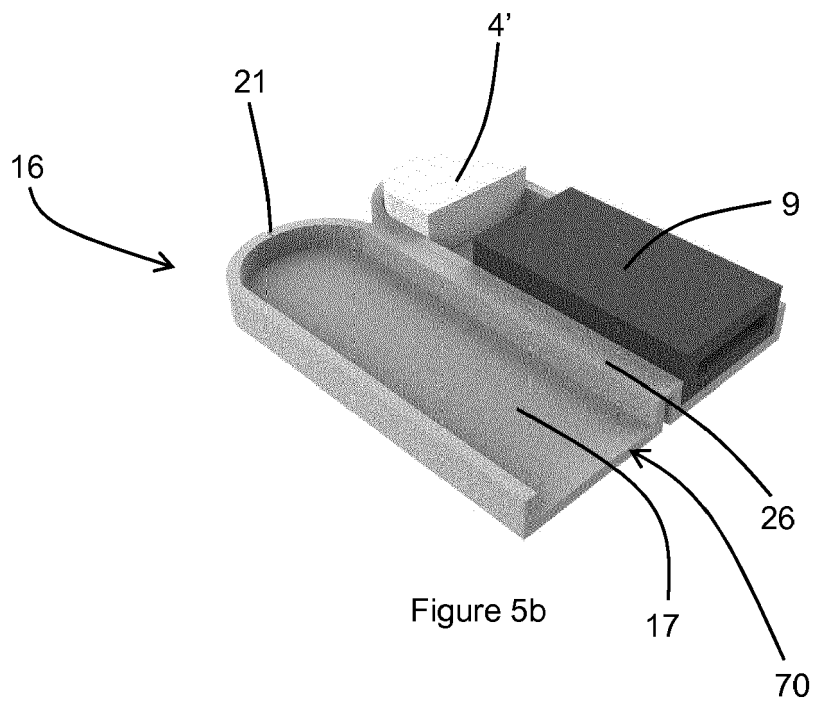
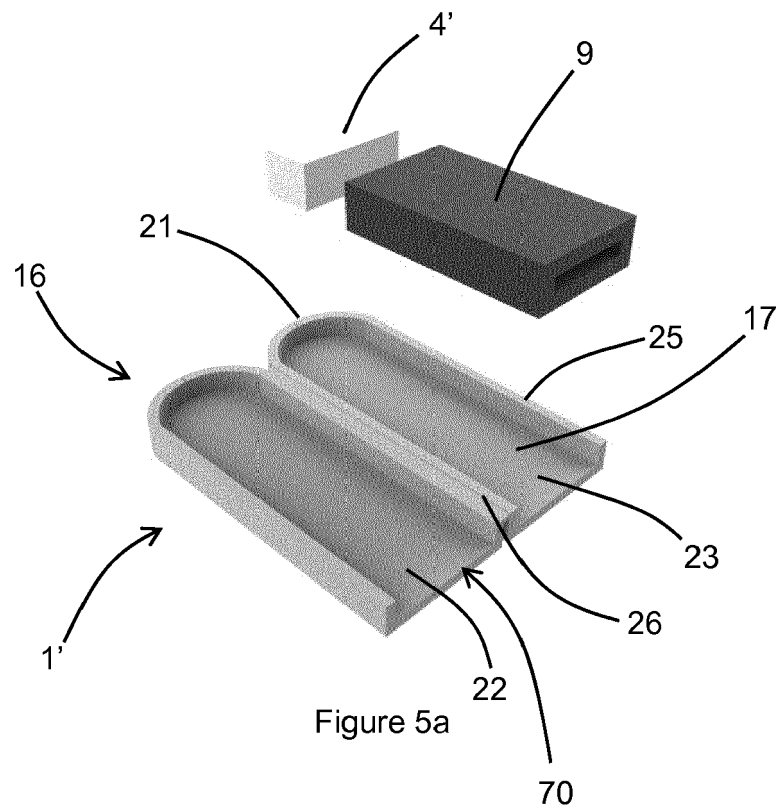
