



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
18.08.2021 Bulletin 2021/33

(51) Int Cl.:
A24F 47/00 ^(2020.01) **A24F 40/85** ^(2020.01)

(21) Application number: **20157496.9**

(22) Date of filing: **14.02.2020**

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

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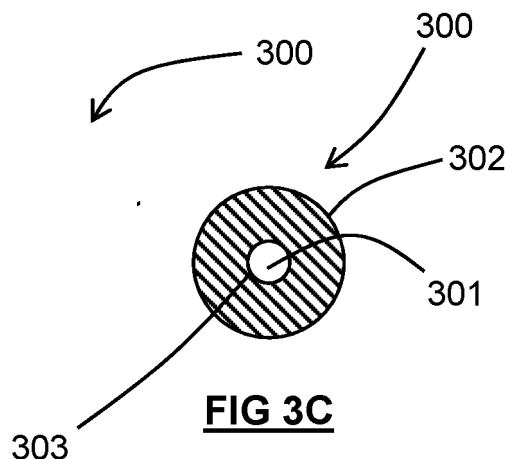
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(54) **SMOKING SUBSTITUTE SYSTEM**

(57) The present invention relates to a smoking substitute system and particularly, although not exclusively, to a smoking substitute system comprising a smoking substitute device and a cleaning consumable for the smoking substitute device. According to the present in-

vention, there is provided a cleaning consumable for cleaning a smoking substitute device, the cleaning consumable comprising a cleaning fluid for cleaning at least one of a consumable receiving cavity and a heating element of a smoking substitute device.



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 smoking substitute device and a cleaning consumable for the smoking substitute device.

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 re-

semble 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 vaporisation 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.

SUMMARY OF THE INVENTION

[0016] At its most general, the present invention relates to a cleaning consumable for the smoking substitute de-

vice.

[0017] According to a first aspect of the present invention, there is provided a cleaning consumable for cleaning a smoking substitute device, the cleaning consumable comprising a cleaning fluid for cleaning at least one of a consumable receiving cavity and a heating element of a smoking substitute device.

[0018] According to a second aspect of the present invention, there is provided a smoking substitute system comprising a smoking substitute device comprising a body and an elongate heating element projecting along a longitudinal axis from the body and into a consumable receiving cavity and a cleaning consumable according to the first aspect.

[0019] According to a third aspect of the present invention, there is provided a method of cleaning a substitute smoking device, the method comprising inserting a cleaning consumable according to the first aspect into an aerosol-forming article receiving cavity of a smoking substitute device; and scouring at least one of the cavity and a heating element arranged in the cavity by agitating the cleaning consumable.

[0020] By providing a cleaning consumable comprising a cleaning fluid, the cleaning consumable may provide an easy way and intuitive means of cleaning a smoking substitute device to a user of a smoking substitute device, in particular the elements that come in regular contact with an aerosol-forming article, like a tobacco containing consumable, in particular the consumable-receiving cavity and the heating element of the smoking substitute device. An according consumable may provide the functionality of removing unwanted debris from device, while reducing the chance of damaging the smoking substitute device due to improper handling or cleaning, in particular breakage of a heating element like e.g. a rod heater.

[0021] The cleaning fluid may be a solvent. Advantageously, when the heating element is immersed in the cleaning fluid, said cleaning fluid may effect cleaning of the heating element without the need of a user to physically scraping residue off the heating element. The user may leave the cleaning consumable in the smoking substitute device for a predetermined period of time before its removal from the device. Said predetermined period of time may range from 1 minute to 60 minutes. During said predetermined period of time, the user may rotate the cleaning consumable to promote cleaning, e.g. to loosen the residue. The user may remove the cleaning consumable after said predetermined period of time. The consumable may be reusable or disposable after one use. The cleaning fluid may be in a liquid form, or it may be a gel, or it may be a solid liquid suspension comprising solid particles for improving the removal of residue. A rigid form or body may allow the user to hold onto an end of the cleaning consumable during its insertion into the smoking substitute device.

[0022] Optional features will now be set out. These are applicable singly or in any combination with any aspect.

