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(54) **SMOKING SUBSTITUTE SYSTEM**

RAUCHERSATZSYSTEM

SYSTÈME DE SUBSTITUTION DU TABAC

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Description

TECHNICAL FIELD

[0001] The present invention relates to a smoking substitute system and particularly, although not exclusively, to a smoking substitute system comprising a device for heating a consumable.

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 (also referred to as a "consumables") 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 Heated Tobacco ("HT") approach in which tobacco (rather than an "e-liquid") is heated or warmed to release vapour. HT is also known as "heat not burn" ("HNB"). The tobacco may be leaf tobacco or reconstituted tobacco. The vapour may contain nicotine and/or flavourings. In the HT approach the intention is that the tobacco is heated but not burned, i.e. the tobacco does not undergo combustion.

[0011] A typical HT 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 components 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 the location of vapourisation to an outlet of the consumable (e.g. a mouthpiece), the vapour cools and condenses to form an aerosol for inhalation by the user. The aerosol will normally contain the volatile compounds.

[0013] In HT 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 HT approach may reduce the odour and/or health risks that can arise through the burning, combustion and pyrolytic degradation of tobacco.

[0014] There may be a need for improved design of smoking substitute systems, in particular HT smoking substitute systems, to enhance the user experience and improve the function of the HT smoking substitute system.

[0015] The present disclosure has been devised in the light of the above considerations.US2017/042243 discloses an electrically heated aerosol-generating system with end heater. WO2019/030166 discloses an aerosol-generating device with induction heater with a side opening.

SUMMARY OF THE INVENTION

[0016] An invention is set out in the claims. At its most general, the present invention relates to a heat not burn (HNB) device having a thermally conductive shroud thermally connected to a heating element for heating a HNB consumable.

[0017] According to a first aspect of the present invention, there is provided a heat not burn (HNB) device comprising the features of claim 1.

[0018] The provision of an HNB device having a thermally conductive shroud provides external heating of the HNB consumable and may avoid the need for an additional external heater for external heating of the HNB consumable. The thermally conductive shroud transfers heat to an outer surface of the HNB consumable, which may facilitate even heating across the HNB consumable. This may result in consistent delivery of vapour from a HNB consumable engaged with the device. Furthermore, the thermally conductive shroud may increase vapour yield from a HNB consumable by reducing condensation of vapour that may otherwise occur at e.g. an internal surface of an outer wrapping layer of the consumable.

[0019] The heater is elongate so as to define a longitudinal axis. The heater is arranged to penetrate a portion of the consumable when received in the cavity. Thus, the heater may heat the consumable internally whilst the shroud heats the consumable externally.

[0020] The thermally conducting shroud may be configured to extend longitudinally to an extent that is greater than or equal to a longitudinal extent of the heater. That is, the heating element may not extend beyond an end of the shroud (i.e. it may be fully contained in the cavity defined by the shroud).

[0021] The shroud may be generally tubular. The shroud may have a generally circular cross-section, or may alternatively have a triangular, rectangular, etc. cross section. The shroud may be in the form of a section (or an arc) of a tubular shape (i.e. it may not be a complete tubular shape). In this respect, the shroud may only extend partially about a consumable when received in the cavity.

[0022] The shroud may be elongate. The cavity defined by the shroud may be generally cylindrical. In this respect, the shroud may be configured such that, when a consumable is received in the cavity, an inner surface of the shroud is substantially in contact with an outer surface of the consumable. Thus, the internal diameter of the shroud (when tubular) may be substantially the same as an external diameter of a consumable. In this way, a portion of the consumable may closely fit within the cavity defined by the shroud. That is, the shroud may be configured so as to be in contact with an outer surface of the consumable when received in the cavity.

[0023] The thermally conductive shroud may comprise an inner surface facing the cavity (i.e. or a consumable received within the cavity). The shroud may comprise an opposing outer surface facing away from the cavity (or away from a consumable when received in the cavity). The thermal emissivity of the inner surface may be greater than the thermal emissivity of the outer surface. That is, the inner surface may be configured so as to be more effective than the outer surface at emitting energy as thermal radiation. For example, the inner and outer surfaces may comprise different materials or coatings (so as to have different emissivity properties).

[0024] The thermally conductive shroud may be formed partly or wholly of a thermally conductive material. The shroud may comprise e.g. a ceramic material, aluminium and/or stainless steel.

[0025] The thermally conductive path may be formed partly or wholly of a thermally conductive material. The thermally conductive path may comprise a thermally conductive plastic or ceramic for transferring heat from the heater to the shroud. The thermally conductive path and shroud may be formed of the same material. The thermally conductive path and shroud may be integrally formed. Alternatively, the thermally conductive path and the shroud may be separate components that are in contact (or can be brought into contact).

[0026] The device may comprise a mount for mounting the heater to the device. The mount may form at least part of the thermally conductive path. The mount may define the entire thermally conductive path. That is, the mount may thermally connect the heater to the shroud (i.e. so as to transfer heat from the heater to the shroud). A portion of the mount may comprise a thermally insulative material. For example, the mount may comprise zirconia. This thermally insulative portion of the mount may restrict heat transfer from the heater to the device. Where the mount defines part of the thermally conductive path, that portion of the mount may comprise a thermally conductive material (i.e. such as those discussed above with respect to the thermally conductive path). The mount may be integrally formed with the heater and/or the shroud.

[0027] The thermally conductive shroud may be at least partially surrounded by a thermally insulative housing. The thermally insulative housing may extend circumferentially about the shroud. The thermally insulative housing may extend fully about a circumference of the shroud. The thermally insulative housing may form part of a housing of the device. In this respect, the thermally insulative housing may define an outer surface of the device. Alternatively, the thermally insulative housing may be in the form of a component separate to the housing of the device and e.g. may be disposed between a housing of the device and the shroud. The thermally insulative housing may be arranged to restrict heat transfer between the shroud and an external surface of a housing of the device.

[0028] The thermally conductive shroud may form part of a removable cap of the device. In this respect, the thermally conductive shroud may be movable relative to the heater. The thermally conductive path may form part of the removable cap and/or the device. The thermally conductive path may (only) connect the shroud and the

heater when the cap is engaged with the device.

[0029] The device may comprise an elongate body. An end of the elongate body may be configured for engagement with an HNB consumable. The device may comprise a cavity that is configured for receipt of at least a portion of the consumable (i.e. for engagement with the consumable). The heater and shroud may be disposed in (e.g. project into) this cavity. In this respect, the cavity defined by the shroud may define a portion of the cavity of the device.

[0030] The heater may comprise a heating element, which may be in the form of a rod that extends from the body of the device. The heating element may be rigidly mounted to the body (e.g. by the mount). The heating element may be elongate so as to define a longitudinal axis and may, for example, have a transverse profile (i.e. transverse to a longitudinal axis of the heating element) that is substantially circular (i.e. the heating element may be generally cylindrical). Alternatively, the heating element may have a transverse profile that is rectangular (i.e. the heater may be a "blade heater"). The heating element may alternatively be in the shape of a tube (i.e. the heater may be a "tube heater"). The heating element may take other forms (e.g. the heating element may have an elliptical transverse profile). The shape and/or size (e.g. diameter) of the transverse profile of the heating element may be generally consistent for the entire length (or substantially the entire length) of the heating element.

[0031] The heating element may be between 15 mm and 25 mm long, e.g. between 18 mm and 20 mm long, e.g. around 19 mm long. Similarly, the shroud may be between 15 mm and 25 mm long, e.g. between 18 mm and 20 mm long, e.g. around 19 mm long. The heating element may have a diameter of between 1.5 mm and 2.5 mm, e.g. a diameter between 2 mm and 2.3 mm, e.g. a diameter of around 2.15 mm.

