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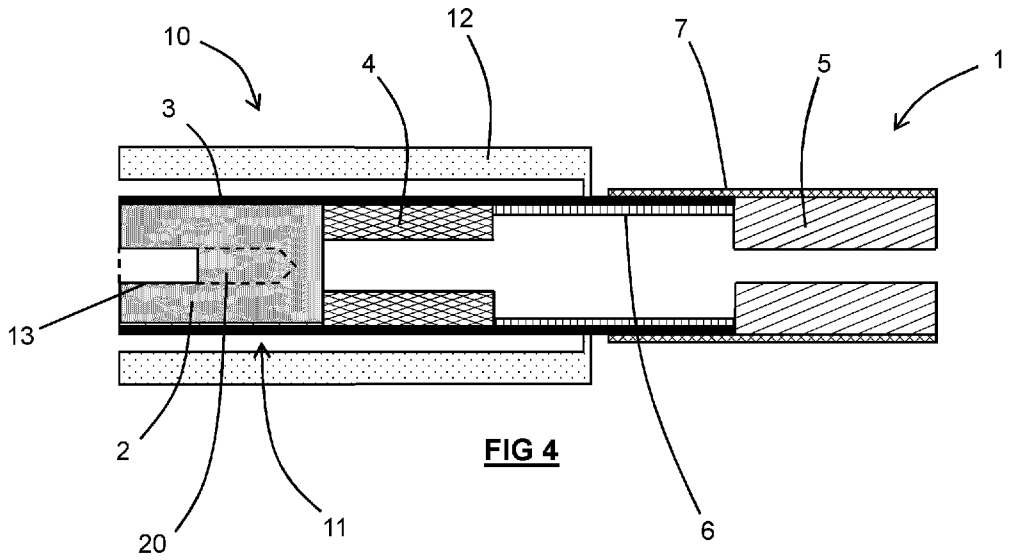


FIG 4

(57) Abstract: The present disclosure relates to aerosol-forming articles comprising an aerosol-forming substrate (2) wherein the aerosol-forming substrate comprises a p re-formed axially-extending recess (13) adapted to receive an external heating element.

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Smoking substitute consumable

Field of the Disclosure

The present disclosure relates to a consumable for use in a smoking substitute system and particularly, although not exclusively, to a heat-not-burn (HNB) consumable.

Background

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.

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.

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.

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.

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.

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.

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.

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

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.

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.

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.

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.

There is a need for improved design of HNB consumables to enhance the user experience and improve the function of the HNB smoking substitute system.

The present disclosure has been devised in the light of the above considerations.

Summary of the Disclosure

At its most general, the present disclosure relates to an aerosol-forming article e.g. a smoking substitute article such as an HNB consumable an aerosol-forming substrate adapted to facilitate insertion of an elongated heating element.

According to a first aspect, the present invention provides an aerosol-forming article (e.g. a smoking substitute article such as an HNB consumable) comprising an aerosol-forming substrate wherein the aerosol-forming substrate comprises a pre-formed axially-extending recess adapted to receive an external heating element.

By providing an aerosol-forming substrate having a pre-formed axially-extending recess for receiving an external heating element (i.e. formed during manufacture of the article rather than during insertion of the external heater), the user of a smoking substitute system having an external heater can easily locate the heater correctly in the aerosol-forming substrate and penetrate the aerosol-forming substrate with reduced resistance from the aerosol-forming substrate.

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

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.

In order to generate an aerosol, the aerosol-forming 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.

The aerosol-forming substrate at least partly comprises plant material. 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.

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.

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

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).

The aerosol-forming substrate may comprise a gathered sheet of homogenised (e.g. paper/slurry recon) tobacco or gathered shreds/strips formed from such a sheet.

In some embodiments, the sheet used to form the aerosol-forming substrate has a grammage greater than or equal to 100 g/m^2, e.g. greater than or equal to 110 g/m^2 such as greater than or equal to 120 g/m^2.

The sheet may have a grammage of less than or equal to 300 g/m^2 e.g. less than or equal to 250 g/m^2 or less than or equal to 200 g/m^2.

The sheet may have a grammage of between 120 and 190 g/m^2.

The aerosol-forming substrate may comprise extruded tobacco which 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 to form the tube-shaped extrudate.