[0023] According to a preferred embodiment of the

present invention, the cleaning fluid may be configured to be heated by the heating element.

[0024] According to a further preferred embodiment of the present invention, the cleaning consumable may comprise a heat activatable fluid that is configured to activate upon heating.

[0025] According to a further preferred embodiment of the present invention, the cleaning consumable may comprise a heat activatable fluid comprising a gel that is configured to phase change into a liquid upon heating.

[0026] According to a further preferred embodiment of the present invention, the cleaning fluid may comprise a solvent and/or a cleaning alcohol component, in particular isopropyl alcohol.

[0027] For example, the cleaning fluid may only activate to clean the heating element at an elevated temperature, or it may clean the heating element more efficiently at an elevated temperature.

[0028] The cleaning fluid may comprise a suitable detergent. The cleaning fluid may be capable of removing the residues from the heating element. The cleaning fluid may be configured to be heated by the heating element and as such promote convection in the cavity, as well as enable the removal organic residues more effectively. However, the cleaning fluid may also capable of carrying out cleaning at ambient temperatures. In use, the consumable may be retained on the heating element for a predetermined period of time ranging from a minute to an hour.

[0029] For example, in use the heating element may be activated to heat the cleaning fluid to a temperature below the boiling point of the fluid. Said temperature may range from 25°C to 95°C. Advantageously, at such elevated temperatures, the cleaning fluid may clean the heating element more efficiently, e.g. some organic components in the residue may be removed more readily. In some cases where the cleaning fluid comprises a gel, the gel may phase change into a liquid and thereby permits free flow of cleaning fluid within the cleaning capsule. Advantageously, such arrangement encourages convection in the cleaning capsule, and thereby it may result in a more efficient cleaning process.

[0030] For example, the cleaning fluid may only activate to clean the heating element at an elevated temperature, or it may clean the heating element more efficiently at an elevated temperature.

[0031] The cleaning fluid may be a substance that promotes the removal of residue, deposits, dirt or debris. In particular, the cleaning fluid may be a solvent that removes or promotes removal of these unwanted substances, in particular by reducing adhesion of these substances to surfaces, like the surfaces of the cavity or the heating element. With such a reduced adhesion, a movement of the cleaning consumable in the cavity, e.g. an insertion, a removal or an in-situ movement, like rotation or twisting the cleaning consumable in the cavity, may promote the removal of these unwanted substances.

[0032] According to a further preferred embodiment of

the present invention, the cleaning consumable may further comprise a substrate formed of cellulose monoacetate and in particular having an elongate bore extending longitudinally at least partly therethrough for receipt of the heating element.

[0033] According to a further preferred embodiment of the present invention, the cleaning consumable may be configured to contact a surface of the cavity and/or of the heating element during its insertion into, rotation in and/or removal from the cavity, and thereby may scrape off residue formed on said surface.

[0034] According to a further preferred embodiment of the present invention, the cleaning consumable may comprise a similar cross sectional profile and size of an aerosol-forming article.

[0035] According to a preferred embodiment of the present invention, a longitudinal length of the cleaning consumable may be greater than a longitudinal length of the heating element, in particular greater than the depth of the cavity. (

[0036] According to a preferred embodiment of the present invention, the cleaning consumable may comprise a bore extending longitudinally therethrough, and wherein in particular the bore has a transverse cross section that is substantially the same as a transverse cross-section of the heating element.

[0037] The cleaning consumable (e.g. the substrate) may have a longitudinal length that is greater than 20 mm. The longitudinal length may be greater than e.g. 30 mm or 40 mm. The longitudinal length may be approximately 50 mm (e.g. 48 mm).

[0038] The cleaning consumable (e.g. the substrate) may have a transverse cross-sectional shape that is substantially circular (annular). The cross-sectional shape of the bore may alternatively be rectangular, elliptical, triangular, etc. The cleaning consumable (e.g. the substrate) may have a diameter (i.e. in a transverse direction) that is greater than 5 mm and less than 15 mm. The diameter may be greater than 5 mm and less than 10 mm. The diameter may e.g. be approximately 7 mm. The shape (e.g. and size) of the cross-section of the consumable (e.g. the substrate) may be consistent for the length (i.e. the entire length) of the consumable.