[0032] The heating element may be formed of ceramic. The heating element may comprise a core (e.g. a ceramic core) comprising Al_2O_3. The core of the heating element may have a diameter of 1.8 mm to 2.1 mm, e.g. between 1.9 mm and 2 mm. The heating element may comprise an outer layer (e.g. an outer ceramic layer) comprising Al_2O_3. The thickness of the outer layer may be between 160 μm and 220 μm, e.g. between 170 μm and 190 μm, e.g. around 180 μm. The heating element may comprise a heating track, which may extend longitudinally along the heating element. The heating track may be sandwiched between the outer layer and the core of the heating element. The heating track may comprise tungsten and/or rhenium. The heating track may have a thickness of around 20 μm. The thermally conductive path may connect the heating track to the shroud. The heating track may form part of the thermally conductive path.

[0033] As is set forth above, the heating element projects into a cavity defined by the shroud (e.g. along a longitudinal axis). The shroud and the heating element may be located within a cavity of the device (e.g. defined by a body of the device). In this respect, the heater and shroud may extend from an internal base of the cavity towards an opening of the cavity. The length of the heating element and/or the shroud (i.e. along the longitudinal axis of the heating element) may be less than the depth of the cavity. Hence, the heating element may extend for only a portion of the length of the cavity. That is, the heating element may not extend through (or beyond) the opening of the cavity.

[0034] The heating element may be configured for insertion into a HNB consumable when received in the cavity defined by the shroud. In that respect, a distal end (i.e. distal from a base of the heating element where it is mounted to the device) of the heating element may comprise a tapered portion, which may facilitate insertion of the heating element into the consumable. The heating element may fully penetrate the consumable when received in the cavity. That is, the entire length, or substantially the entire length, of the heating element may be received in the consumable.

[0035] The heating element may have a length that is less than, or substantially the same as, an axial length of an aerosol-forming substrate forming part of a consumable. Thus, when such a consumable is engaged with the device, the heating element may only penetrate the aerosol-forming substrate, rather than other components of the consumable. The heating element may penetrate the aerosol-forming substrate for substantially the entire axial length of the aerosol forming-substrate. Thus, heat may be transferred from (e.g. an outer circumferential surface of) the heating element to the surrounding aerosol-forming substrate, when penetrated by the heating element. That is, heat may be transferred radially outwardly (in the case of a cylindrical heating element).

[0036] Similarly, the shroud may have a length that is less than or substantially the same as, an axial length of an aerosol-forming substrate forming part of a consumable. Thus, when such a consumable is engaged with the device, the shroud may surround the aerosol-forming substrate, rather than other components of the consumable. Thus, heat may be transferred from (e.g. the inner surface of) the shroud to the surrounding aerosol-forming substrate. That is, heat may be transferred radially inwardly from the shroud to the aerosol-forming substrate.

[0037] As is set forth above, the device may comprise a removable cap. The cap may be disposed at the end of the body that is configured for engagement with a consumable. The cap may at least partially enclose the heating element. The cap may be moveable between an open position in which access is provided to the heating element, and a closed position in which the cap at least partially encloses the heating element. The cap may be slideably engaged with the body of the device, and may be slideable between the open and closed positions. When the shroud forms part of the cap, the thermally conductive path may only connect the shroud and the heating element when the cap is in the closed position.

[0038] The cap may define at least a portion of the cavity of the device (i.e. in which the heating element and shroud are located). That is, the cavity may be fully defined by the cap, or each of the cap and body may define a portion of the cavity. The cap may comprise an opening to the cavity. The opening may be configured for receipt of at least a portion of an HNB consumable. That is, an HNB consumable may be inserted through the opening and into the cavity (so as to be engaged with the device).

[0039] The cap may be configured such that when an HNB consumable is engaged with the device (e.g. received in the cavity), only a portion of the HNB consumable is received in the cavity. That is, a portion of the HNB consumable (not received in the cavity) may protrude from (i.e. extend beyond) the opening. This (protruding) portion of the HNB consumable may be a terminal (e.g. mouth) end of the HNB consumable, which may be received in a user's mouth for the purpose of inhaling aerosol formed by the device.

[0040] The device may comprise a power source or may be connectable to a power source (e.g. a power source separate to the device). The power source may be electrically connectable to the heating element. In that respect, altering (e.g. toggling) the electrical connection of the power source to the heating element may affect a state of the heating element. For example, toggling the electrical connection of the power source to the heating element may toggle the heating element between an on state and an off state. The power source may be a power store. For example, the power source may be a battery or rechargeable battery (e.g. a lithium ion battery).

[0041] The device may comprise an input connection (e.g. a USB port, Micro USB port, USB-C port, etc.). The input connection may be configured for connection to an external source of electrical power, such as a mains electrical supply outlet. The input connection may, in some cases, be used as a substitute for an internal power source (e.g. battery or rechargeable battery). That is, the input connection may be electrically connectable to the heater (for providing power to the heater). Hence, in some forms, the input connection may form at least part of the power source of the device.

[0042] Where the power source comprises a rechargeable power source (such as a rechargeable battery), the input connection may be used to charge and recharge the power source.

[0043] The device may comprise a user interface (UI). In some embodiments the UI may include input means to receive operative commands from the user. The input means of the UI may allow the user to control at least one aspect of the operation of the device. In some embodiments the input means may comprise a power button to switch the device between an on state and an off state.

[0044] In some embodiments the UI may additionally or alternatively comprise output means to convey information to the user. In some embodiments the output means may comprise a light to indicate a condition of the device (and/or the aerosol-forming article) to the user. The condition of the device (and/or HNB consumable) indicated to the user may comprise a condition indicative of the operation of the heater. For example, the condition may comprise whether the heating element is in an off state or an on state. In some embodiments, the UI unit may comprise at least one of a button, a display, a touchscreen, a switch, a light, and the like. For example, the output means may comprise one or more (e.g. two, three, four, etc.) light-emitting diodes ("LEDs") that may be located on the body of the device.

[0045] The device may further comprise a puff sensor (e.g. airflow sensor), which form part of the input means of the UI. The puff sensor may be configured to detect a user drawing on an end (i.e. a terminal (mouth) end) of the aerosol-forming article. The puff sensor may, for example, be a pressure sensor or a microphone. The puff sensor may be configured to produce a signal indicative of a puff state. The signal may be indicative of the user drawing (an aerosol from the aerosol-forming article) such that it is e.g. in the form of a binary signal. Alternatively or additionally, the signal may be indicative of a characteristic of the draw (e.g. a flow rate of the draw, length of time of the draw, etc).

[0046] The device may comprise a controller, or may be connectable to a controller that may be configured to control at least one function of the device. The controller may comprise a microcontroller that may e.g. be mounted on a printed circuit board (PCB). The controller may also comprise a memory, e.g. non-volatile memory. The memory may include instructions, which, when implemented, may cause the controller to perform certain tasks or steps of a method. Where the device comprises an input connection, the controller may be connected to the input connection.

[0047] The controller may be configured to control the operation of the heater (and e.g. the heating element). Thus, the controller may be configured to control vaporisation of an aerosol forming part of an aerosol-forming article engaged with the device. The controller may be configured to control the voltage applied by power source to the heater. For example, the controller may be configured to toggle between applying a full output voltage (of the power source) to the heater and applying no voltage to the heater. Alternatively or additionally, the control unit may implement a more complex heater control protocol.

[0048] The device may further comprise a voltage regulator to regulate the output voltage supplied by the power source to form a regulated voltage. The regulated voltage may subsequently be applied to the heater.

[0049] In some embodiments, where the device comprises a UI, the controller may be operatively connected to one or more components of the UI. The controller may be configured to receive command signals from an input means of the UI. The controller may be configured to control the heater in response to the command signals. For example, the controller may be configured to receive "on" and "off" command signals from the UI and, in

response, may control the heater so as to be in a corresponding on or off state.

[0050] The controller may be configured to send output signals to a component of the UI. The UI may be configured to convey information to a user, via an output means, in response to such output signals (received from the controller). For example, where the device comprises one or more LEDs, the LEDs may be operatively connected to the controller. Hence, the controller may configured to control the illumination of the LEDs (e.g. in response to an output signal). For example, the controller may be configured to control the illumination of the LEDs according to (e.g. an on or off) state of the heater.