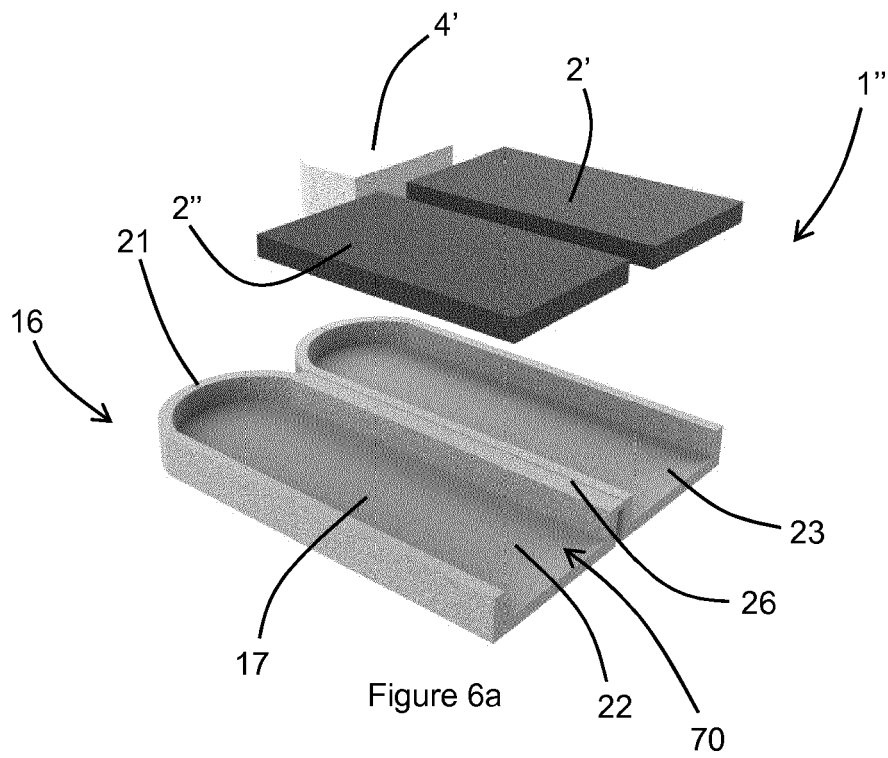
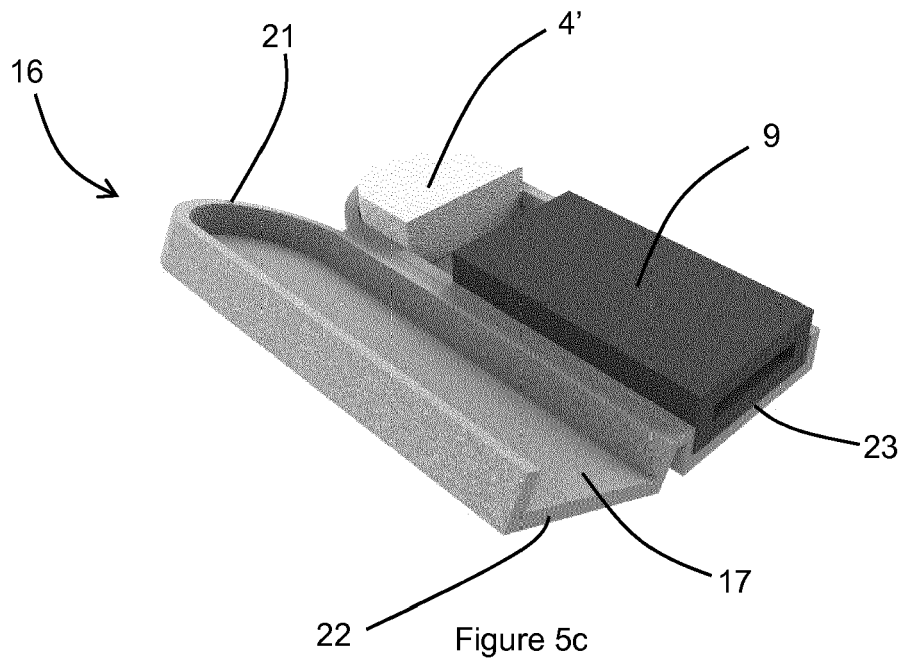