[0039] The cleaning consumable may have a longitudinal length that is greater than a longitudinal length of the heating element. In this respect, the heating element may fully penetrate the substrate when received in cleaning consumable. That is, the entire length, or substantially the entire length, of the heating element may be received in the cleaning consumable (e.g. the substrate). 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. The length of the cleaning consumable (e.g. the substrate) may be as provided above with respect to the first aspect.

[0040] The cleaning consumable may have a greater longitudinal length than the cavity (i.e. defining the depth of the cavity). Thus, a first axial end of the cleaning con-

sumable may project from the cavity when the cleaning consumable is received in the cavity. This first axial end of the cleaning consumable may be used by a user to move (e.g. rotate) the cleaning consumable when received in the cavity. The opposing second axial end of the consumable may abut a base of the cavity. Thus, when the cleaning consumable is moved (e.g. rotated) the second axial end of the consumable may scour the base of the cavity so as to clean the base.

[0041] When the cleaning consumable (e.g. the substrate) comprises a bore, a (transverse) cross-sectional of the bore may be substantially the same as a transverse cross-sectional shape of the heater. For example, both the heating element and the bore of the cleaning consumable may have a transverse cross-sectional shape that is substantially circular (i.e. the heating element may be generally cylindrical). Alternatively, both the heating element and the bore of the cleaning consumable may have a transverse cross-sectional shape 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"). In such an embodiment, the bore of the cleaning consumable may have a transverse cross-section that is annular (which may extend only partway through the substrate).

[0042] When the cleaning consumable (e.g. the substrate) is solid, the cleaning consumable may be formed such that the heating element is able to pierce the substrate (for insertion into the cleaning consumable). For example, the substrate may be formed such that the cleaning consumable is capable of being pierced (e.g. with a force that is similar to that during insertion of a smoking substitute consumable onto the heater). Alternatively, or additionally, the cleaning consumable (e.g. the substrate) may comprise a weakened portion or a frangible portion that facilitates insertion of the heating element into the cleaning consumable.

[0043] When the cleaning consumable (e.g. the substrate) comprises a bore, a (transverse) cross-sectional of the bore may be substantially the same as a transverse cross-sectional shape of the heater. For example, both the heating element and the bore of the cleaning consumable may have a transverse cross-sectional shape that is substantially circular (i.e. the heating element may be generally cylindrical). Alternatively, both the heating element and the bore of the cleaning consumable may have a transverse cross-sectional shape 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"). In such an embodiment, the bore of the cleaning consumable may have a transverse cross-section that is annular (which may extend only partway through the substrate).

[0044] The bore may extend (e.g. centrally) fully through the substrate (i.e. from one end of the substrate to an opposing end along the longitudinal length of the consumable). The bore may alternatively only extend partway into the substrate. The bore may have a longi-

tudinal length that is between 15 mm and 25 mm long, e.g. between 18 mm and 20 mm long, e.g. around 19 mm long.

[0045] The bore may have a transverse cross-sectional shape that is circular (or may e.g. be rectangular, elliptical, etc.) The bore may have a diameter (i.e. in the transverse direction) 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. The shape (e.g. and size) of the cross-section of the bore may be consistent for the length (i.e. the entire length) of the bore.

[0046] The substrate may be a unitary body. That is, the cleaning consumable may be in the form of a single integrally formed substrate. The substrate e.g. the cellulose acetate substrate may be at least partly circumscribed by a wrapping layer e.g. an abrasive wrapping layer.

[0047] A distal end of the heating element (i.e. distal from a base of the heating element where it is mounted to the device) may comprise a tapered portion, which may facilitate insertion of the heating element into the cleaning consumable.

[0048] Like the bore, 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. Alternatively, the bore and/or heater may be tapered along their respective lengths.