[0051] Where the device comprises a sensor (e.g. a puff/airflow sensor), the controller may be operatively connected to the sensor. The controller may be configured to receive a signal from the sensor (e.g. indicative of a condition of the device and/or engaged aerosol-forming article). The controller may be configured to control the heater, or an aspect of the output means, based on the signal from the sensor.

[0052] The device may comprise a wireless interface configured to communicate wirelessly (e.g. via Bluetooth (e.g. a Bluetooth low-energy connection) or WiFi) with an external device. Similarly, the input connection may be configured for wired connection to an external device so as to provide communication between the device and the external device.

[0053] The external device may be a mobile device. For example, the external device may be a smart phone, tablet, smart watch, or smart car. An application (e.g. app) may be installed on the external device (e.g. mobile device). The application may facilitate communication between the device and the external device via the wired or wireless connection.

[0054] The wireless or wired interface may be configured to transfer signals between the external device and the controller of the device. In this respect, the controller may control an aspect of the device in response to a signal received from an external device. Alternatively or additionally, an external device may respond to a signal received from the device (e.g. from the controller of the device).

[0055] In a second aspect, there is provided a system (e.g. a smoking substitute system) comprising a device according to the first aspect and a HNB consumable. The consumable may comprise an aerosol-forming substrate at an upstream end of the consumable.

[0056] 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 article/consumable being the mouth end or outlet where the aerosol exits the consumable for inhalation by the user. The upstream end of the article/consumable is the opposing end to the downstream end.

[0057] 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 article/consumable.

[0058] 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.

[0059] The aerosol-forming substrate may comprise 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.

[0060] The plant material may be 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.

[0061] 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).

[0062] 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.

[0063] The aerosol-forming substrate may comprise one or more additives selected from humectants, flavourants, fillers, aqueous/non-aqueous solvents and binders.

[0064] 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.

[0065] The aerosol-forming substrate may be formed in a substantially cylindrical shape such that the article/-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 e.g. between 11 and 14mm such as around 12 or 13mm.

[0066] 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.

[0067] The or at least one of the filter element(s) (e.g. the terminal filter element) may be comprised of cellulose acetate or polypropylene tow. The at least one filter element (e.g. the terminal filter element) may be comprised of activated charcoal. The at least one filter element (e.g. the terminal element) may be comprised of paper. The or each filter element may be at least partly (e.g. entirely) circumscribed with a plug wrap e.g. a paper plug wrap.

[0068] 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.

[0069] 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.

[0070] 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. The spacer element may be circumscribed by the (paper) wrapping layer.

[0071] According to a third aspect of the present disclosure, not according to the invention and present for illustration purposes only, there is provided a method of using the system according to the second aspect, the method comprising inserting the consumable into the device; and heating the consumable using the heater and the shroud of the device.

[0072] In some embodiments the method may comprise inserting the article into a cavity within a body of the device and penetrating the article with the heating element of the device upon insertion of the article.

[0073] The invention includes the combination of the aspects and preferred features described except where such a combination is clearly impermissible or expressly avoided.

[0074] 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

[0075] 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 is a schematic of a smoking substitute system;

Figure 2A is a front view of a first embodiment of a smoking substitute system with the consumable engaged with the device;

Figure 2B is a front view of the first embodiment of the smoking substitute system with the consumable disengaged from the device;

Figure 2C is a section view of the consumable of the first embodiment of the smoking substitute system;

Figure 2D is a detailed view of an end of the device of the first embodiment of the smoking substitute system;

Figure 2E is a section view of the first embodiment of the smoking substitute system;

Figure 2F is a top view of a first embodiment of a thermally conductive shroud of a smoking substitute system; and

Figure 2G is perspective view of the first embodiment of the thermally conductive shroud of a smoking substitute system.

DETAILED DESCRIPTION OF THE INVENTION

[0076] Aspects and embodiments of the present invention will now be discussed with reference to the

accompanying figures. Further aspects and embodiments will be apparent to those skilled in the art. All documents mentioned in this text are incorporated herein by reference.

[0077] Figure 1 is a schematic providing a general overview of a smoking substitute system 100. The system 100 includes a substitute smoking device 101 and an aerosol-forming article in the form of a consumable 102, which comprises an aerosol former 103. The system is configured to vaporise the aerosol former by heating the aerosol former 103 (so as to form a vapour/aerosol for inhalation by a user).

[0078] The heater 104 forms part of the device 101 and is configured to heat the aerosol former 103. The heater 104 is electrically connected to a power source 105, for example, when the consumable 102 is engaged with the device 101. Heat from the heater 104 vaporises the aerosol former 103 to produce a vapour. The vapour subsequently condenses to form an aerosol, which is ultimately inhaled by the user.

[0079] The system 100 further comprises a power source 105 that forms part of the device 101. In other embodiments the power source 105 may be external to (but connectable to) the device 101. The power source 105 is electrically connected to the heater 104 such that it is able to supply power to the heater 104 (i.e. for the purpose of heating the aerosol former 103). Thus, control of the electrical connection of the power source 105 to the heater 104 provides control of the state of the heater 104. The power source 105 may be a power store, for example a battery or rechargeable battery (e.g. a lithium ion battery).

[0080] The system 100 further comprises an I/O module comprising a connector 106 (e.g. in the form of a USB port, Micro USB port, USB-C port, etc.). The connector 106 is configured for connection to an external source of electrical power, e.g. a mains electrical supply outlet. The connector 106 may be used in substitution for the power source 105. That is the connector 106 may be electrically connectable to the heater 104 so as to supply electricity to the heater 104. In such embodiments, the device may not include a power source, and the power source of the system may instead comprise the connector 106 and an external source of electrical power (to which the connector 106 provides electrical connection).

[0081] In some embodiments, the connector 106 may be used to charge and recharge the power source 105 where the power source 105 includes a rechargeable battery.

[0082] The system 100 also comprises a user interface (UI) 107. Although not shown, the UI 107 may include input means to receive commands from a user. The input means of the UI 107 allows the user to control at least one aspect of the operation of the system 100. The input means may, for example, be in the form of a button, touchscreen, switch, microphone, etc.

[0083] The UI 107 also comprises output means to convey information to the user. The output means may, for example, comprise lights (e.g. LEDs), a display screen, speaker, vibration generator, etc.

[0084] The system 100 further comprises a controller 108 that is configured to control at least one function of the device 101. In the illustrated embodiment, the controller 108 is a component of the device 101, but in other embodiments may be separate from (but connectable to) the device 101. The controller 108 is configured to control the operation of the heater 104 and, for example, may be configured to control the voltage applied from the power source 105 to the heater 104. The controller 108 may be configured to toggle the supply of power to the heater 104 between an on state, in which the full output voltage of the power source 105 is applied to the heater 104, and an off state, in which the no voltage is applied to the heater 104.

[0085] Although not shown, the system 100 may also comprise a voltage regulator to regulate the output voltage from the power source 105 to form a regulated voltage. The regulated voltage may then be applied to the heater 104.

[0086] In addition to being connected to the heater 104, the controller 108 is operatively connected to the UI 107. Thus, the controller 108 may receive an input signal from the input means of the UI 107. Similarly, the controller 108 may transmit output signals to the UI 107. In response, the output means of the UI 107 may convey information, based on the output signals, to a user. The controller also comprises a memory 109, which is a non-volatile memory. The memory 109 includes instructions, which when implemented, cause the controller to perform certain tasks or steps of a method.

[0087] Figures 2A and 2B illustrate a heated-tobacco (HT) smoking substitute system 200. The system 200 is an example of the system 100 described in relation to Figure 1. System 200 includes an HT device 201 and an HT consumable 202. The description of Figures 1 above is applicable to the system 200 of Figures 2A and 2B, and will thus not be repeated.

[0088] The device 201 and the consumable 202 are configured such that the consumable 202 can be engaged with the device 201. Figure 2A shows the device 201 and the consumable 202 in an engaged state, whilst Figure 2B shows the device 201 and the consumable 202 in a disengaged state.