The aerosol-forming substrate may comprise at least 50 wt% plant material, e.g. at least 60 wt% plant material e.g. around 65 wt% plant material. The aerosol-forming substrate may comprise 80 wt% or less plant material e.g. 75 or 70 wt% or less plant material.

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

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%.

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 %.

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 %.

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

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.

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

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.

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

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%.

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/dosed throughout the aerosol-forming substrate e.g. it may be added to the liquid mixture of plant material prior to extrusion.

The aerosol-forming substrate may be formed in a substantially cylindrical shape such that the consumable resembles a conventional cigarette. It may have a diameter of between 5 and 10mm e.g. between 6 and 9mm or 6 and 8mm e.g. around 7 mm.

It may have an axial length of between 10 and 15mm.

The aerosol-forming substrate may have an axial length of between 10 and 15 mm. The axially-extending recess may extend the entire axial length of the aerosol-forming substrate e.g. it may have an axial length of between 10 and 15 mm. In other embodiments, the axially-extending recess may have an axial downstream end that terminates within the aerosol-forming substrate. The axial upstream end of the axially-extending recess is at the axial upstream end of the article/consumable. The axial distance between the upstream and downstream axial ends of the axially-extending recess may be greater than 1mm e.g. greater than 2mm or 3mm or 4mm or 5 mm or 6mm or 7mm or 8mm or 9mm.

The axially-extending recess in the aerosol-forming substrate may a substantially circular radial cross-section at its upstream axial end and may have a diameter of between 1 and 3 mm e.g. around 2mm.

The axial upstream end of the axially-extending recess may be provided at the axial centre of the upstream axial end of the aerosol-forming substrate.

The axially-extending recess may have a substantially uniform radial cross-section along its axial length (e.g. with the downstream axial end having substantially the same cross-sectional shape/area as the upstream axial end) or the axially-extending recess may taper to a reduced cross-sectional area/diameter at the downstream axial end. For example, the axially-extending recess may taper to a point.

The axially-extending recess may be formed by indenting the upstream axial end of the aerosol-forming substrate or the aerosol-forming substrate may be formed around a removable insert which leaves the shape of the recess once removed.

The aerosol-forming substrate may be circumscribed by a wrapping layer e.g. a paper wrapping layer. The wrapping layer may overlie an inner foil layer or may comprise a paper/foil laminate (with the foil innermost).

The article/consumable may comprise at least one filter element. There may be a terminal filter element at the downstream/mouth end of the article/consumable. There may be an upstream filter element upstream from the terminal filter element. The terminal and upstream filter elements may be axially adjacent or axially spaced from one another. The upstream filter element may be circumscribed by the (paper) wrapping layer.

The or at least one of the filter element(s) (e.g. the terminal filter element and/or upstream filter element) may be comprised of cellulose acetate or polypropylene tow. The or at least one of the filter element(s) (e.g. the terminal filter element and/or upstream filter element) may be comprised of activated charcoal. The or at least one of the filter element(s) (e.g. the terminal filter element and/or upstream filter element) may be comprised of paper. The or at least one of the filter element(s) (e.g. the terminal filter element and/or upstream filter element) may be comprised of extruded plant material. The or each filter element may be at least partly (e.g. entirely) circumscribed with a plug wrap e.g. a paper plug wrap.

The or each filter element may have a substantially cylindrical shape with a diameter substantially matching the diameter of the aerosol-forming substrate (with or without its associated wrapping layer). The axial length of the or each filter element may be less than 20mm, e.g. between 8 and 15mm, for example between 9 and 13 mm e.g. between 10 and 12mm.

The or at least one of the filter element(s) may be a solid filter element. The or at least one of the filter element(s) may be a hollow bore filter element. The or each hollow bore filter may have a bore diameter of between 1 and 5 mm, e.g. between 2 and 4 mm or between 2 and 3 mm.

The terminal filter element (at the downstream end of the article/consumable) may be joined to the upstream elements forming the article/consumable by a circumscribing tipping layer e.g. a tipping paper layer. The tipping paper may have an axial length longer than the axial length of the terminal filter element such that the tipping paper completely circumscribes the terminal filter element plus the wrapping layer surrounding any adjacent upstream element.