[0049] The heating element may have a diameter (e.g. when cylindrical) 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. The diameter of the bore of the cleaning consumable (e.g. the substrate) may be substantially the same as the diameter of the heating element. In this respect, the heating element may fit closely within the bore when inserted therein, such that internal surfaces of the cleaning consumable (e.g. the substrate) (defining the bore) contact outer surfaces of the heating element. In some embodiments, the bore may be smaller than the heating element (e.g. in diameter), such that the bore is forced to expand as the heating element is inserted therein. This may ensure contact between the cleaning consumable and the heating element. In other embodiments, the cross-sectional area of the bore may be larger than the cross-sectional area of the heating element.

[0050] The device may comprise an elongate body. An end of the elongate body may be configured for engagement with a heated tobacco (HT) consumable. The device may comprise a cavity that is configured for receipt of at least a portion of the HT consumable (i.e. for engagement with the HT consumable). The heating element may be disposed in (e.g. and project into) this cavity. The cleaning consumable may have the same size and shape as a HT consumable configured for use with the device. The consumable may have the same cross-section as a filter of the HT consumable.

[0051] According to a preferred embodiment of the present invention, agitating the cleaning consumable

may comprise rotating the cleaning consumable about a longitudinal axis of the smoking substitute device, in particular about a longitudinal axis of the heating element.

[0052] Agitating the cleaning consumable may comprise rotating cleaning consumable about a longitudinal axis of the heating element. Agitating the cleaning consumable may comprise a repetitive movement (e.g. a reciprocating movement along the longitudinal axis). Agitating the cleaning consumable may comprise a combination of longitudinal and rotational movement of the cleaning consumable relative to the heating element.

[0053] An outer surface of the cleaning consumable (e.g. the wrapping layer) may be configured to contact an internal wall of the body defining cavity when received therein. In this way, when the cleaning consumable is moved relative to the device, the outer surface (e.g. the wrapping layer) of the cleaning consumable may move against the internal wall of the cavity so as to abrade/scour residue that has accumulated on the surface of the cavity. For example, an outer (e.g. circumferential) surface of the cleaning consumable (which may be at least partially circumscribed by the wrapping layer) may be formed so as to contact (i.e. lie against) an internal wall defining the cavity. The cross-sectional shape (and size) of the cleaning consumable may be substantially the same as the cavity. For example, both the cleaning consumable and cavity may have a circular cross-sectional shape. The cleaning consumable may substantially fill the cavity when received therein.

[0054] According to a preferred embodiment of the present invention, the heating element may project within the aerosol-forming article receiving cavity of the device, the method may further comprise inserting the cleaning consumable into the cavity for receipt of the heating element into the cleaning consumable, and may further comprise scouring one or more walls defining the cavity by agitating the cleaning consumable in the cavity.

[0055] According to a further preferred embodiment of the present invention, the method may further comprise scouring the heating element and the walls of the cavity concurrently, and/or removing the cleaning consumable from the smoking substitute device, thereby scraping off residue formed on at least one of the walls of the cavity and the heating element.

[0056] According to a further preferred embodiment of the present invention, the cleaning consumable may comprise a cavity or reservoir and the heating element projects into the cavity or reservoir such that when the cleaning consumable is received in the cavity of the smoking substitute device, the heating element is inserted into the consumable.

[0057] According to a further preferred embodiment of the present invention, the cleaning consumable substantially may fill the cavity when received therein.

[0058] According to a further preferred embodiment of the present invention, an outer surface of the cleaning consumable may contact an inner wall defining the cavity of the smoking substitute device when received therein.

[0059] The scouring may be such that residue that has accumulated on the heating element may be removed/dislodged/abraded from the heating element by the cleaning consumable.

[0060] The heating element may project within a cavity of the device, and the method may comprise inserting the cleaning consumable into the cavity (so as to receive the heating element therein). The method may comprise scouring one or more inner walls of the device defining the cavity. In this way, the heating element and the inner walls of the device may be scoured concurrently using the cleaning consumable. The method may comprise substantially filling the cavity with the cleaning consumable.

