(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 782 483 A1**

(12) **EUROPEAN PATENT APPLICATION**

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

(51) Int Cl.:
A24D 1/20 *(2020.01)*

(21) Application number: **19193259.9**

(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) The present disclosure provides a heat not burn (HNB) consumable comprising an aerosol-forming substrate having upper and lower surfaces spaced by longitudinally-extending transverse surfaces. At least one of the surfaces (e.g. each of the transverse surfaces) is a curved or rounded surface (or has a curved/rounded portion) and the substrate has a greater width than depth. The upper and lower surfaces may be planar. The substrate may be extruded.

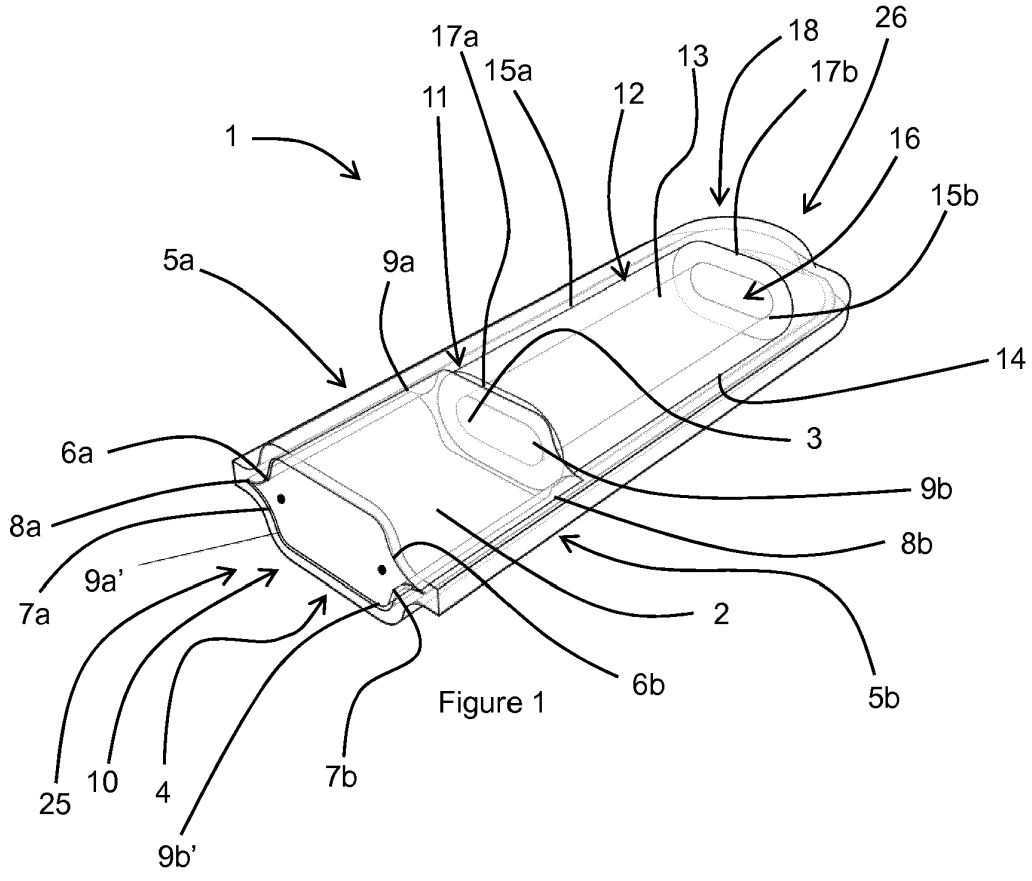

Figure 1

EP 3 782 483 A1

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 unpleasing 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 an aerosol-forming substrate having upper and lower surfaces spaced by longitudinally-extending transverse surfaces wherein at least one of the surfaces is a curved or rounded surface or comprises a curved or rounded surface portion and wherein the substrate has a non-circular transverse cross section.

[0021] In a first aspect, there is provided a heat not burn (HNB) consumable comprising an aerosol-forming substrate having upper and lower surfaces spaced by opposing longitudinally-extending transverse surfaces wherein at least one of the surfaces is a curved or rounded surface or comprises a curved or rounded surface portion and wherein the substrate has a greater width (between the transverse surfaces) than depth (between the upper and lower surfaces).

[0022] Providing a substrate having a greater width than depth, rather than a substrate comprising a cylindrical rod (having a substantially circular cross section), allows the substrate to abut or receive a planar heating element aligned with the width direction. Thus there is a greater surface area for contact with the heating element thus allowing quicker and more even heat transfer from the heating element to the substrate. 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 substrate. The curved surface(s) (portion(s)) reduces the number of (or eliminates) right-angled corners associated with a planar substrate having a rectangular transverse cross section. Such corners present areas of substrate that are remote from the heating element and thus prone to incomplete heating.

[0023] Optional features will now be set out. These are applicable singly or in any combination with any aspect.

[0024] 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.

[0025] 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.

[0026] The terms "upper" and "lower" as used herein are not intended to infer any orientation of the substrate/consumable before, during or after use.

[0027] In some embodiments, the opposing transverse surfaces are both curved/rounded.

[0028] In some embodiments, the upper and lower surfaces are both curved/rounded.