The or at least one of the filter elements e.g. the terminal filter element may include a capsule e.g. a crushable capsule (crush-ball) containing a liquid flavourant e.g. a liquid flavourant as described above. The capsule can be crushed by the user during smoking of the consumable to release the flavourant. The capsule may be located at the axial centre of the terminal filter element.

In some embodiments, the article/consumable may comprise an aerosol-cooling element which is adapted to cool the aerosol generated from the aerosol-forming substrate (by heat exchange) before being inhaled by the user.

The aerosol-cooling element will be downstream from the aerosol-forming substrate. For example, it may be between the aerosol-forming substrate and the upstream filter element and/or between the two filter elements. The aerosol cooling element may be at least partly (e.g. entirely) circumscribed by the (paper) wrapping layer.

The aerosol-cooling element may be formed of a plastics material selected from the group consisting of polylactic acid (PLA), polyvinyl chloride (PVC), polyethylene (PE) and polyethylene terephthalate (PET).

The aerosol-cooling element may be formed of a crimped/gathered sheet of material to form a structure having a high surface area with a plurality of longitudinal channels to maximise heat exchange and cooling of the aerosol.

The article/consumable may comprise a spacer element that defines a space or cavity between the aerosol-forming substrate and the downstream end of the consumable. The spacer element may comprise a cardboard tube. It may be provided between the aerosol-forming substrate and the upstream filter element and/or between the two filter elements. The spacer element may be circumscribed by the (paper) wrapping layer.

The spacer element may have an external diameter of between 5 and 10mm e.g. between 6 and 9mm or 6 and 8mm e.g. around 7 mm. It may have an axial length of between 10 and 15mm e.g. between 12 and 14 mm or 13 and 14mm e.g. around 14mm.

In a second aspect, there is provided a system comprising an article/consumable according to the first aspect and a device comprising a heating element.

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

The device may comprise a main body for housing the heating element. The heating element may comprise an elongated e.g. rod, tube-shaped or blade heating element. The heating element may project into or surround a cavity within the main body for receiving the article/consumable.

The cross-sectional of the axially-extending recess of the aerosol-forming substrate may substantially match the cross-sectional area of the elongated heater. For example, the heater is a rod/rube heater, the diameter of the axially-extending recess may substantially match the diameter of the rod/rube heater.

The device (e.g. the main body) may further comprise an electrical power supply e.g. a (rechargeable) battery for powering the heating element. It may further comprise a control unit to control the supply of power to the heating element.

In a third aspect, there is provided a method of using a system according to the second aspect, the method comprising:

inserting the article/consumable into the device such that the heating element is received in the axially-extending recess of the aerosol-forming substrate; and

heating the article/consumable using the heating element.

The skilled person will appreciate that except where mutually exclusive, a feature or parameter described in relation to any one of the above aspects may be applied to any other aspect. Furthermore, except where mutually exclusive, any feature or parameter described herein may be applied to any aspect and/or combined with any other feature or parameter described herein.

Summary of the Figures

So that the invention may be understood, and so that further aspects and features thereof may be appreciated, embodiments illustrating the principles of the invention will now be discussed in further detail with reference to the accompanying figures, in which:

Figure 1 shows a first embodiment of an HNB consumable;

Figure 2 shows a second embodiment of an HNB consumable

Figure 3 shows a third embodiment of an HNB consumable; and

Figure 4 shows the first embodiment within a device forming an HNB system.

Detailed Description of the Figures

As shown in Figure 1, the HNB consumable 1 comprises an aerosol-forming substrate 2 at the upstream end of the consumable 1.

The aerosol-forming substrate 2 comprises a rod-shaped extrudate of tobacco and is dosed with 20wt% of a humectant such as propylene glycol (PG) or vegetable glycerine (VG).

The aerosol-forming substrate 2 is formed in a substantially cylindrical shape such that the consumable resembles a conventional cigarette. It has diameter of around 7mm and an axial length of around 12mm. The extrudate comprises an axially-extending recess which has its axial upstream end at the axial upstream end of the aerosol-forming substrate 2. The axially-extending recess 13 extends about a third of the lnght of the aerosol-forming substrate 2 and thus has an axial length of around 4mm. It has a bore diameter of around 2mm and a blunt downstream axial end.