[0089] The device 201 comprises a body 209 and cap 210. In use the cap 210 is engaged at an end of the body 209. Although not apparent from the figures, the cap 210 is moveable relative to the body 209. In particular, the cap 210 is slideable and can slide along a longitudinal axis of the body 209.

[0090] The device 201 comprises an output means (forming part of the UI of the device 201) in the form of a plurality of light-emitting diodes (LEDs) 211 arranged linearly along the longitudinal axis of the device 201 and on an outer surface of the body 209 of the device 201. A button 212 is also arranged on an outer surface of the body 209 of the device 201 and is axially spaced (i.e. along the longitudinal axis) from the plurality of LEDs 211.

[0091] Figure 2C show a detailed section view of the consumable of 202 of the system 200. The consumable 202 generally resembles a cigarette. In that respect, the consumable 202 has a generally cylindrical form with a diameter of 7 mm and an axial length of 70 mm. The consumable 202 comprises an aerosol forming substrate 213, a terminal filter element 214, an upstream filter element 215 and a spacer element 216. In other embodiments, the consumable may further comprise a cooling element. A cooling element may exchange heat with vapour that is formed by the aerosol-forming substrate 213 in order to cool the vapour so as to facilitate condensation of the vapour.

[0092] The aerosol-forming substrate 213 is substantially cylindrical and is located at an upstream end 217 of the consumable 202, and comprises the aerosol former of the system 200. In that respect, the aerosol forming substrate 213 is configured to be heated by the device 201 to release a vapour. The released vapour is subsequently entrained in an airflow flowing through the aerosol-forming substrate 213. The airflow is produced by the action of the user drawing on a downstream 218 (i.e. terminal or mouth end) of the consumable 202.

[0093] In the present embodiment, the aerosol forming substrate 213 comprises tobacco material that may, for example, include any suitable parts of the tobacco plant (e.g. 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). For example, the aerosol-forming substrate 213 may comprise a gathered sheet of homogenised (e.g. paper/slurry recon) tobacco or gathered shreds/strips formed from such a sheet.

[0094] In order to generate an aerosol, the aerosol forming substrate 213 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. The aerosol-forming substrate 213 may further comprise one or more additives. For example, such additives may be in the form of humectants (e.g. propylene glycol and/or vegetable glycerine), flavourants, fillers, aqueous/non-aqueous solvents and/or binders.

[0095] The terminal filter element 214 is also substantially cylindrical, and is located downstream of the aerosol forming substrate 213 at the downstream end 218 of the consumable 202. The terminal filter element 214 is in the form of a hollow bore filter element having a bore 219 (e.g. for airflow) formed therethrough. The diameter of the bore 219 is 2 mm. The terminal filter element 214 is formed of a porous (e.g. monoacetate) filter material. As set forth above, the downstream end 218 of the consumable 202 (i.e. where the terminal filter 214 is located) forms a mouthpiece portion of the consumable 202 upon which the user draws. Airflow is drawn from the upstream end 217, thorough the components of the consumable 202, and out of the downstream end 218. The airflow is driven by the user drawing on the downstream end 218 (i.e. the mouthpiece portion) of the consumable 202.

[0096] The upstream filter element 214 is located axially adjacent to the aerosol-forming substrate 213, between the aerosol-forming substrate 213 and the terminal filter element 214. Like the terminal filter 214, the upstream filter element 215 is in the form of a hollow bore filter element, such that it has a bore 220 extending axially therethrough. In this way, the upstream filter 215 may act as an airflow restrictor. The upstream filter element 215 is formed of a porous (e.g. monoacetate) filter material. The bore 220 of the upstream filter element 214 has a larger diameter (3 mm) than the terminal filter element 214.

[0097] The spacer 216 is in the form of a cardboard tube, which defines a cavity or chamber between the upstream filter element 215 and the terminal filter element 214. The spacer 216 acts to allow both cooling and mixing of the vapour/aerosol from the aerosol-forming substrate 213. The spacer has an external diameter of 7 mm and an axial length of 14mm.

[0098] Although not apparent from the figure, the aerosol-forming substrate 213, upstream filter 215 and spacer 216 are circumscribed by a paper wrapping layer. The terminal filter 214 is circumscribed by a tipping layer that also circumscribes a portion of the paper wrapping layer (so as to connect the terminal filter 214 to the remaining components of the consumable 202). The upstream filter 215 and terminal filter 214 are circumscribed by further wrapping layers in the form of plug wraps.

[0099] Returning now to the device 201, Figure 2D illustrates a detailed view of the end of the device 201 that is configured to engage with the consumable 202. The cap 210 of the device 201 includes an opening 221 to an internal cavity 222 (more apparent from Figure 2D) defined by the cap 210. The opening 221 and the cavity 222 are formed so as to receive at least a portion of the consumable 202. During engagement of the consumable 202 with the device 201, a portion of the consumable 202 is received through the opening 221 and into the cavity 222. After engagement (see Figure 2B), the downstream end 218 of the consumable 202 protrudes from the opening 221 and thus protrudes also from the device 201. The opening 221 includes laterally disposed notches 226. When a consumable 202 is received in the opening 221, these notches 226 remain open and could, for example, be used for retaining a cover to cover the end of the device 201.

[0100] Figure 2E shows a cross section through a central longitudinal plane through the device 201. The device 201 is shown with the consumable 202 engaged therewith.

[0101] The device 201 comprises a heater 204 comprising heating element 223. The heater 204 forms part of the body 209 of the device 201 and is rigidly mounted to the body 209 and projects into a cavity 251 defined by a

shroud 250 (which will be discussed in more detail below). In the illustrated embodiment, the heater 204 is a rod heater with a heating element 223 having a circular transverse profile. In other embodiments the heater may be in the form of a blade heater (e.g. heating element with a rectangular transverse profile) or a tube heater (e.g. heating element with a tubular form that is inserted into the substrate of the consumable 202).

[0102] The heating element 223 of the heater 204 projects from an internal base of the cavity 222 along a longitudinal axis towards the opening 221. As is apparent from the figure, the length (i.e. along the longitudinal axis) of the heating element is less than a depth of the cavity 222. In this way, the heating element 223 does not protrude from or extend beyond the opening 221.

[0103] When the consumable 202 is received in the cavity 222 (as is shown in Figure 2E), the heating element 223 penetrates the aerosol-forming substrate 213 of the consumable 202. In particular, the heating element 223 extends for nearly the entire axial length of the aerosol-forming substrate 213 when inserted therein. Thus, when the heater 204 is activated, heat is transferred radially from an outer circumferential surface the heating element 223 to the aerosol-forming substrate 213.

[0104] As mentioned above, the device 201 further includes a thermally conductive shroud 250. This shroud 250 and the heater 204 are shown in more detail in figures 2F and 2G. The shroud 250 defines a cavity 251 for receipt of the HNB consumable 202 and, as is set forth above, the heater 204 projects into the cavity 251 of the shroud 250 such that when a consumable 202 is received in the cavity 251 defined by the shroud, the heater 204 penetrates the aerosol-forming substrate 213 of the consumable 202.

[0105] The thermally conductive shroud 250 is tubular and, like the heater 204, extends along the longitudinal axis. The heater 204 extends along a central axis of the shroud 250, such that the heater 204 and shroud 250 are generally concentrically arranged. In particular, the heater 204 and shroud 250 extend longitudinally (within the cavity 222 of the device 201) to approximately the same extent. That is, the length (i.e. in the longitudinal direction) of the heater 204 is approximately the same as the length of the shroud 250. Thus, the shroud 250 extends along an external portion of the consumable 202 that is adjacent to the aerosol-forming substrate 213 of the consumable 202.

[0106] As may be appreciated from Figure 2E, the shroud 250 is configured so as to enclose a portion of the HNB consumable 202 such that an inner surface 253 of the shroud 250 surrounds and faces an outer wrapping layer of the consumable 202 when received in the cavity 251. An opposing outer 254 circumferential surface of the shroud 250 faces away from the HNB consumable 202 when received in the cavity 251. Although not apparent from the figures, the inner surface 253 comprises a coating that provides it with a higher thermal emissivity than the outer surface 254. Thus, in operation, more heat is radiated from the inner surface 253 (towards the consumable 202) than the outer surface 254 (away from the consumable 202).