Figure 2







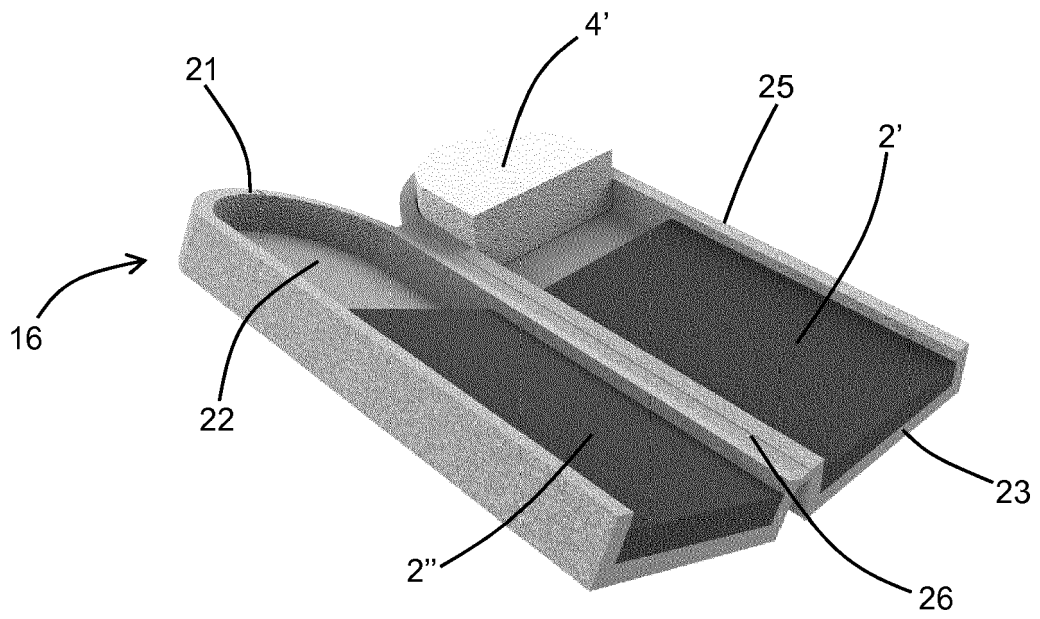


Figure 6b

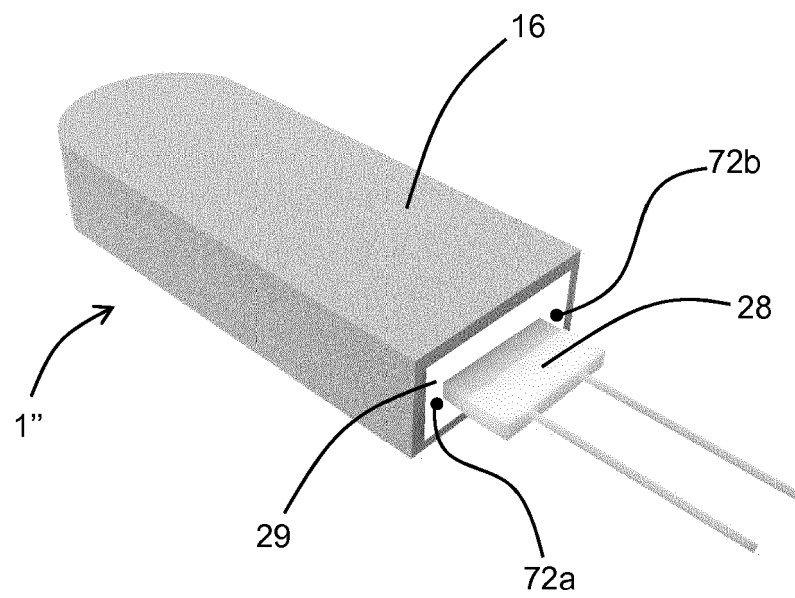