The aerosol-forming substrate 2 is circumscribed by a paper wrapping layer 3.

The consumable 1 comprises an upstream filter element 4 and a downstream (terminal) filter element 5. The two filter elements 4, 5 and spaced by a cardboard spacer tube 6. Both filter elements 4, 5 are formed of cellulose acetate tow and wrapped with a respective paper plug layer (not shown).

Both filter elements have a substantially cylindrical shape. The diameter of the upstream filter 4 matches the diameter of the aerosol-forming substrate 2. The diameter of the terminal filter element 5 is slightly larger and matches the combined diameter of the aerosol-forming substrate 2 and the wrapping layer 3. The upstream filter element is slightly shorter in axial length than the terminal filter element at an axial length of 10mm compared to 12mm for the terminal filter element.

The cardboard tube spacer is longer than each of the two filter portions having an axial length of around 14mm.

Each filter element 4, 5 is a hollow bore filter element with a hollow, longitudinally extending bore. The diameter of the bore in the upstream filter is slightly larger than the diameter of the bore in the terminal filter having a diameter of 3mm compared to 2 mm for the terminal filter element.

The cardboard spacer tube 6 and the upstream filter portion 4 are circumscribed by the wrapping layer 3.

The terminal filter element 5 is joined to the upstream elements forming the consumable by a circumscribing paper tipping layer 7. The tipping layer 7 encircles the terminal filter portion and has an axial length of around 20mm such that it overlays a portion of the cardboard tube spacer 6.

Figure 2 shows a second embodiment of a consumable 1' which is the same as that shown in Figure 1 except that the terminal filter element 5 is a solid filter element and comprises a crushable capsule 8 (crush-ball) having a shell wall containing a liquid menthol or cherry or vanilla flavourant. The capsule 8 is spherical and has a diameter of 3.5mm. It is positioned within the axial centre of the terminal filter portion 5. The capsule 8 may be omitted from the Figure 2 embodiment and may be included in the Figure 1 embodiment. The axially-extending recess 13' in the Figure 2 embodiment is tapered from a diameter of around 2mm to a diameter of around 1mm.

Figure 3 shows a third embodiment of a consumable 1'' which is the same as the first embodiment except that the wrapping layer 3 does not completely circumscribe the cardboard spacer tube 6 such that there is an annular gap 9 between the tipping layer 7 and the cardboard spacer tube 6 downstream of the end of the wrapping layer 3. Furthermore, the axially extending recess 13'' tapers from a diameter of around 2mm to a point. Finally, the extruded rod of tobacco is replaced with an aerosol-forming substrate 2' comprising 65 wt% tobacco which is provided in the form of gathered shreds produced from a sheet of slurry/paper recon tobacco. The tobacco is dosed with 20wt% of a humectant such as propylene glycol (PG) or vegetable glycerine (VG) and has a moisture content of between 7-9 wt%. The aerosol-forming substrate further comprises cellulose pulp filler and guar gum binder.

Figure 4 shows the first embodiment inserted into an HNB device 10 comprising a rod-shaped heating element (not shown). The heating element projects into a cavity 11 within the main body 12 of the device.

The consumable 1 is inserted into the cavity 11 of the main body 12 of the device 10 such that the heating rod 20 is received in the axially-extending recess 13 of the aerosol-forming substrate 2. Heating of the reconstituted tobacco in the aerosol-forming substrate 2 is effected by powering the heating element (e.g. with a rechargeable battery (not shown)). As the tobacco is heated, moisture and volatile compound (e.g. nicotine) within the tobacco and the humectant are released as a vapour and entrained within an airflow generated by inhalation by the user at the terminal filter portion 5.

As the vapour cools within the upstream filter element 4 and the cardboard spacer tube 6, it condenses to form an aerosol containing the volatile compounds for inhalation by the user.

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

While the invention has been described in conjunction with the exemplary embodiments described above, many equivalent modifications and variations will be apparent to those skilled in the art when given this disclosure. Accordingly, the exemplary embodiments of the invention set forth above are considered to be illustrative and not limiting. Various changes to the described embodiments may be made without departing from the spirit and scope of the invention.