[0107] The shroud 250 has a substantially circular cross-section and thus the cavity 251 defined by the shroud 250 also has a circular cross-section such that it is particularly suitable for receipt of a consumable 202 having circular cross-section. It should be appreciated that in other embodiments the shroud 250 may have a rectangular, triangular, polygonal or other suitable cross section to surround or enclose a HNB consumable having an alternative shape.

[0108] As is apparent from Figures 2F and 2G, a mount 255 is provided for mounting the heater 204 to the device 201. The mount 255 has a generally cuboid shape and comprises a central aperture through which the heater 204 projects. In the illustrated embodiment, the mount 255 defines a thermally conductive path 256 that extends from the heater 202 to the shroud 250. Thus, when the heater 204 is active, heat is transferred from the heater 204, along the thermally conductive path 256 (in this case being a portion of the mount 255) to the shroud 250 so as to heat the shroud 250. In this way, the shroud 250 may supply heat to the consumable 202 through an outer wrapping layer of the consumable 202. As may be apparent, this can lead to more even heating of the consumable 202, which can be achieved without the provision of multiple heaters.

[0109] The shroud may be formed of one or more of a ceramic material, aluminium and stainless steel, or any other suitable material (e.g. being thermally conductive). The mount 255 may comprise a thermally insulative material (such as zirconia) for restricting heat transfer between the heater 204 and the housing of the device 201. However, the portion of the mount 255 that defines the thermally conductive path 256 (i.e. the upper surface between the heater 204 and the shroud 250) comprises a thermally conductive material, such as a thermally conductive plastic, ceramic or metal. This portion of the mount may be substantially surrounded by the thermally insulative portion of the mount so as to prevent heat transfer between the thermally conductive path 256 and the rest of the device 201.

[0110] Although not immediately apparent from the figures, the shroud 250 forms part of the cap 210 of the device 201. In this respect, the shroud 250 is movable (with the cap 210) with respect to heater 204 and the mount 255. Thus, when the cap 210 is disengaged from the body 209, or is slid away from the heater 204 (along the longitudinal axis), the shroud 250 is not in contact with the mount 255. The shroud 250 can then be brought into contact with the mount 255 by sliding the cap 210 along the longitudinal axis towards the mount 255 so as to be engaged with the body 209. In particular, this brings a base (or bottom end) of the mount 255 into contact with an upper surface of the mount 255 defining the thermally conductive path 256.

[0111] Whilst not shown, the device 201 or the cap 210

may further comprise an insulative housing that at least partially surrounds the shroud 250 in order to restrict heat transfer from the shroud to the body 209 of the device 201. At least a portion of the insulative housing may define an outer surface of the body 209 of the device 201.

[0112] Returning to Figure 2E, the device 201 further comprises an electronics cavity 224. A power source, in the form of a rechargeable battery 205 (a lithium ion battery), is located in electronics cavity 224.

[0113] The device 201 includes a connector (i.e. forming part of an IO module of the device 201) in the form of a USB port 206. The connector may alternatively be, for example, a micro-USB port or a USB-C port for examples. The USB port 206 may be used to recharge the rechargeable battery 205.

[0114] The device 201 includes a controller (not shown) located in the electronics cavity 224. The controller comprises a microcontroller mounted on a printed circuit board (PCB). The USB port 206 is also connected to the controller (i.e. connected to the PCB and microcontroller).

[0115] The controller is configured to control at least one function of the device 201. For example, the controller is configured to control the operation of the heater 204. Such control of the operation of the heater 204 may be accomplished by the controller toggling the electrical connection of the rechargeable battery 205 to the heater 204. For example, the controller is configured to control the heater 204 in response to the user depressing the button 212. Depressing the button 212 may cause the controller to allow a voltage (from the rechargeable battery 205) to be applied to the heater 204 (so as to cause the heating element 223 to be heated).

[0116] The controller is also configured to control the LEDs 211 in response to (e.g. a detected) a condition of the device 201 or the consumable 202. For example, the controller may control the LEDs to indicate whether the device 201 is in an on state or an off state (e.g. one or more of the LEDs may be illuminated by the controller when the device is in an on state).

[0117] The device 202 comprises a further input means (i.e. in addition to the button 212) in the form of a puff sensor 225. The puff sensor 225 is configured to detect a user drawing (i.e. inhaling) at the downstream end 218 of the consumable 202. The puff sensor 225 may, for example, be in the form of a pressure sensor, flowmeter or a microphone. The puff sensor 225 is operatively connected to the controller in the electronics cavity 224, such that a signal from the puff sensor 225, indicative of a puff state (i.e. drawing or not drawing), forms an input to the controller (and can thus be responded to by the controller).

[0118] 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 as defined in the appended claims.

[0119] 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.

[0120] Any section headings used herein are for organizational purposes only and are not to be construed as limiting the subject matter described.

[0121] 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.

[0122] 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%.

[0123] 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 claims.

Claims

1. A heat not burn "HNB" device (101, 201) comprising:

a thermally conductive shroud (250) at least partly defining a cavity (251) for receipt of an HNB consumable (102, 202), said thermally conductive shroud being arranged to transfer heat to an outer surface of a HNB consumable (102, 202), when it is received in the cavity (251);
a heater (104, 204); and
a thermally conductive path (256) connecting the heater (104, 204) to the shroud (250);
characterised in that the heater (104, 204) projects into the cavity (251), is elongate and

defines a longitudinal axis, and is arranged to penetrate a portion of the consumable (102, 202) when received in the cavity (251).

2. A heat not burn device (101, 201) according to claim 1, wherein the thermally conducting shroud (250) extends longitudinally to an extent that is greater than or equal to a longitudinal extent of the heater (104, 204).

3. A heat not burn device (101, 201) according to any one of the preceding claims, wherein the thermally conductive shroud (250) comprises an inner surface (253) facing the cavity (251), and an opposing outer surface (254) facing away from the cavity (251).

4. A heat not burn device (101, 201) according to claim 3, wherein the thermal emissivity of the inner surface (253) is greater than the thermal emissivity of the outer surface (254).

5. A heat not burn device (101, 201) according to any one of the preceding claims, wherein the thermally conductive shroud (250) comprises a ceramic material, aluminium and/or stainless steel.

6. A heat not burn device (101, 201) according to any one of the preceding claims, wherein the thermally conductive path (256) comprises a thermally conductive plastic, ceramic, aluminium and/or stainless steel for transferring heat from the heater (104, 204) to the to the shroud (250).

7. A heat not burn device (101, 201) according to any one of the preceding claims, comprising a mount (255) for mounting the heater (104, 204) to the device (101, 201), the mount (255) forming at least part of the thermally conductive path (256).

8. A heat not burn device (101, 201) according to claim 7, wherein at least a portion of the mount (255) is formed of a thermally insulative material.

9. A heat not burn device (101, 201) according to any one of the preceding claims, wherein the thermally conductive shroud (250) is at least partly surrounded by a thermally insulative housing.

10. A heat not burn device (101, 201) according to any one of the preceding claims, wherein the thermally conductive shroud (250) forms part of a removable cap (210) of the device (101, 201).

11. A smoking substitute system (100, 200), comprising:

a device (101, 201) according to any one of the preceding claims; and
a heat not burn consumable (102, 202).

Patentansprüche

1. Erhitzen-statt-Verbrennen-, "HNB"-, Vorrichtung (101, 201), umfassend;

eine wärmeleitfähige Ummantelung (250), die zumindest teilweise einen Hohlraum (251) zum Aufnehmen einer HNB-Verbrauchsware (102, 202) definiert, wobei die wärmeleitfähige Ummantelung angeordnet ist, um Wärme zu einer Außenfläche einer HNB-Verbrauchsware (102, 202) zu übertragen, wenn sie im Hohlraum (251) aufgenommen ist;
ein Heizelement (104, 204); und
einen wärmeleitfähigen Pfad (256), der das Heizelement (104, 204) mit der Ummantelung (250) verbindet;
dadurch gekennzeichnet, dass das Heizelement (104, 204) in den Hohlraum (251) hinein vorsteht, länglich ist und eine Längsachse definiert und angeordnet ist, um in einen Abschnitt der Verbrauchsware (102, 202) einzudringen, wenn sie im Hohlraum (251) aufgenommen ist.