[0029] 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 substrate is a planar substrate.

[0030] 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.

[0031] In these embodiments, at least one and preferably both of the opposing transverse surfaces comprises 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.

[0032] 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.

[0033] 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.

[0034] In some embodiments (e.g. where there are planar upper and lower surfaces), 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.

[0035] 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".

[0036] In other embodiments, the opposing transverse surfaces may be planar (e.g. parallel to one another) or as described above (i.e. 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 substrate may have a truncated oval transverse cross-section. 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 comprise two concave portions meeting at a longitudinally extending ridge, the substrate may have a modified mandorla transverse cross-section.

[0037] 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 (in a plan view). 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.

[0038] 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.

[0039] The substrate may have a single heating surface (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.

[0040] In other embodiments, the substrate is heated internally and outwards (towards the upper and lower surfaces).

[0041] 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.

[0042] Alternatively, the substrate may have a hollow core for releasably and slidably receiving the heating element.

[0043] 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.

[0044] 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.

[0045] 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.

[0046] 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.

[0047] 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).

[0048] 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.

[0049] 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.

[0050] 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.

[0051] The shape of the transverse cross section of the core recess may match the shape of the transverse cross section of the substrate.

[0052] 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.

[0053] 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.

[0054] 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.

[0055] 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.

[0056] 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.

[0057] In these embodiments, the substrates will each having an inner heating surface facing the planar recess and an opposing outer surface.

[0058] The two planar substrates are preferably vertically and horizontally aligned. The planar recess is also vertically and horizontally aligned with the planar substrates.

[0059] 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.

[0060] The thermally conductive material may be provided as a foil which may be textured e.g. dimpled.

[0061] 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.

[0062] The consumable may comprise a further layer of the or a further thermally conductive material on an outer surface of the plant product opposing the recess.

[0063] 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.

[0064] 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.

[0065] 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.

[0066] 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.

[0067] 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.

[0068] The e-liquid may contain aerosol formers such as polyglycol (PG) and/or vegetable glycerine (VG). It may contain flavourings.

[0069] 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.

[0070] The consumable may further comprise a filter. 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.

[0071] 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.

[0072] 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.

[0073] 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.

[0074] In other embodiments, at least one and preferably both of the opposing transverse surfaces may comprise a curved or rounded (concave or convex) surface.

[0075] 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.

[0076] 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.

[0077] 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".

[0078] 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.

[0079] 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.

[0080] The filter has an upstream longitudinal end face which faces and may abut the downstream longitudinal end face of the substrate.

[0081] 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).

[0082] 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.

[0083] The hollow bore may have a circular, rectangular or obround transverse cross sectional area. The bore may have a uniform transverse cross-sectional area.

[0084] 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.

[0085] 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.

[0086] In some embodiments, the filter may comprise at least one liquid release member.

[0087] 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.

[0088] 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.

[0089] The liquid release member may positioned proximal the abutment between the filter (e.g. at the upstream 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.

[0090] 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.

[0091] 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.

[0092] 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.

[0093] 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).

[0094] 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.

[0095] The consumable may comprise a housing i.e. the substrate may be at least partly (and preferably en-

tirely) enclosed within the housing. 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.

[0096] 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.

[0097] Preferably, the housing is formed of a material that is substantially rigid or semi-rigid i.e. it is not easily flexible.

[0098] 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.

[0099] 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.

[0100] 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.

[0101] 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.

[0102] 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 pump, palm pulp or bagasse pulp. Bagasse pulp is most preferred.

[0103] 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.

[0104] 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.

[0105] 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.

[0106] 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.

[0107] 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).

[0108] 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 has a substantially obround transverse cross section i.e. the housing is an obround cylindrical housing.

[0109] 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.

[0110] 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".

[0111] 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.

[0112] 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.

[0113] The chamber within the housing preferably has the same transverse cross section as the housing.

[0114] Preferably, the transverse cross-section of the housing and the chamber matches the transverse cross-section of the substrate.

[0115] The housing may have an at least partly open upstream longitudinal end face. Alternatively, as discussed below, the upstream longitudinal end face may comprise an upstream end wall that at least partly (and preferably fully) obscures the substrate from view.

[0116] The housing may have an opposing downstream longitudinal end wall. The downstream longitudinal end wall may comprise at least one outlet/mouthpiece aperture. The downstream longitudinal end wall may comprise a curved/rounded (e.g. a convex/semi-circular) end wall.

[0117] The inner surface of the downstream longitudinal end wall of the housing may abut the downstream

longitudinal end surface of the filter.

[0118] 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.

[0119] The downstream longitudinal end /wall may also comprise a junction.

[0120] 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).

[0121] 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).

[0122] As discussed above, the downstream longitudinal end of the housing comprises a downstream longitudinal end wall. The filter is typically provided adjacent e.g. with its downstream longitudinal end face abutting this longitudinal end wall of the housing. Thus the downstream longitudinal end wall at least partly (and preferably completely) obscures/conceals the filter from view by the user.

[0123] 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.

[0124] Although the downstream longitudinal end wall may comprise one or more outlet(s)/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.

[0125] Similarly, the upstream longitudinal end face may comprise an upstream longitudinal end wall that at least partly obscures the substrate from view at least prior to use.