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

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

Throughout this specification, including the claims which follow, unless the context requires otherwise, the words “have”, “comprise”, and “include”, and variations such as “having”, “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.

It must be noted that, as used in the specification and the appended claims, the singular forms “a,” “an,” and “the” include plural referents unless the context clearly dictates otherwise. Ranges may be expressed herein as from “about” one particular value, and/or to “about” another particular value. When such a range is expressed, another embodiment includes from the one particular value and/or to the other particular value. Similarly, when values are expressed as approximations, by the use of the antecedent “about,” it

will be understood that the particular value forms another embodiment. The term “about” in relation to a numerical value is optional and means, for example, +/- 10%.

The words "preferred" and "preferably" are used herein refer to embodiments of the invention that may provide certain benefits under some circumstances. It is to be appreciated, however, that other embodiments may also be preferred under the same or different circumstances. The recitation of one or more preferred embodiments therefore does not mean or imply that other embodiments are not useful, and is not intended to exclude other embodiments from the scope of the disclosure, or from the scope of the claims.

Claims:

1. An aerosol-forming article comprising an aerosol-forming substrate wherein the aerosol-forming substrate comprises a pre-formed axially-extending recess adapted to receive an external heating element.

2. An article according to claim 1 wherein the article is a heat not burn consumable.

3. An article according to claim 1 or 2 wherein the axially-extending recess has an upstream axial end and a downstream axial end wherein the downstream axial end of spaced from the downstream axial end of the substrate.

4. An article according to claim 3 wherein the axial spacing between the upstream and downstream axial ends of the axially-extending recess is between 1 and 7mm.

5. An article according to any one of the preceding claims wherein the axially-extending recess has a substantially circular radial cross-section at its upstream axial end with a diameter of between 1 and 3 mm.

6. An article according to any one of the preceding claims wherein the axially-extending recess has a substantially uniform radial cross-sectional area along its axial length.

7. An article according to any one of claims 1 to 5 wherein the axially-extending recess tapers to a reduced cross-sectional area/diameter at the downstream axial end.

8. An article according to any one of preceding claims further comprising a filter element downstream and axially adjacent the aerosol-forming substrate.

9. An article according to claim 8 further comprising a terminal mouth filter element at the axial downstream end of the article.

10. An article according to claim 9 wherein the filter element and terminal filter element are axially spaced by a cooling element or spacer.

11. An article according to any one of claims 8 to 10 wherein the filter element and/or the terminal filter element is/are a hollow bore element.

12. A smoking substitute system comprising an article according to any one of the preceding claims and a device comprising an elongated heating element.

13. A method of using the system according to claim 12, the method comprising:

inserting the article into the device such that the heating element is received in the axially extending recess; and

heating the article using the heating element.