[0061] The device may comprise an elongate body. An end of the elongate body may be configured for engagement with an aerosol-forming article. For example, the body may be configured for engagement with a heated tobacco (HT) consumable (or heat-not-burn (HNB) consumable). The terms "heated tobacco" and "heat-not-burn" are used interchangeably herein to describe a consumable that is of the type that is heated rather than combusted (or are used interchangeably to describe a device for use with such a 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 aerosol-forming article may be of the type that comprises an aerosol former (e.g. carried by an aerosol-forming substrate).

[0062] The device may comprise a heater for heating the aerosol-forming article. 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 extend from the end of the body that is configured for engagement with the aerosol-forming article.

[0063] The heater (and thus the heating element) may be rigidly mounted to the body. 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.

[0064] 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. 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.

[0065] 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 .

[0066] The heating element may be located in the cavity (of the device), and may extend (e.g. along a longitudinal axis) from an internal base of the cavity towards an opening of the cavity. The length of the heating element (i.e. along the longitudinal axis of the heater) 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.

[0067] The heating element may be configured for insertion into an aerosol-forming article (e.g. a HT consumable) when an aerosol-forming article is received in the cavity. 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 aerosol-forming article. The heating element may fully penetrate an aerosol-forming article when the aerosol-forming article is received in the cavity. That is, the entire length, or substantially the entire length, of the heating element may be received in the aerosol-forming article.

[0068] 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 an aerosol-forming article (e.g. a HT consumable). Thus, when such an aerosol-forming article is engaged with the device, the heating element may only penetrate the aerosol-forming substrate, rather than other components of the aerosol-forming article. The heating element may penetrate the aerosol-forming substrate for substantially the entire axial length of the aerosol-forming-substrate of the aerosol-forming article. 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) or e.g. radially inwardly (in the case of a tube heater).

[0069] Where the heater is a tube heater, the heating element of the tube heater may surround at least a portion of the cavity. When the portion of the aerosol-forming article is received in the cavity, the heating element may surround a portion of the aerosol-forming article (i.e. so as to heat that portion of the aerosol-forming article). In

particular, the heating element may surround an aerosol forming substrate of the aerosol-forming article. That is, when an aerosol-forming article is engaged with the device, the aerosol forming substrate of the aerosol-forming article may be located adjacent an inner surface of the (tubular) heating element. When the heating element is activated, heat may be transferred radially inwardly from the inner surface of the heating element to heat the aerosol forming substrate.

[0070] The cavity may comprise a (e.g. circumferential) wall (or walls) and the (tubular) heating element may extend around at least a portion of the wall(s). In this way, the wall may be located between the inner surface of the heating element and an outer surface of the aerosol-forming article. The wall (or walls) of the cavity may be formed from a thermally conductive material (e.g. a metal) to allow heat conduction from the heating element to the aerosol-forming article. Thus, heat may be conducted from the heating element, through the cavity wall (or walls), to the aerosol-forming substrate of an aerosol-forming article received in the cavity.

[0071] In some embodiments the device may comprise a cap disposed at the end of the body that is configured for engagement with an aerosol-forming article. Where the device comprises a heater having a heating element, 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.

[0072] The cap may define at least a portion of the cavity of the device. 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. Where the cap fully defines the cavity, the cap may comprise an aperture for receipt of the heating element into the cavity (when the cap is in the closed position). The cap may comprise an opening to the cavity. The opening may be configured for receipt of at least a portion of an aerosol-forming article. That is, an aerosol-forming article may be inserted through the opening and into the cavity (so as to be engaged with the device).

[0073] The cap may be configured such that when an aerosol-forming article is engaged with the device (e.g. received in the cavity), only a portion of the aerosol-forming article is received in the cavity. That is, a portion of the aerosol-forming article (not received in the cavity) may protrude from (i.e. extend beyond) the opening. This (protruding) portion of the aerosol-forming article may be a terminal (e.g. mouth) end of the aerosol-forming article, which may be received in a user's mouth for the purpose of inhaling aerosol formed by the device.

[0074] 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 heater. In that respect,

altering (e.g. toggling) the electrical connection of the power source to the heater may affect a state of the heater. For example, toggling the electrical connection of the power source to the heater may toggle the heater 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).