2. Erhitzen-statt-Verbrennen-Vorrichtung (101, 201) nach Anspruch 1, wobei die wärmeleitfähige Ummantelung (250) sich der Länge nach in einem Ausmaß erstreckt, das größer oder gleich einem Längsausmaß des Heizelements (104, 204) ist.

3. Erhitzen-statt-Verbrennen-Vorrichtung (101, 201) nach einem der vorangegangenen Ansprüche, wobei die wärmeleitfähige Ummantelung (250) eine Innenfläche (253), die dem Hohlraum (251) zugewandt ist, und eine entgegengesetzte Außenfläche (254), die vom Hohlraum (251) abgewandt ist, umfasst.

4. Erhitzen-statt-Verbrennen-Vorrichtung (101, 201) nach Anspruch 3, wobei das thermische Emissionsvermögen der Innenfläche (253) größer ist als das thermische Emissionsvermögen der Außenfläche (254).

5. Erhitzen-statt-Verbrennen-Vorrichtung (101, 201) nach einem der vorangegangenen Ansprüche, wobei die wärmeleitfähige Ummantelung (250) ein Keramikmaterial, Aluminium und/oder Edelstahl umfasst.

6. Erhitzen-statt-Verbrennen-Vorrichtung (101, 201) nach einem der vorangegangenen Ansprüche, wobei der wärmeleitfähige Pfad (256) wärmeleitfähige(n/s) Kunststoff, Keramik, Aluminium und/oder Edelstahl zum Übertragen von Hitze vom Heizelement (104, 204) zur Ummantelung (250) umfasst.

7. Erhitzen-statt-Verbrennen-Vorrichtung (101, 201)

nach einem der vorangegangenen Ansprüche, umfassend eine Halterung (255) zum Montieren des Heizelements (104, 204) auf der Vorrichtung (101, 201) umfasst, wobei die Halterung (255) zumindest einen Teil des wärmeleitfähigen Pfads (256) ausbildet.

8. Erhitzen-statt-Verbrennen-Vorrichtung (101, 201) nach Anspruch 7, wobei zumindest ein Abschnitt der Halterung (255) aus einem wärmeisolierenden Material ausgebildet ist.

9. Erhitzen-statt-Verbrennen-Vorrichtung (101, 201) nach einem der vorangegangenen Ansprüche, wobei die wärmeleitfähige Ummantelung (250) zumindest teilweise von einem wärmeisolierenden Gehäuse umgeben ist.

10. Erhitzen-statt-Verbrennen-Vorrichtung (101, 201) nach einem der vorangegangenen Ansprüche, wobei die wärmeleitfähige Ummantelung (250) einen Teil eines entfernbaren Deckels (210) der Vorrichtung (101, 201) ausbildet.

11. Rauchersatzsystem (100, 200), umfassend:

eine Vorrichtung (101, 201) nach einem der vorangegangenen Ansprüche; und
eine Erhitzen-statt-Verbrennen-Verbrauchsware (102, 202).

Revendications

1. Dispositif « HNB » de chauffage sans combustion (101, 201), comprenant :

une enveloppe thermiquement conductrice (250) définissant au moins partiellement une cavité (251) pour recevoir un consommable HNB (102, 202), ladite enveloppe thermiquement conductrice étant agencée pour transférer de la chaleur à une surface extérieure d'un consommable HNB (102, 202), lorsqu'il est reçu dans la cavité (251) ;
un dispositif de chauffage (104, 204) ; et
un trajet thermiquement conducteur (256) connectant le dispositif de chauffage (104, 204) à l'enveloppe (250) ;
caractérisé en ce que le dispositif de chauffage (104, 204) fait saillie dans la cavité (251), est allongé et définit un axe longitudinal, et est agencé pour pénétrer dans une partie du consommable (102, 202) lorsqu'il est reçu dans la cavité (251).

2. Dispositif de chauffage sans combustion (101, 201) selon la revendication 1, dans lequel l'enveloppe thermiquement conductrice (250) s'étend longitudinalement dans une mesure qui est supérieure ou égale à une étendue longitudinale du dispositif de chauffage (104, 204).

3. Dispositif de chauffage sans combustion (101, 201) selon l'une quelconque des revendications précédentes, dans lequel l'enveloppe thermiquement conductrice (250) comprend une surface interne (253) orientée vers la cavité (251), et une surface externe opposée (254) orientée à l'opposé de la cavité (251).

4. Dispositif de chauffage sans combustion (101, 201) selon la revendication 3, dans lequel l'émissivité thermique de la surface interne (253) est supérieure à l'émissivité thermique de la surface externe (254).

5. Dispositif de chauffage sans combustion (101, 201) selon l'une quelconque des revendications précédentes, dans lequel l'enveloppe thermiquement conductrice (250) comprend un matériau de céramique, de l'aluminium et/ou de l'acier inoxydable.

6. Dispositif de chauffage sans combustion (101, 201) selon l'une quelconque des revendications précédentes, dans lequel le trajet thermiquement conducteur (256) comprend un plastique thermiquement conducteur, de la céramique, de l'aluminium et/ou de l'acier inoxydable pour transférer de la chaleur du dispositif de chauffage (104, 204) à l'enveloppe (250).

7. Dispositif de chauffage sans combustion (101, 201) selon l'une quelconque des revendications précédentes, comprenant une monture (255) pour monter le dispositif de chauffage (104, 204) sur le dispositif (101, 201), la monture (255) formant au moins une partie du trajet thermiquement conducteur (256).

8. Dispositif de chauffage sans combustion (101, 201) selon la revendication 7, dans lequel au moins une partie de la monture (255) est formée d'un matériau thermiquement isolant.

9. Dispositif de chauffage sans combustion (101, 201) selon l'une quelconque des revendications précédentes, dans lequel l'enveloppe thermiquement conductrice (250) est au moins partiellement entourée par un logement thermiquement isolant.

10. Dispositif de chauffage sans combustion (101, 201) selon l'une quelconque des revendications précédentes, dans lequel l'enveloppe thermiquement conductrice (250) fait partie d'un capuchon amovible (210) du dispositif (101, 201).

11. Système à fumer de substitution (100, 200), compre-

nant :

un dispositif (101, 201) selon l'une quelconque des revendications précédentes, et
un consommable de chauffage sans combustion (102, 202).