[0126] The upstream longitudinal end face of the housing may comprise an upstream longitudinal end wall for at least partly overlying (e.g. abutting) the upstream longitudinal end face of the substrate. The upstream longitudinal end wall may comprise an aperture (into which the heating element can be inserted).

[0127] The upstream longitudinal end wall may be 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 aperture (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.

[0128] In other embodiments, the upper longitudinal end wall of the housing may extend along the upper and lower edges to form rails defining the aperture therebetween. The aperture may be dimensioned to match the dimensions of the planar recess when the consumable comprises two planar substrates.

[0129] 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.

[0130] The upstream longitudinal end face of the housing may additionally or alternatively comprise a pierceable or peelable membrane such as a metallic foil or plastic membrane. The membrane may be mounted across the entire open upstream longitudinal end face of the housing or it may be mounted on the upstream longitudinal end wall across the aperture. The membrane seals the upstream longitudinal end face prior to use and is pierced to mount the consumable on the heating element.

[0131] 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 opoids, cathine and cathinone, kavalactones, mysticin, beta-carboline alkaloids, salvinorin A together with any combinations, functional equivalents to, and/or synthetic alternatives of the foregoing.

[0132] 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* (Guamura), *Cestrum noctumum, Cynoglossum virginianum* (wild comfrey), *Cytisus scoparius, Damiana, Entada rheedii, Eschscholzia califomica* (California Poppy), *Fittonia albivenis, Hippobroma longiflora, Humulus japonica* (Japanese Hops), *Humulus lupulus* (Hops), *Lactuca virosa* (Lettuce Opium), *Laggera 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 incamata* (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), *Tarchonanthus camphoratus, Tumera diffusa* (Damiana), *Verbascum* (Mullein), *Zamia latifolia* (Maconha Brava) together with any combinations, functional equivalents to, and/or synthetic alternatives of the foregoing.

[0133] 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.

[0134] Any suitable parts of the tobacco plant may be used. This includes leaves, stems, roots, bark, seeds and flowers.

[0135] 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).

[0136] The aerosol-forming substrate may comprise reconstituted tobacco. The substrate, especially the hollow core substrate, may be formed by extrusion.

[0137] 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.

[0138] 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.

[0139] The aerosol-forming substrate may comprise one or more additives selected from humectants, flavourants, fillers, aqueous/non-aqueous solvents and binders.

[0140] 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%.

[0141] 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 least 40 wt %.

[0142] 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 %.

[0143] Preferably, the humectant content is 1 to 40 wt % of the aerosol-forming substrate, such as 1 to 20 wt %

[0144] 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.

[0145] Preferably the binder content is 5 to 10 wt% of the aerosol-forming substrate e.g. around 6 to 8 wt%.

[0146] 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.

[0147] Preferably, the filler content is 5 to 10 wt% of the aerosol-forming substrate e.g. around 6 to 9 wt%.

[0148] 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%.

[0149] 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.

[0150] The consumable described above may be coupled with a heating element in a heat not burn (HNB) device.

[0151] 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.

[0152] The device may be a HNB device i.e. a device adapted to heat but not combust the aerosol-forming substrate.

[0153] 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.

[0154] The device may further comprise a PCB connected to the heating element(s) for controlling the tem-

perature of the heating element(s). It may further comprise a battery e.g. a recyclable battery such as a 2000mAh battery.

[0155] 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.

[0156] 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.

[0157] 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.

[0158] The first/second/core heating element may be a ceramic heating element.

[0159] 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.

[0160] The sealing plate may be slidable (e.g. slidable in an axial direction) from the first position to the second position.

[0161] 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.

[0162] 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.

[0163] The device housing (and the cavity) may have a substantially rectangular or obround transverse cross-section.

[0164] 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.

[0165] 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 prevent from contacting the hot heating element.

[0166] 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; and

heating the consumable using the heating element.

[0167] In some embodiments, the method comprises inserting the consumable into a cavity within the device housing and penetrating the consumable with a core heating element upon insertion of the consumable. For example, 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.

[0168] 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. Where there is a membrane/foil sealing the upstream longitudinal end face of the housing or the aperture, the membrane is removed or pierced to allow insertion of the core heating element into the housing.

[0169] 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.

[0170] 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.

[0171] 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

[0172] 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 perspective internal view of a first embodiment of a consumable;

Figure 2 shows the downstream longitudinal end wall of the housing of the embodiment shown in Figure 1; and

Figures 3a - 3g show alternative transverse cross sections of an aerosol-forming substrate, filter or housing; and

Figures 4 - 6 show a device for heating a consumable.

Detailed Description

[0173] 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.

[0174] Figure 1 shows a perspective internal view of a first embodiment of a consumable 1.

[0175] The planar substrate 2 comprises a planar upper surface 3 and a planar lower surface 4 spaced by opposing longitudinally-extending transverse surfaces 5a, 5b. The depth of the substrate 2 (between the upper and lower surfaces 3, 4) and the width of the substrate 2 (between the opposing transverse surfaces 5a, 5b) are unequal with the width being greater than the depth.

[0176] The opposing transverse surfaces 5a, 5b each comprise a longitudinally-extending upper concave portion 6a, 6b and lower concave portion 7a, 7b which meet at a longitudinally-extending ridge 8a, 8b.