Figure 7

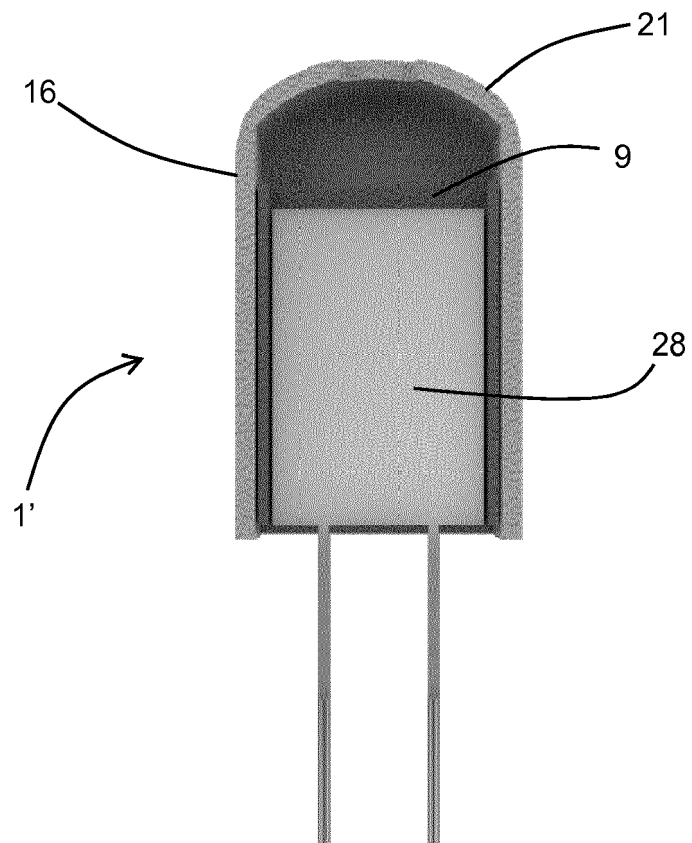
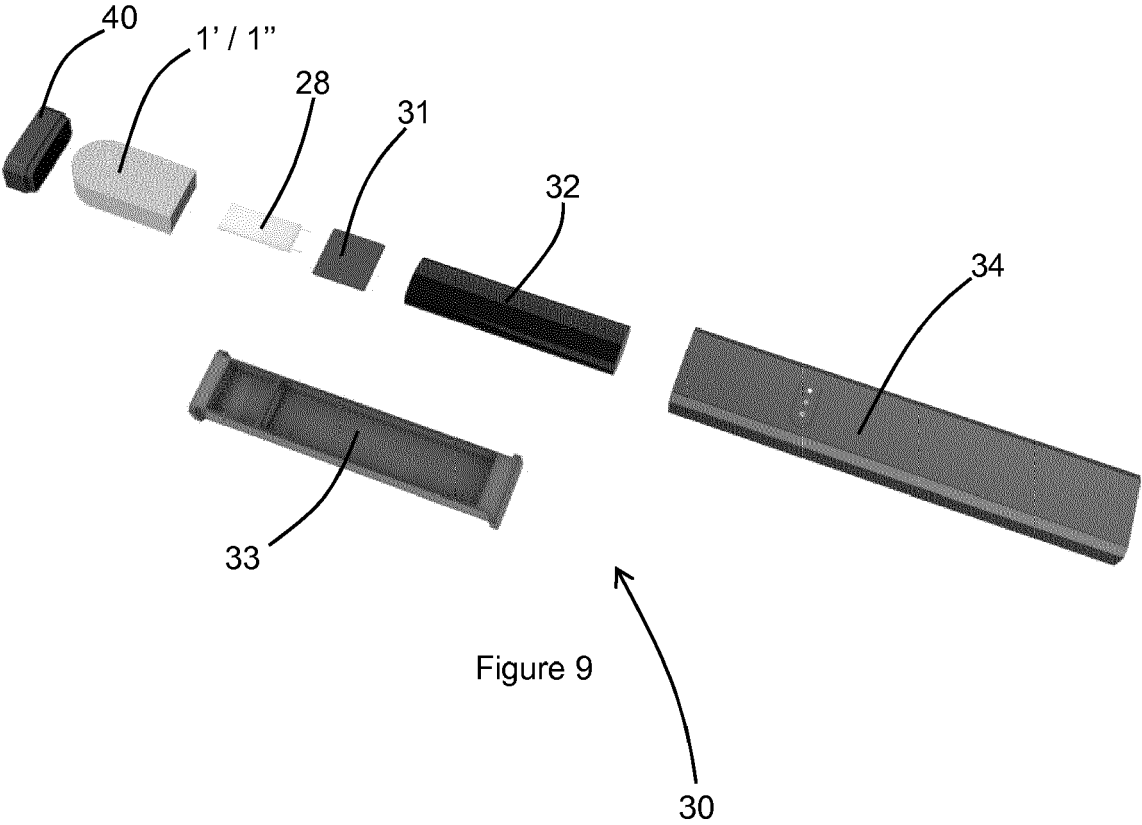