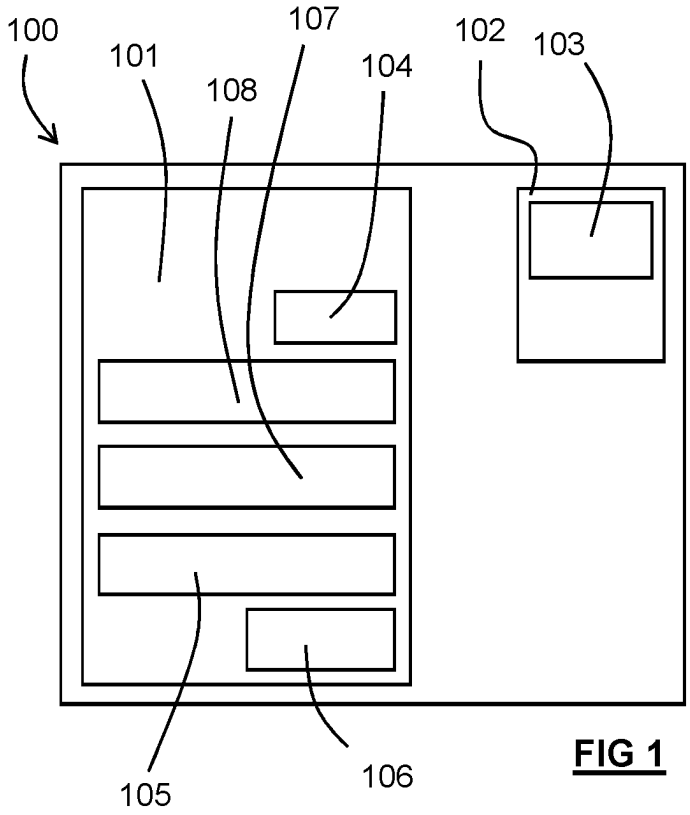


FIG 1

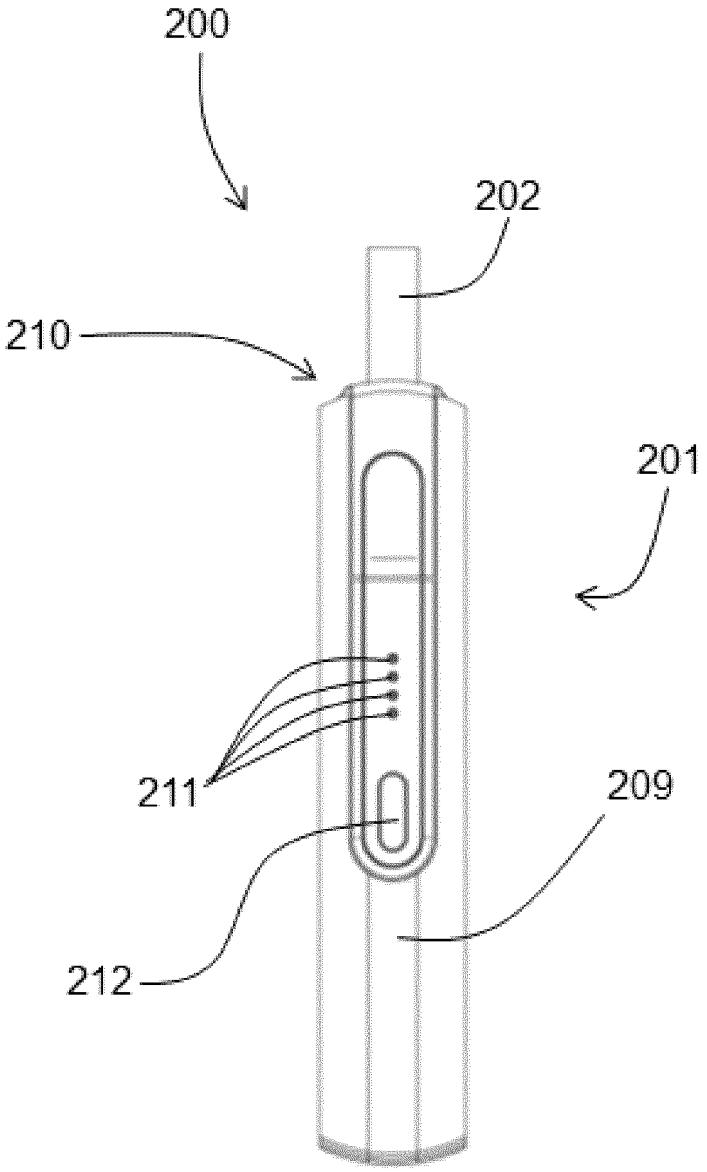


FIG 2A

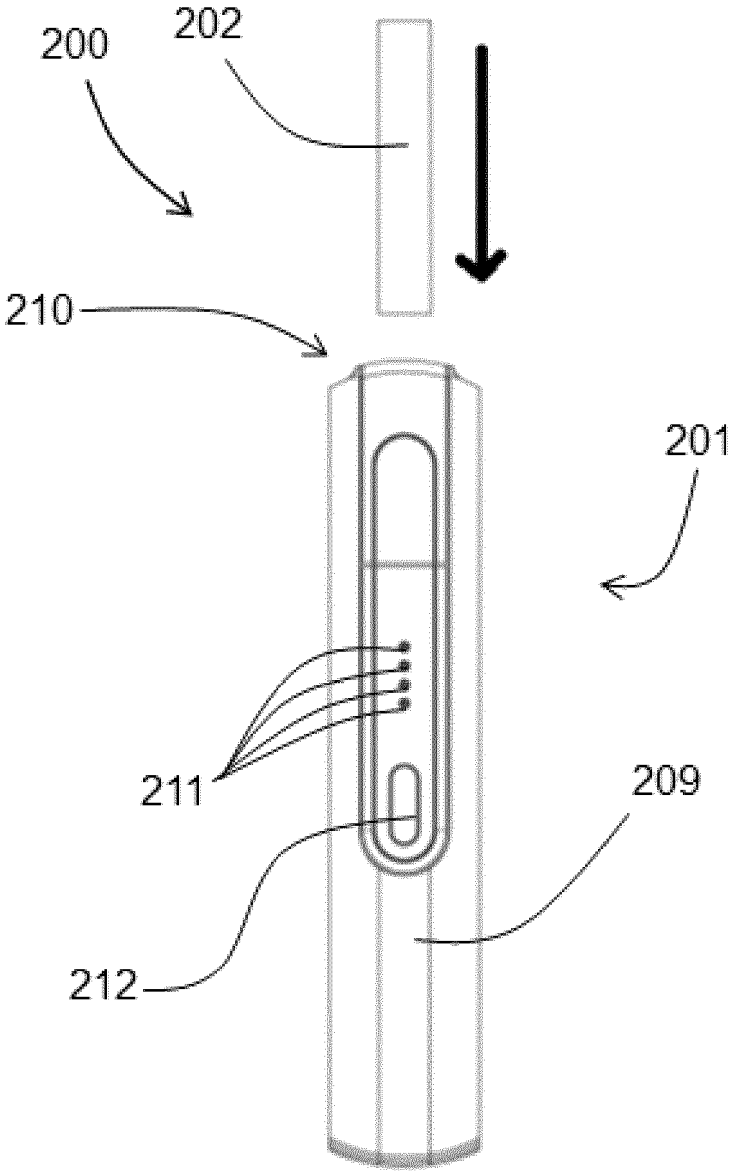


FIG 2B

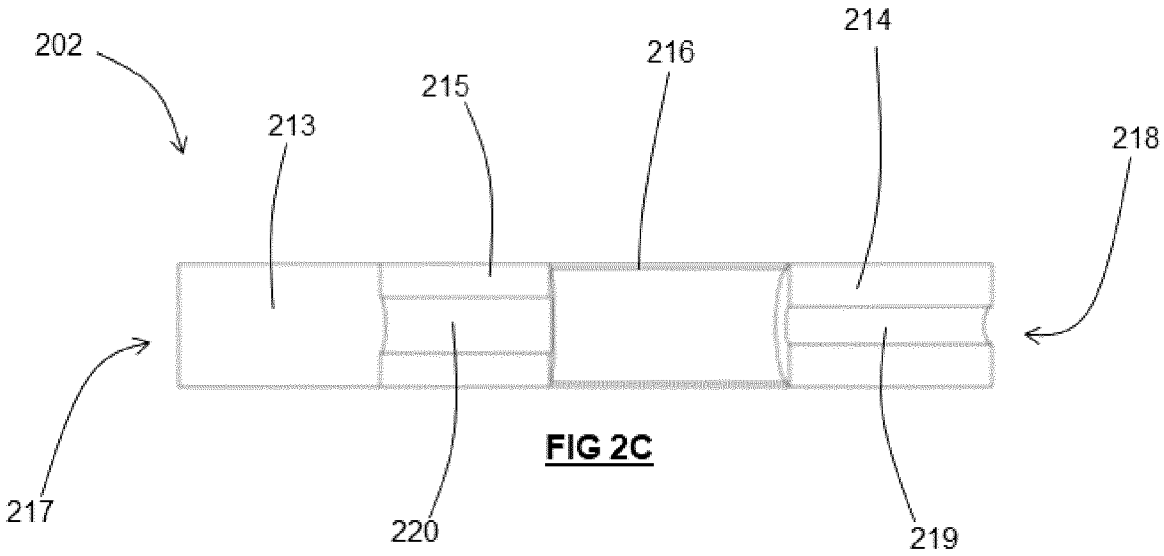


FIG 2C

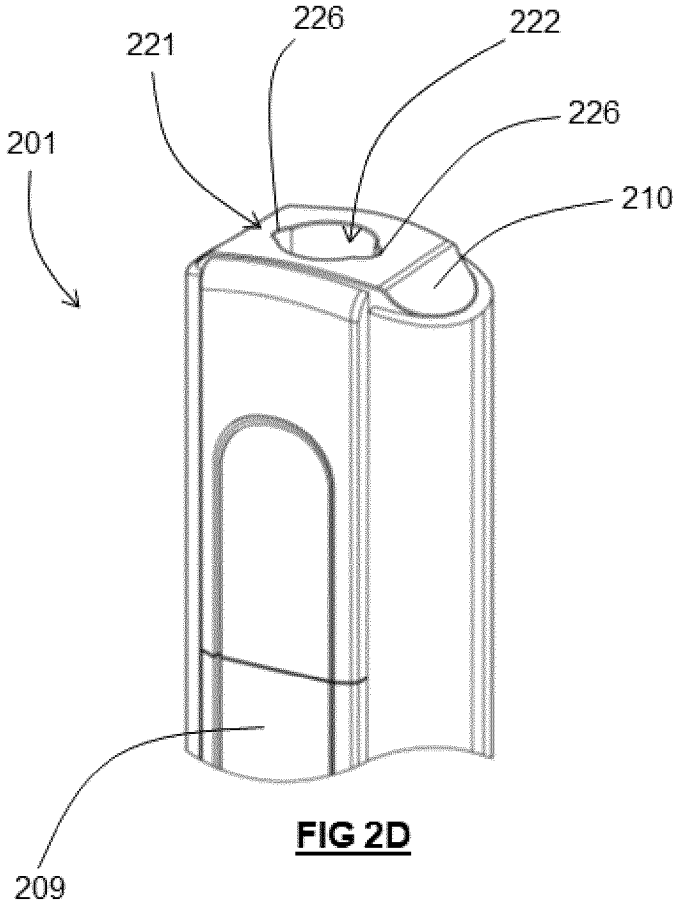
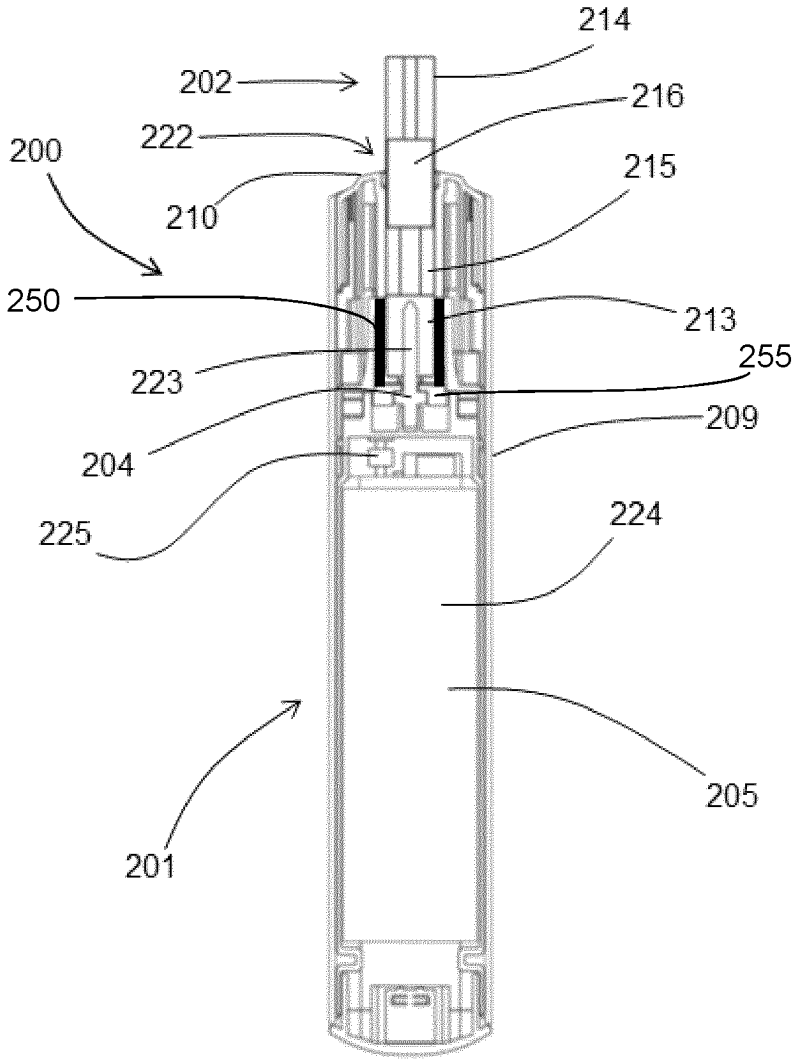