[0177] The concave portions 7a, 7b are spaced from the upper surface 3 and lower surface 4 by opposing convex portions 9a, 9a', 9b, 9b' such that the transverse cross-section through the substrate 2 is a modified obround where the opposing transverse surfaces 5a, 5b each take the form of a curly brace/bracket i.e. "{" and "}".

[0178] The length of the substrate 2 (between the upstream end face 10 and downstream end face 11) is around 12 mm long. The width of the substrate 2 (between opposing transverse surfaces 5a, 5b) may be around 12 mm. The depth of the substrate 2 (between the upper and lower surfaces 3, 4) may be around 6 mm.

[0179] The substrate 2 is formed of cast leaf slurry recon tobacco. It may alternatively be formed as extruded tobacco e.g. with added flavouring.

[0180] The consumable further comprises a planar filter 12. The filter 12 comprises a substantially planar upper surface 13 and a substantially planar lower surface 14 equally spaced by opposing longitudinally-extending transverse surfaces 15a, 15b.

[0181] The opposing transverse surfaces 15a, 15b each comprise a substantially convex surface (a semi-circular surface) such that the planar filter 12 has a substantially obround transverse cross section i.e. the filter 12 is an obround cylindrical filter.

[0182] The filter 12 has greater width and length than depth. The length is around 22mm and the width is around 12 mm. The depth is around 6mm.

[0183] The filter 12 has a hollow bore 16. The hollow bore 16 extends from the upstream longitudinal end face 17a of the filter 12 to the downstream longitudinal end face 17b of the filter 12.

[0184] The hollow bore 16 has an obround transverse cross sectional area. The bore 16 has a uniform transverse cross-sectional area. The bore 16 is dimensioned such that there is a thickness of filter material of around 1.5mm from the bore 16 to the upper lower surfaces 13, 14 and the opposing transverse surfaces 15a, 15b.

[0185] The upstream longitudinal end face 17a of the filter 12 faces and abuts the downstream longitudinal end face 11 of the substrate 2.

[0186] The filter 12 is comprised of cellulose acetate or polypropylene tow. The filter 12 is circumscribed with a paper plug wrap (not shown).

[0187] The substrate 2 and filter 12 are contained within a rigid bagasse housing 18.

[0188] The housing 18 comprises upper and lower walls 19, 20 spaced by opposing longitudinally-extending transverse walls 21a, 21b. The housing 18 has a wall thickness of around 0.8 mm.

[0189] The upper and lower walls 19, 20 are substantially planar and equally spaced by the transverse surfaces 21a, 21b, (i.e. the upper and lower walls 19, 20 are parallel to one another).

[0190] The opposing transverse surfaces 21a, 21b each comprise upper and lower concave portions 22a, 22a', 22b, 22b' which meet at a longitudinally-extending ridge 23.

[0191] The concave portions 22a, 22a', 22b, 22b' are spaced from the upper and lower surfaces by opposing convex portions 24a, 24a', 24b, 24b' such that the transverse cross-section of the housing 18 is a modified obround.

[0192] The chamber within and defined by the inner surfaces of the housing walls 19, 20, 21a, 21b is a modified obround cylindrical chamber, i.e. the transverse cross-section of the chamber within the housing 18 matches the transverse cross section of the substrate 2.

[0193] The housing 18 may have a length of around 42 mm, a height of around 6 mm and a width of around 15 mm.

[0194] The housing 18 has open upstream longitudinal end face 25 which may be sealed by a metallic foil or a plastic membrane (not shown). This foil or membrane obscures the substrate 2 from view.

[0195] The downstream longitudinal end of the housing 18 is shown in Figure 2. The downstream longitudinal end wall 26 conceals the filter 12 from view by the user.

[0196] Although the downstream longitudinal end wall 26 comprises a mouthpiece aperture 27, 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 12 is significantly impeded.

[0197] 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 25. For example, the device may be as described in relation to figures 4-6 below.

[0198] 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 19, 20 of the housing 18.

[0199] Figures 3a-3g 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.

[0200] Figure 3a shows a substrate 2' with planar upper and lower surfaces 3', 4' and convex (semi-circular) transverse surfaces 5a', 5b' such that the substrate 2' has an obround transverse cross-section. The housing and/ or filter may have the same shape.

[0201] Figure 3b shows a substrate 2" with planar upper and lower surfaces 3", 4" and concave (semi-circular) transverse surfaces 5a", 5b". The housing and/ or filter may have the same shape.

[0202] Figure 3c shows a substrate 2'" which is similar to the substrate shown in Figure 1 except that there are no convex portions 9a, 9a', 9b, 9b' joining the upper and lower surfaces 3, 4 and the concave portions 6a, 6b, 7a, 7b. The housing and/ or filter may have the same shape.

[0203] Figure 3d shows a substrate 2"" which has an oval transverse cross-sectional area. The housing and/ or filter may have the same shape.

[0204] Figure 3e shows a substrate 2'"" with curved (convex) upper and lower surfaces 3'"", 4'"" and planar transverse surfaces 5a""', 5b'"" such that the substrate has a truncated oval transverse cross-sectional area. The housing and/ or filter may have the same shape.