[0075] 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.

[0076] 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.

[0077] 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.

[0078] 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 aerosol-forming article) indicated to the user may comprise a condition indicative of the operation of the heater. For example, the condition may comprise whether the heater 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.

[0079] 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.).

[0080] 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.

[0081] 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.

[0082] 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.

[0083] 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.

[0084] 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 be 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.

[0085] 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.

[0086] 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.

[0087] 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.

[0088] 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).

[0089] An aerosol-forming article may comprise an aerosol-forming substrate at an upstream end of the aerosol-forming article. The article may be in the form of a smoking substitute article, e.g. heated tobacco (HT) consumable (also known as a heat-not-burn (HNB) consumable).

[0090] 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.

[0091] 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.

[0092] 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 opioids, cathine and cathinone, kavalactones, mysticin, beta-carboline alkaloids, salvinorin A together with any combinations, functional equivalents to, and/or synthetic alternatives of the foregoing.

[0093] 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* (Guamora), *Cestrum nocturnum*, *Cynoglossum virginianum* (wild comfrey), *Cytisus scoparius*, *Damiana*, *Entada rheedii*, *Eschscholzia californica* (California Poppy), *Fittonia albivenis*, *Hippobroma longiflora*, *Humulus japonica* (Japanese Hops), *Humulus lu-*

pulus (Hops), *Lactuca virosa* (Lettuce Opium), *Lagdera alata*, *Leonotis leonurus*, *Leonurus cardiaca* (Motherwort), *Leonurus sibiricus* (Honeyweed), *Lobelia cardinalis*, *Lobelia inflata* (Indian-tobacco), *Lobelia siphilitica*, *Nepeta cataria* (Catnip), *Nicotiana species* (Tobacco), *Nymphaea alba* (White Lily), *Nymphaea caerulea* (Blue Lily), Opium poppy, *Passiflora incarnata* (Passionflower), *Pedicularis densiflora* (Indian Warrior), *Pedicularis groenlandica* (Elephant's Head), *Salvia divinorum*, *Salvia dorrii* (Tobacco Sage), *Salvia species* (Sage), *Scutellaria galericulata*, *Scutellaria lateriflora*, *Scutellaria nana*, *Scutellaria species* (Skullcap), *Sida acuta* (Wireweed), *Sida rhombifolia*, *Silene capensis*, *Syzygium aromaticum* (Clove), *Tagetes lucida* (Mexican Tarragon), *Tarhonanthus camphoratus*, *Tumera diffusa* (Damiana), *Verbascum* (Mullein), *Zamia latifolia* (Maconha Brava) together with any combinations, functional equivalents to, and/or synthetic alternatives of the foregoing.

[0094] 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.

[0095] 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).

[0096] 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.

[0097] The aerosol-forming substrate may comprise one or more additives selected from humectants, flavourants, fillers, aqueous/non-aqueous solvents and binders.

[0098] 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.

[0099] 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.

[0100] 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.

[0101] 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 ele-

ment (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.

[0102] 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.

[0103] 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.

[0104] 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.

[0105] The invention includes the combination of the aspects and preferred features described except where such a combination is clearly impermissible or expressly avoided.

[0106] 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

[0107] 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 1A is a schematic of a smoking substitute system;

Figure 1B is a schematic of a variation of the smoking substitute system of Figure 1A;

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 substitute smoking system;

Figures 3A, 3B and 3C are a perspective view, side section view and front section view of a cleaning consumable according to a first embodiment;

Figures 4A and 4B are a side section view and front section view of a cleaning consumable according to a second embodiment;

Figure 5A is a front view of a smoking substitute system with a cleaning consumable disengaged from the device; and

Figures 5B and 5C are front and section views of the smoking substitute system with the cleaning consumable engaged with the device.

DETAILED DESCRIPTION OF THE INVENTION

[0108] 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.

[0109] Figure 1A 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).

[0110] In the illustrated system, the heater 104 forms part of the consumable 102 and is configured to heat the aerosol former 103. In this variation, the heater 104 is electrically connectable to the 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.