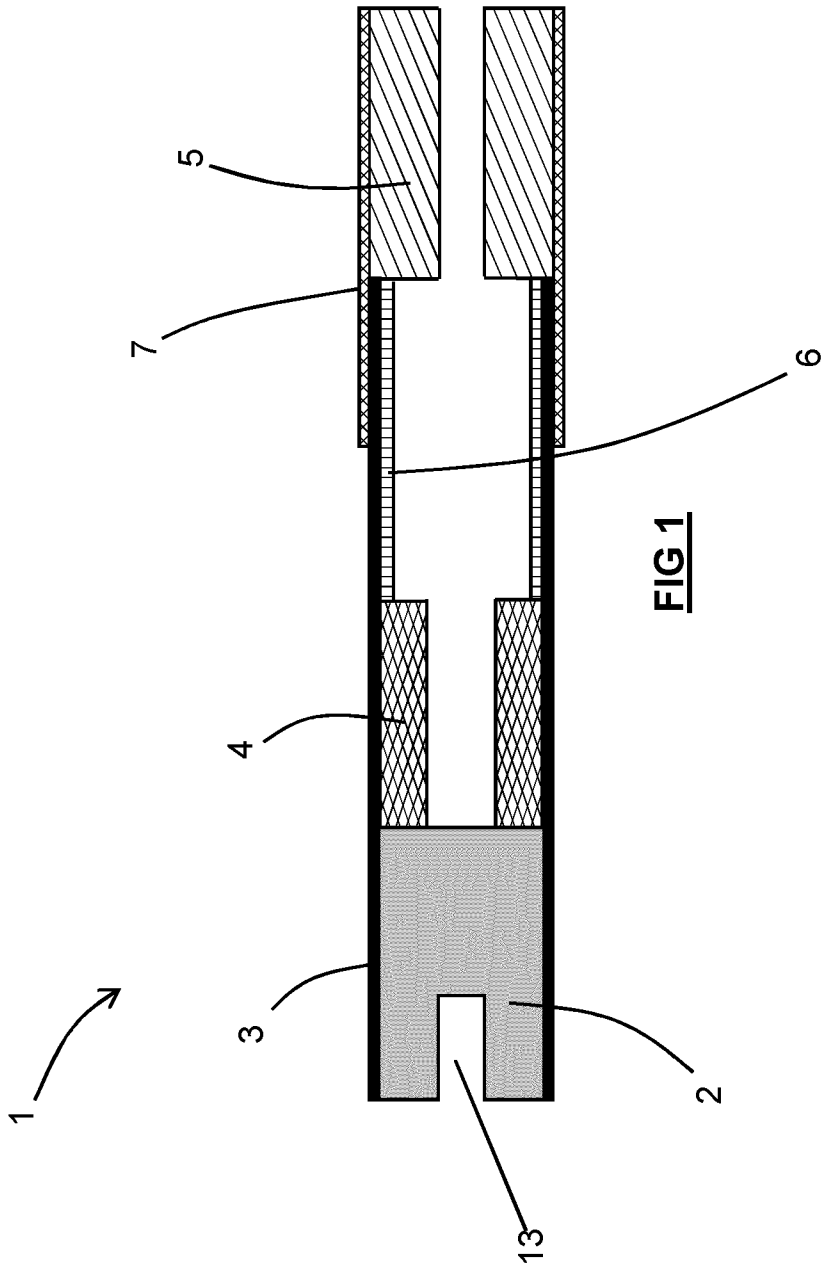


FIG 1

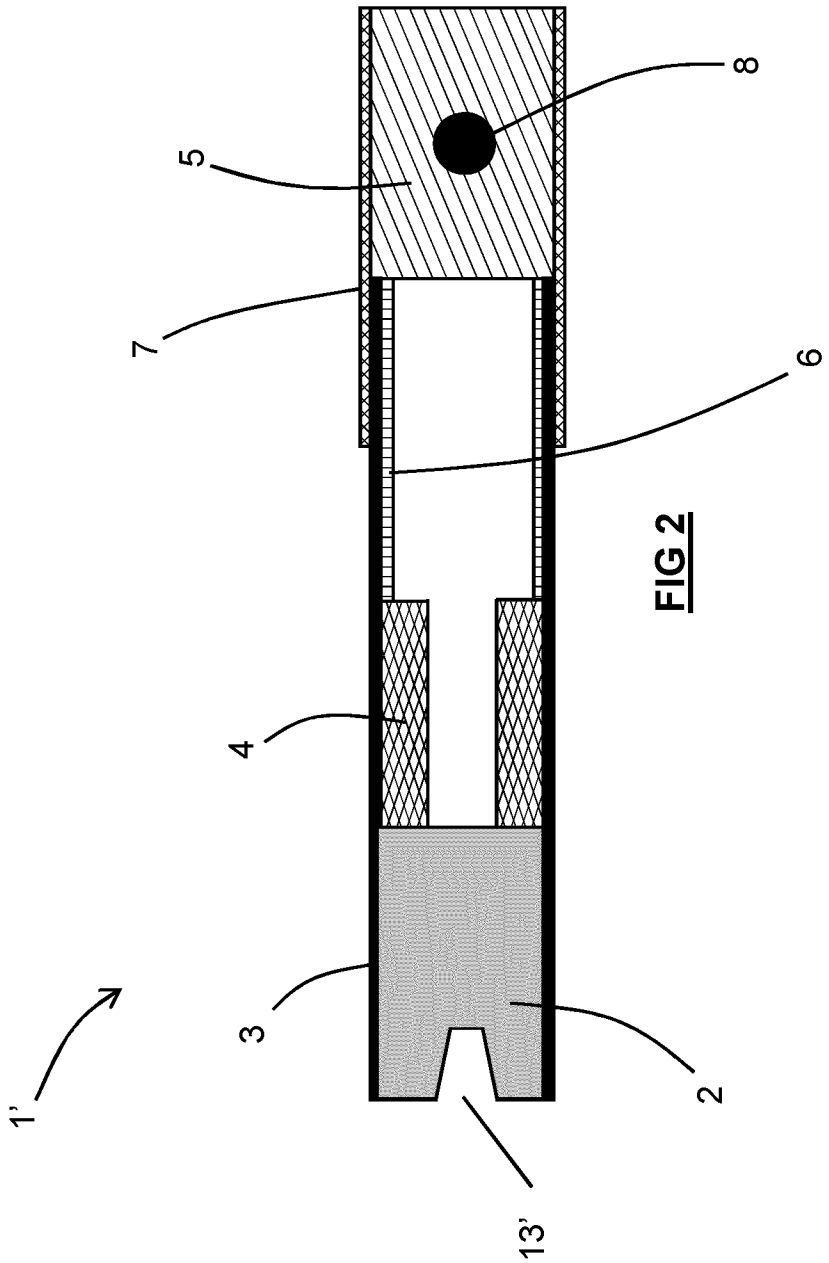


FIG 2

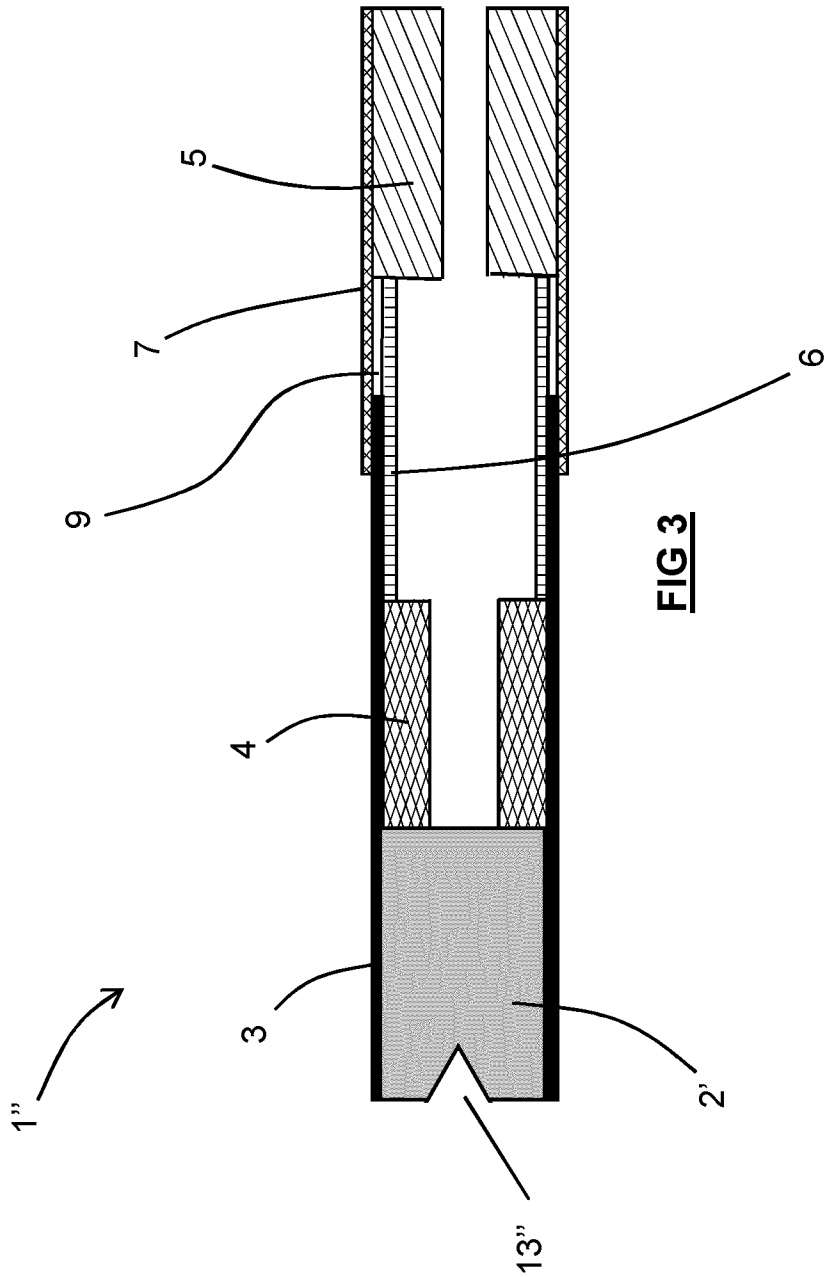


FIG 3

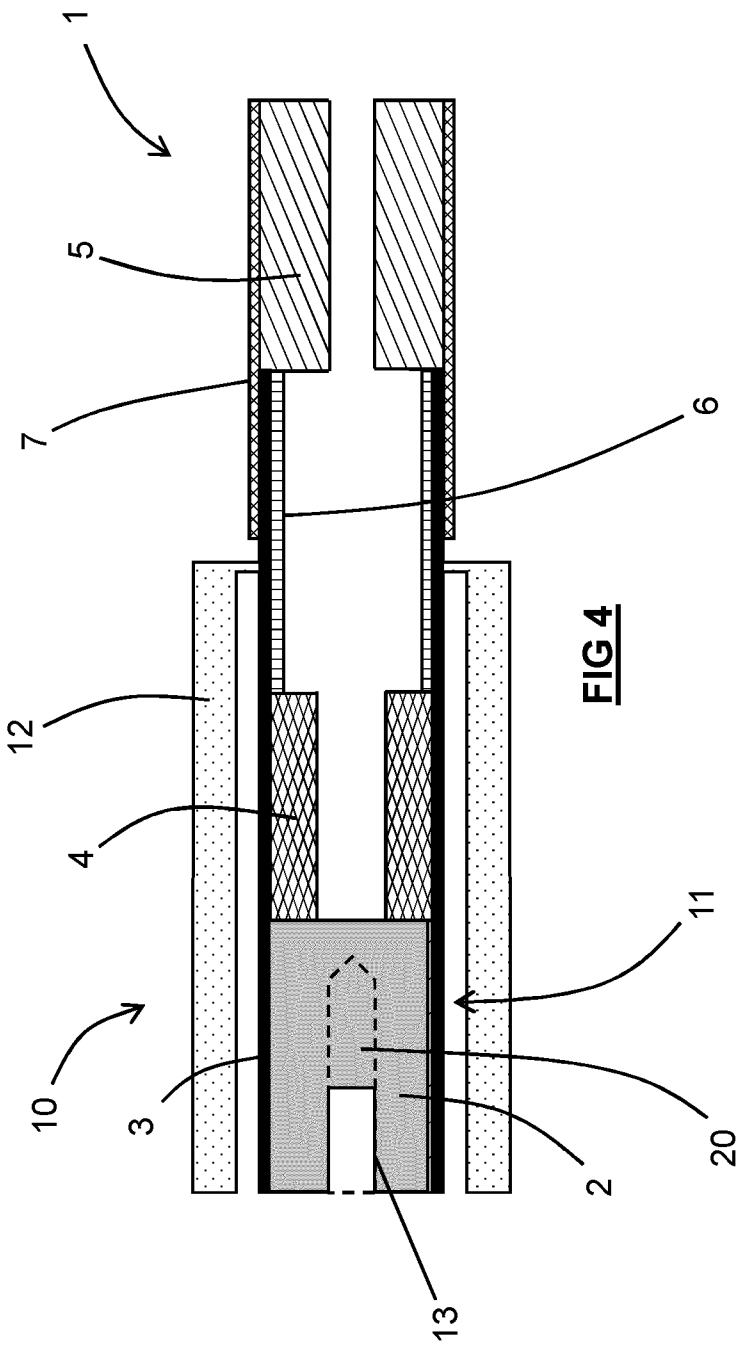


FIG 4

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2019/079161

A. CLASSIFICATION OF SUBJECT MATTER
INV. A24D1/20
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A24D A24F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
21 January 2020	04/02/2020

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Koob, Michael

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Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2019/079161

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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Y	page 2, line 25 - page 11, line 17; figure 1	9-11
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