[0205] Figure 3f shows a substrate the same as Figure 3c except with curved (convex) upper and lower surfaces. The housing and/ or filter may have the same shape.

[0206] Figure 3g shows a substrate the same as Figure 3b except with curved (convex) upper and lower surfaces. The housing and/ or filter may have the same shape.

[0207] Figure 4 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.

[0208] The consumable 1 is insertable into the chamber 35 within the device housing 34 such that the heating element 28 is received in the housing 18 (e.g. within the substrate 2) via the upstream longitudinal end face 25 of the housing 18. The downstream longitudinal end wall 26 of the housing 18 protrudes from the device housing 34.

[0209] The device 30 further comprises a sealing plate 36 movable (slidable in a axial direction) from a first position (shown in figure 5) in which the aperture at the upstream longitudinal end face of the device housing 34 is open, to a second position (shown in Figure 6) in which the aperture is at least partially sealed by the sealing plate 36.

[0210] 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.

[0211] 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.

[0212] The consumable 1 is inserted when the sealing plate 36 is in its first position. The heating element 28 lies within the substrate 2 (either by penetrating the substrate 2 or by being received within the core recess) 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).

[0213] The user then places the downstream longitudinal end wall 26 of the consumable 1 into their mouth and draws on the consumable in order to inhale an aerosol containing nicotine.

[0214] After use, the sealing plate 36 is moved to its second position which forces the consumable 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 prevent from contacting the hot heating element 28.

[0215] 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 in situ.

[0216] 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.

[0217] 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 comprising an aerosol-forming substrate having upper and lower surfaces spaced by opposing longitudinally-extending transverse surfaces wherein at least one of the surfaces is a curved or rounded surface or comprises a curved or rounded surface portion and wherein the substrate has a greater width than depth.

2. A consumable according to claim 1 wherein the upper and lower surfaces are substantially planar and equally spaced by the transverse surfaces such that the substrate is a planar substrate.

3. A consumable according to claim 1 or 2 wherein one or both of the opposing transverse surfaces comprises a concave or convex surface/surface portion.

4. A consumable according to claim 3 wherein the opposing transverse surfaces are convex surfaces and the upper and lower surfaces are planar such that the planar substrate has a substantially obround transverse cross section.

5. A consumable according to claim 3 wherein the opposing transverse surfaces each comprise longitudinally-extending upper and lower concave portions which meet at a longitudinally-extending ridge.

6. A consumable according to claim 5 wherein the concave portions are spaced from the planar upper and lower surfaces by opposing convex portions.

7. A consumable according to any one of the preceding claims wherein the substrate comprises a hollow core for releasably and slidably receiving a heating element.

8. A consumable according to any one of the preceding claims wherein the substrate is an extruded substrate.

9. A consumable according to claim 8 herein the extruded substrate comprises added flavouring.

10. A consumable according to any one of the preceding claims further comprising a filter downstream of the substrate, wherein the filter has an obround or oval transverse cross section.

11. A consumable according to any one of the preceding claims further comprising a rigid or semi-rigid biodegradable housing.

12. A consumable, according to claim 11 wherein the housing comprises upper and lower walls spaced by longitudinally-extending transverse walls wherein at least one of the walls is a curved or rounded wall and wherein the housing has a non-circular transverse cross section.

13. A heat not burn (HNB) system comprising:

    a heat not burn consumable according to any one of claims 1 to 12; and
    a device comprising at least one heating element.

14. A system according to claim 13 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.

15. A method of using a heat not burn system according to claim 13 or 14, the method comprising:

    inserting the consumable into the device; and
    heating the consumable using the heating element.