Figure 8



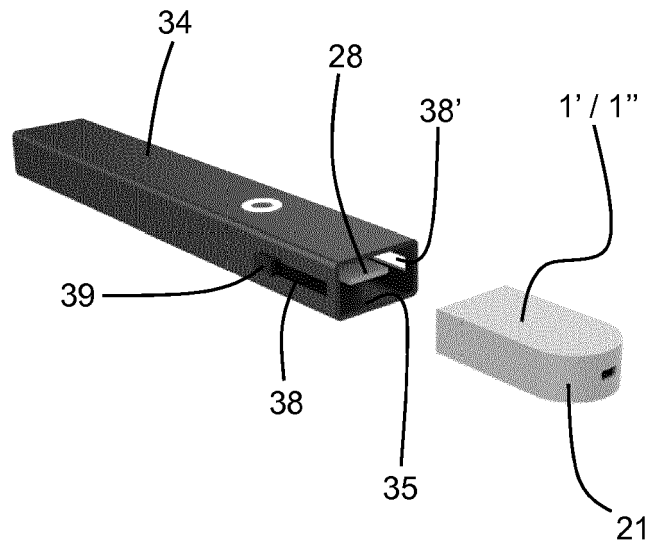


Figure 10

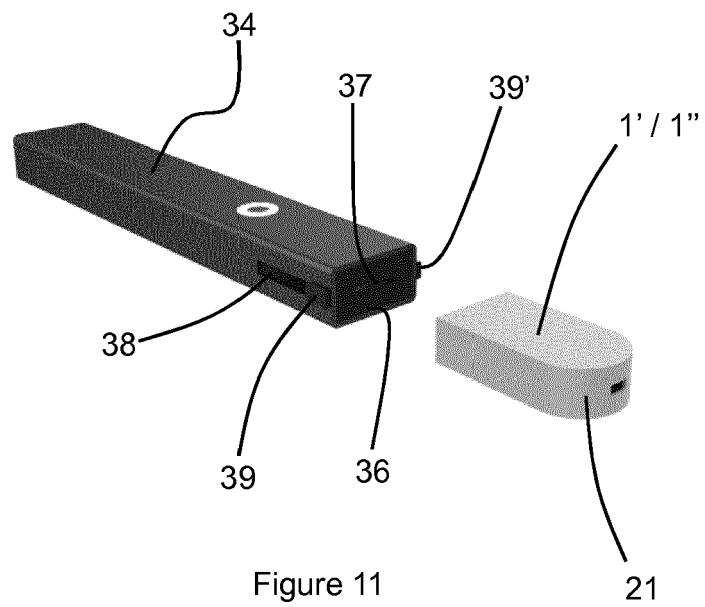


Figure 11

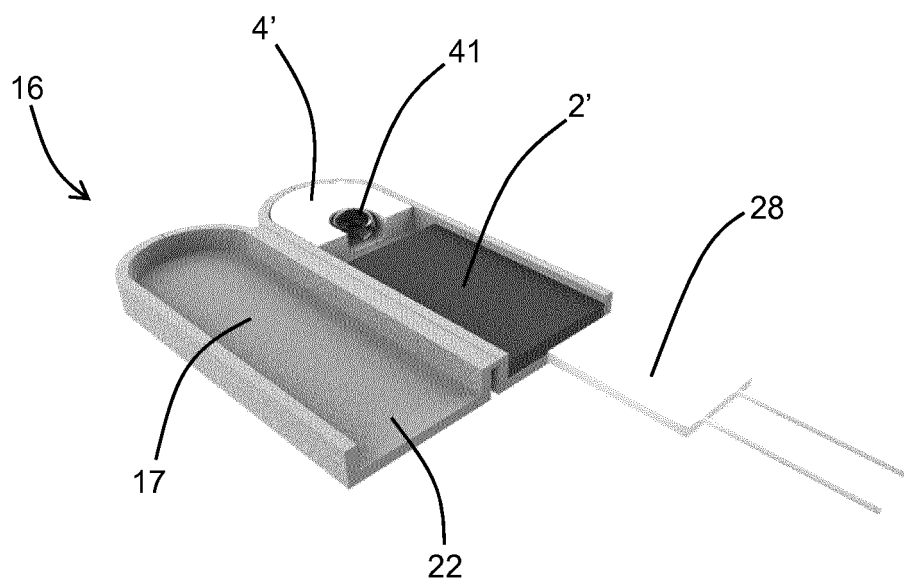


Figure 12

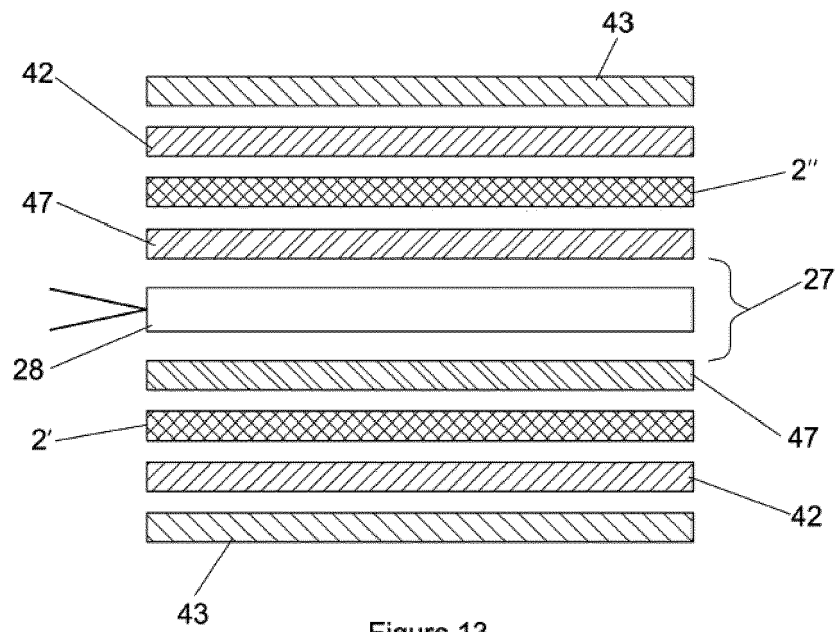


Figure 13

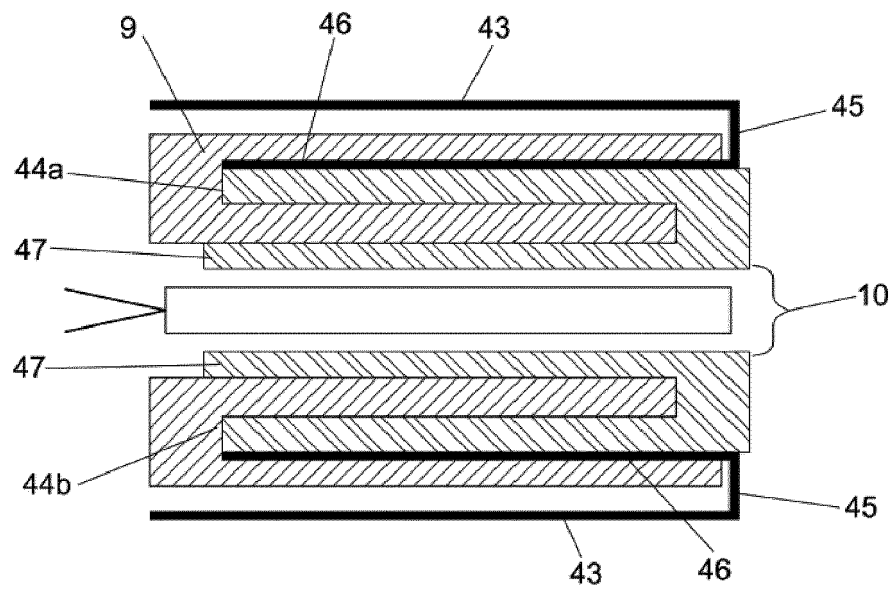