FIG 2D


214
202
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201

FIG 2E

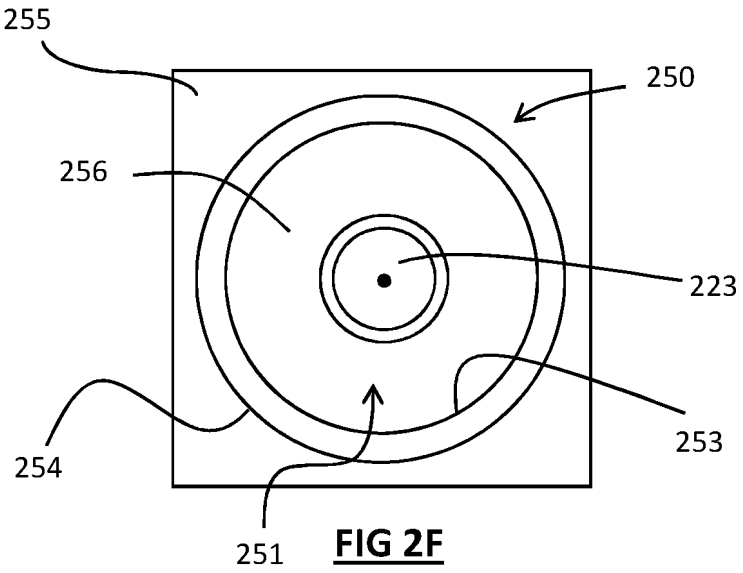

FIG 2F

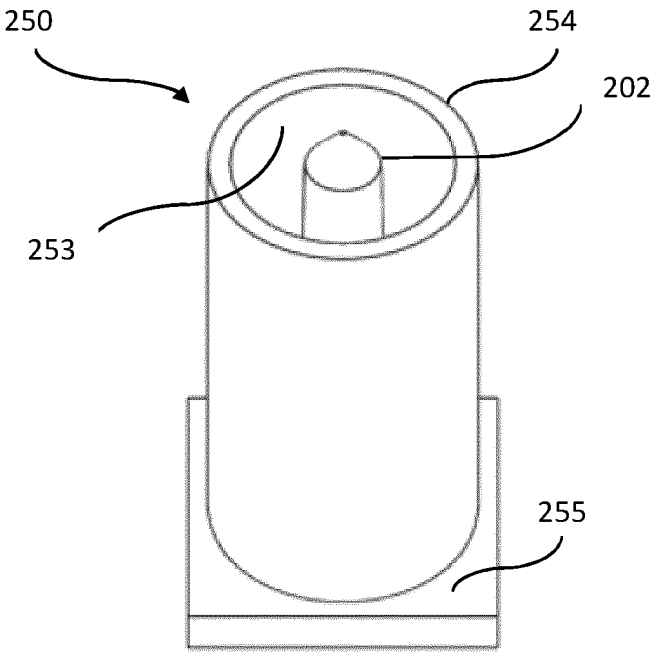

FIG 2G

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 2017042243 A **[0015]**
- WO 2019030166 A **[0015]**