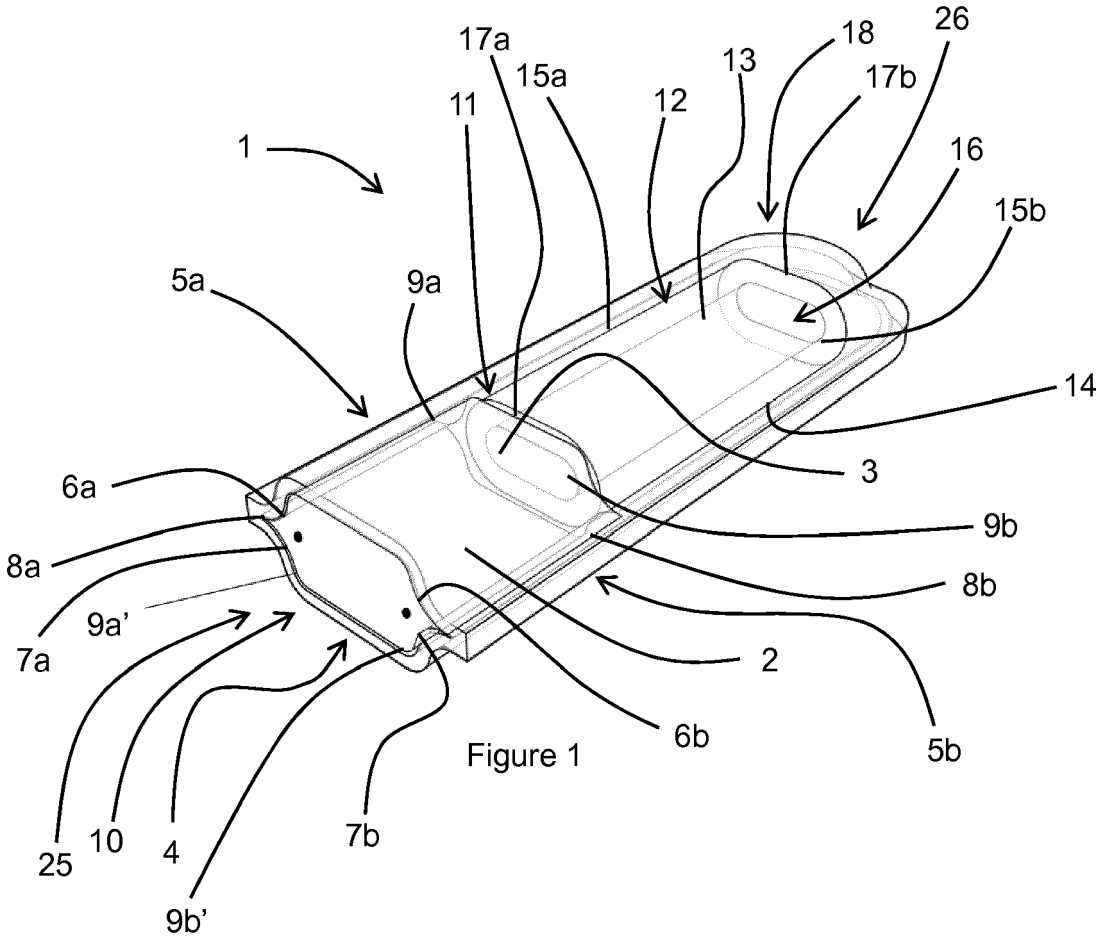

Figure 1

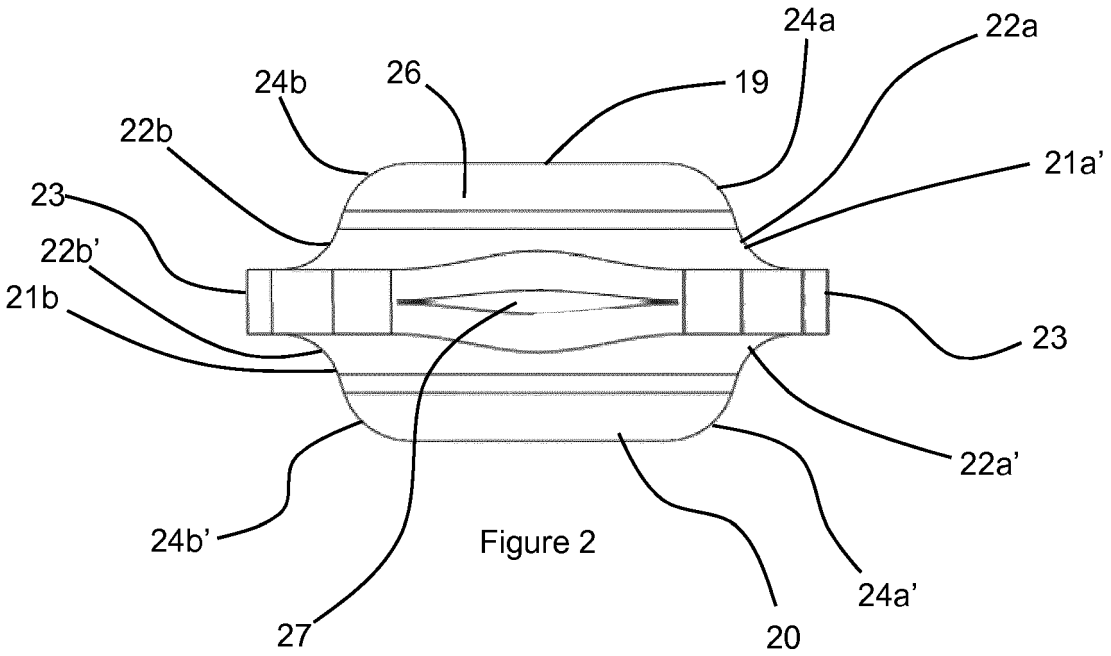

Figure 2

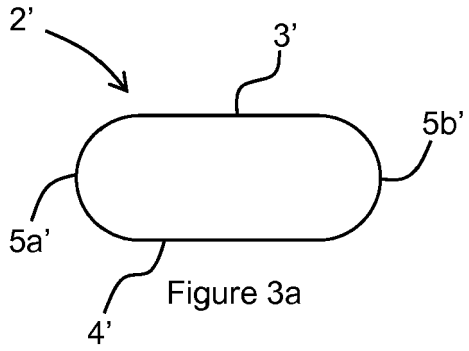

Figure 3a

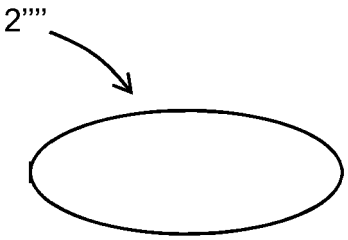

Figure 3d

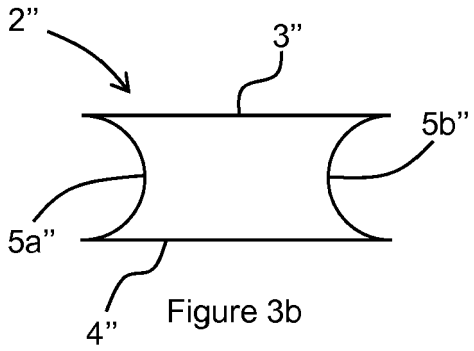

Figure 3b

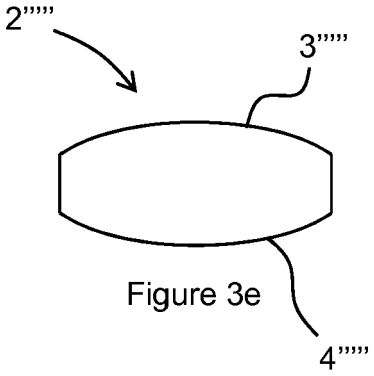

Figure 3e

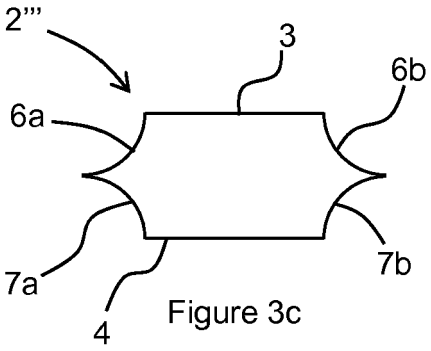

Figure 3c

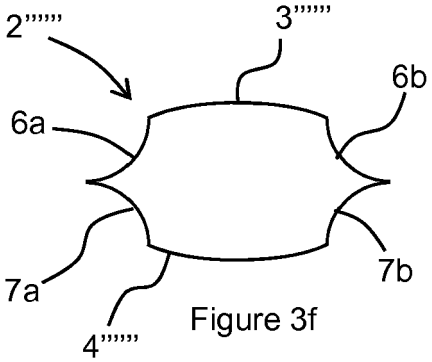

Figure 3f

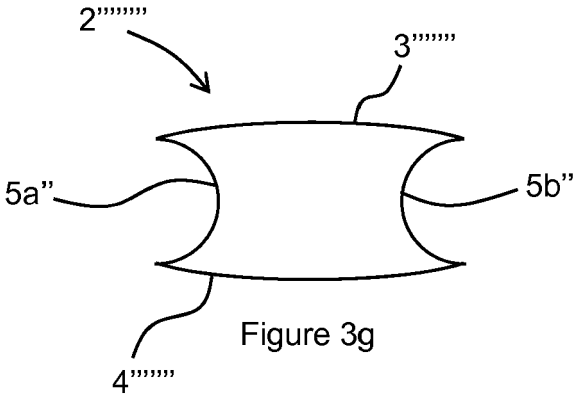

Figure 3g

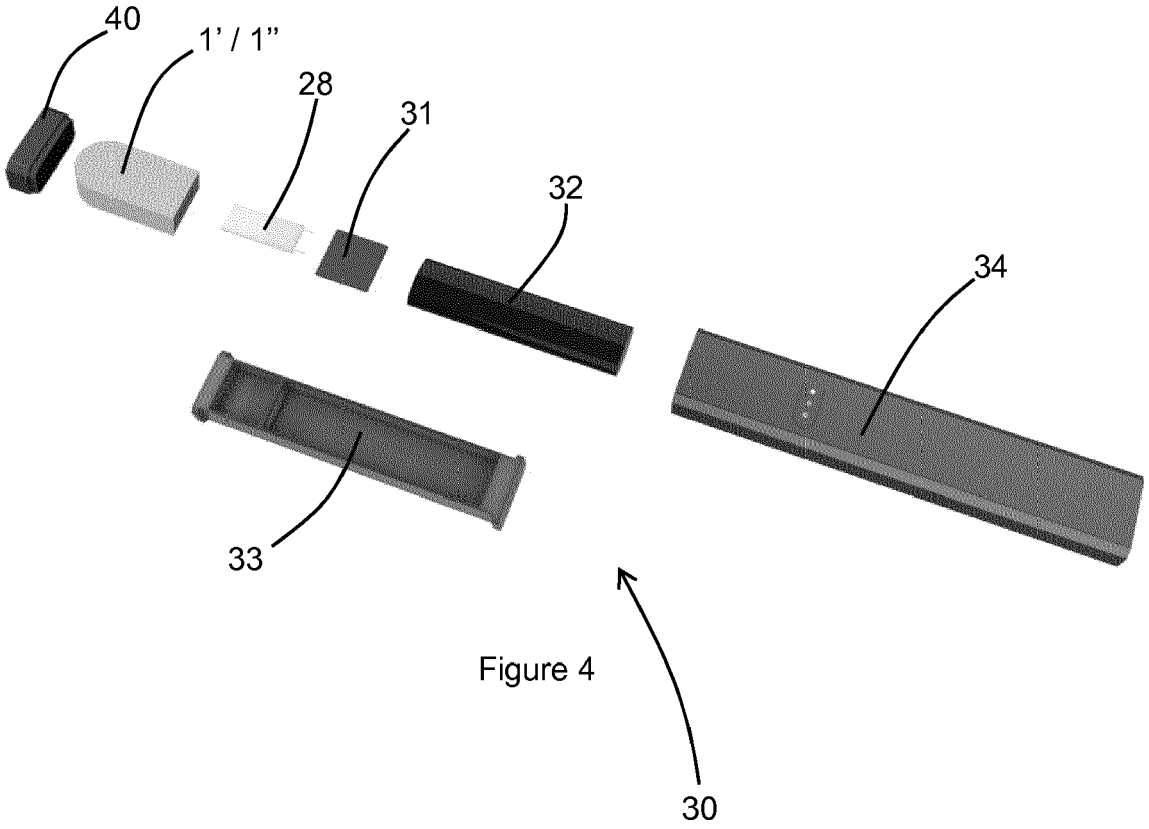

Figure 4

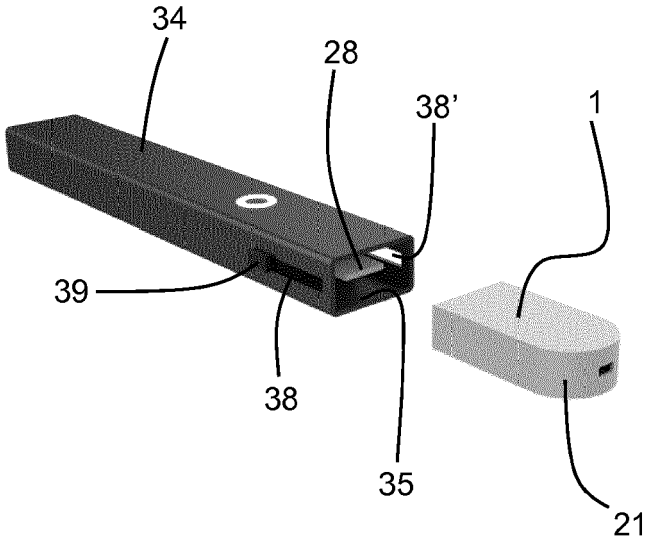

Figure 5

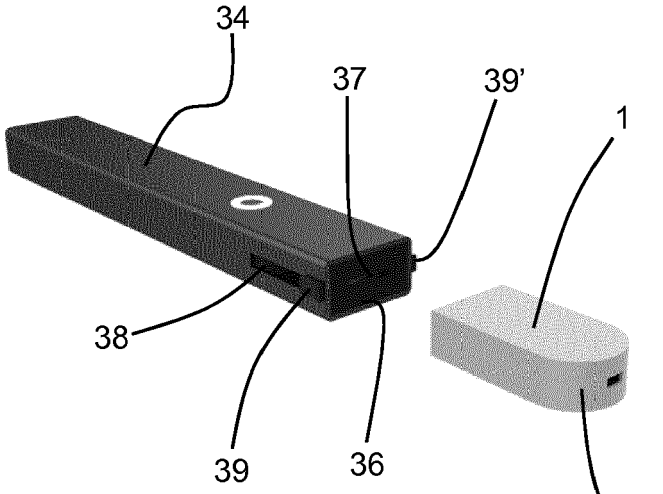

Figure 6

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 19 19 3259