Figure 14

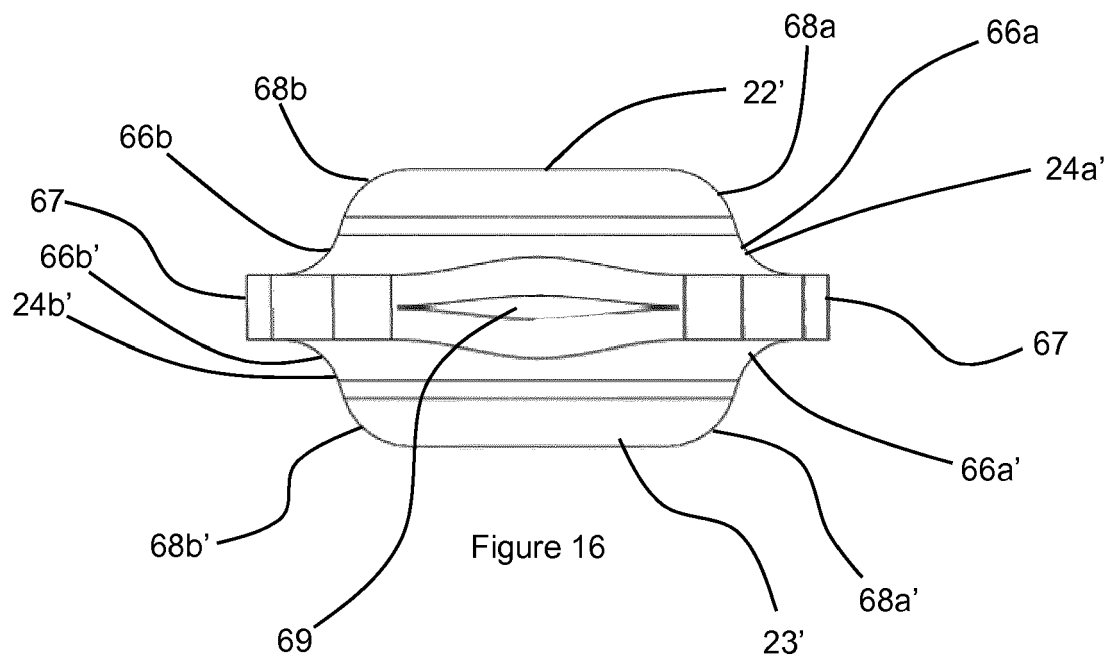
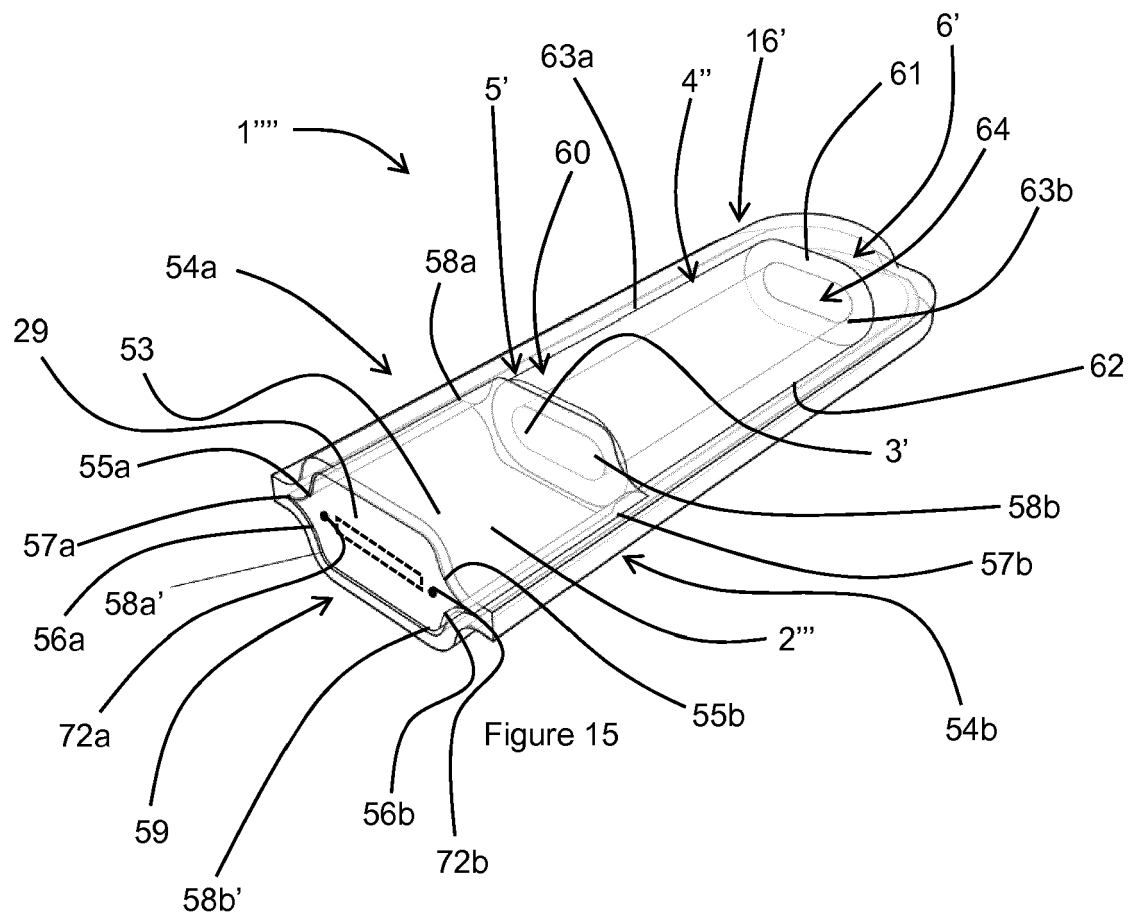




Figure 17a

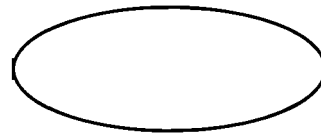


Figure 17d



Figure 17b

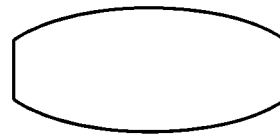


Figure 17e



Figure 17c

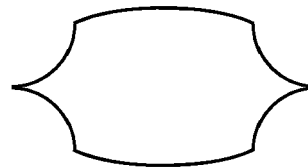


Figure 17f

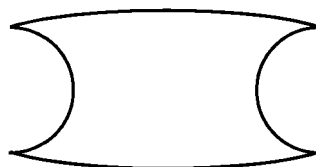


Figure 17g



EUROPEAN SEARCH REPORT

Application Number
EP 19 19 3272

5

10

15

20

25

30

35

40

45

50

55

1

EPO FORM 1503 03.82 (P04C01)