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 A	WO 2018/206615 A2 (PHILIP MORRIS PRODUCTS SA [CH]) 15 November 2018 (2018-11-15) * page 3, line 11 - page 4, line 19; figures 2,3,5 *	1-4,7-15 6	INV. A24D1/20
X	WO 2016/171997 A2 (VIRIYAPANTHU PAUL [US]) 27 October 2016 (2016-10-27) * figure 2 *	1,5	
X	GB 2 534 215 A (NGIP RES LTD [GB]) 20 July 2016 (2016-07-20) * page 13, line 17 - line 35; figure 12 *	1	
X	US 2017/119050 A1 (BLANDINO THOMAS P [US] ET AL) 4 May 2017 (2017-05-04) * paragraphs [0080], [0081] *	1	

TECHNICAL FIELDS SEARCHED (IPC)

A24D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	19 February 2020	Coniglio, Carlo

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

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 19 19 3259

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.

19-02-2020

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2018206615 A2	15-11-2018	CN 110602955 A	20-12-2019
		EP 3621464 A2	18-03-2020
		KR 20190140480 A	19-12-2019
		WO 2018206615 A2	15-11-2018
WO 2016171997 A2	27-10-2016	NONE	
GB 2534215 A	20-07-2016	NONE	
US 2017119050 A1	04-05-2017	AU 2016344642 A1	10-05-2018
		BR 112018008709 A2	30-10-2018
		CA 3003519 A1	04-05-2017
		CA 3056677 A1	04-05-2017
		CN 108366627 A	03-08-2018
		EP 3367829 A1	05-09-2018
		JP 2019500854 A	17-01-2019
		KR 20180059920 A	05-06-2018
		KR 20200000500 A	02-01-2020
		RU 2018115542 A	30-10-2019
		US 2017119050 A1	04-05-2017
		US 2018325173 A1	15-11-2018
		WO 2017072146 A1	04-05-2017

EPO FORM P0459

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