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	EP 3 183 979 A1 (PHILIP MORRIS PRODUCTS SA [CH]) 28 June 2017 (2017-06-28) * abstract * * paragraph [0215] * * paragraphs [0221] - [0227] * * paragraph [0234] * * paragraph [0245] * * figures 1-5 *	1-15	INV. A24F40/42
X	WO 2015/197627 A1 (PHILIP MORRIS PRODUCTS SA [CH]) 30 December 2015 (2015-12-30) * abstract * * page 11, line 33 - page 12, line 20 * * page 19, lines 9-15 * * page 21, line 22 - page 22, line 37 * * figures 1-7 *	1-4,6,7, 9-15	
X	WO 2017/163051 A1 (NICOVENTURES HOLDINGS LTD [GB]) 28 September 2017 (2017-09-28) * abstract * * page 4, line 35 - page 5, line 7 * * page s; figures 1-10 *	1,8,9	TECHNICAL FIELDS SEARCHED (IPC)
X	WO 2017/207435 A1 (PHILIP MORRIS PRODUCTS SA [CH]) 7 December 2017 (2017-12-07) * abstract * * page 27, line 26 - page 28, line 4 * * page 28, lines 16-30 * * page 33, line 32 - page 34, line 2 * * figures 1-15 *	1,9	A24F
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 28 January 2020	Examiner Cabrele, Silvio
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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

EP 19 19 3272

5

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

28-01-2020

10

15

20

25

30

35

40

45

50

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 3183979	A1	28-06-2017	CA 3001784 A1	29-06-2017
			CN 107105791 A	29-08-2017
			DK 3183979 T3	16-07-2018
			EP 3183979 A1	28-06-2017
			ES 2679069 T3	21-08-2018
			HU E038716 T2	28-11-2018
			JP 2018502586 A	01-02-2018
			KR 20170086127 A	25-07-2017
			LT 3183979 T	10-07-2018
			PL 3183979 T3	31-10-2018
			PT 3183979 T	15-10-2018
			RU 2644107 C1	07-02-2018
			SI 3183979 T1	31-07-2018
			TR 201808893 T4	23-07-2018
			US 2018271152 A1	27-09-2018
			WO 2017108983 A1	29-06-2017

WO 2015197627	A1	30-12-2015	AR 100971 A1	16-11-2016
			AU 2015279350 A1	27-10-2016
			CA 2949326 A1	30-12-2015
			CN 106793833 A	31-05-2017
			EP 3113637 A1	11-01-2017
			ES 2705407 T3	25-03-2019
			JP 6326512 B2	16-05-2018
			JP 2017524353 A	31-08-2017
			KR 20160145838 A	20-12-2016
			PH 12016502033 A1	09-01-2017
			PL 3113637 T3	28-06-2019
			PT 3113637 T	25-03-2019
			RU 2654192 C1	16-05-2018
			SG 11201610724P A	27-01-2017
			TR 201819273 T4	21-01-2019
			TW 201603726 A	01-02-2016
			US 2017095002 A1	06-04-2017
			WO 2015197627 A1	30-12-2015

WO 2017163051	A1	28-09-2017	AR 107977 A1	04-07-2018
			AU 2017236411 A1	20-09-2018
			BR 112018069377 A2	22-01-2019
			CA 3018455 A1	28-09-2017
			CL 2018002640 A1	21-12-2018
			CN 108883238 A	23-11-2018
			EP 3432953 A1	30-01-2019
			GB 2550540 A	29-11-2017
			JP 6621154 B2	18-12-2019
			JP 2019512220 A	16-05-2019

EPO FORM P0459

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

55

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

EP 19 19 3272

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

28-01-2020

10

15

20

25

30

35

40

45

50

55

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		KR 20180118701 A	31-10-2018
		PH 12018502014 A1	15-07-2019
		US 2019099562 A1	04-04-2019
		WO 2017163051 A1	28-09-2017

WO 2017207435 A1	07-12-2017	CN 109068754 A	21-12-2018
		EP 3462941 A1	10-04-2019
		JP 2019520044 A	18-07-2019
		KR 20190011718 A	07-02-2019
		US 2020008471 A1	09-01-2020
		WO 2017207435 A1	07-12-2017

EPO FORM P0459

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