[0111] 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 connectable 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).

[0112] 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).

[0113] 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.

[0114] 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, touch-screen, switch, microphone, etc.

[0115] 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.

[0116] 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.

[0117] 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.

[0118] 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.

[0119] Figure 1B is a schematic showing a variation of the system 100 of Figure 1A. In the system 100' of Figure 1B, the heater 104 forms part of the device 101, rather than the consumable 102. In this variation, the heater 104 is electrically connected to the power source 105.

[0120] Figures 2A and 2B illustrate a heated-tobacco (HT) smoking substitute system 200. The system 200 is an example of the systems 100, 100' described in relation to Figures 1A or 1B. System 200 includes an HT device 201 and an HT consumable 202. The description of Figures 1A and 1B above is applicable to the system 200 of Figures 2A and 2B, and will thus not be repeated.

[0121] 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.

[0122] 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.

[0123] 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.

[0124] Figure 2C show a detailed section view of the consumable 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.

[0125] 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.

[0126] 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.

[0127] 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.

[0128] 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.

[0129] The upstream filter element 215 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 215 has a larger diameter (3 mm) than the terminal filter element 214.

[0130] 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.

[0131] 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.

[0132] 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 also protrudes 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 in order to cover the end of the device 201.

[0133] 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.

[0134] 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. 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).

[0135] 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.

[0136] 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.

[0137] 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.

[0138] 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.

[0139] 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 208 (i.e. connected to the PCB and microcontroller).

[0140] The controller 208 is configured to control at least one function of the device 202. For example, the controller 208 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 208 is configured to control the heater 204 in response to a 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).

[0141] 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).

[0142] The device 201 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 208 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 208 (and can thus be responded to by the controller 208).

[0143] Figure 3A, 3B and 3C illustrate a first embodiment of a cleaning consumable 300 for a smoking substitute device. The cleaning consumable 300 is in the form of an elongate unitary substrate, e.g. formed of a cellulose monoacetate, and comprises a bore 301 extending centrally through the cleaning consumable 300 along a longitudinal axis. The cleaning consumable is for cleaning a cavity and/or a heating element of the smoking substitute device. As will be described further below, this

bore 301 is for receipt of a heating element (223) of the smoking substitute device (201) for cleaning the heating element.

[0144] The cleaning consumable 300 comprises an annular transverse cross-section so as to have an outer circumferential surface 302 surrounding (and concentrically aligned with) an internal circumferential surface 303 (defining the bore 301). The outer 302 and inner 303 circumferential surfaces extend between transverse (annular shaped) ends 304a, 304b of the cleaning consumable 300.

[0145] In the present embodiment, the cleaning consumable 300 exemplarily may have a longitudinal length of 48 mm and an outer diameter of 7 mm. The diameter of the bore may be 2.15 mm.

[0146] The material of the cleaning consumable 300, e.g. the substrate, may comprise the cleaning fluid. In other words, the cleaning fluid may be contained in, e.g. deposited in the substrate. For example, the substrate may be soaked in the cleaning fluid. Alternatively, in case a gel-like substance is used, the gel may be deposited in the substrate. The cleaning fluid may be heat activatable. This may comprise that the cleaning fluid is comparably viscous so to remain in the material of the cleaning consumable 300 in an unheated situation, and becomes more liquid when exposed to heat, e.g. from the heating element.

[0147] The cleaning fluid may promote removal of unwanted substances, and may in particular transport said substance to the interior of the cleaning consumable for removal. In particular in a heated condition, the unwanted substances may be transported into the cleaning consumable and gets "trapped" there by a subsequent removal of heat source or a cooling down, like switching off again the heating element.

[0148] Figures 4A and 4B are a side section view and front section view of a cleaning consumable according to a second embodiment of the present invention.

[0149] Figure 4A and 4B illustrate a second embodiment of a cleaning consumable 400. The cleaning consumable 400 of figures 4A and 4B is similar in shape to the cleaning consumable 300 of the first embodiment, except that it does not comprise a bore. Thus, the cleaning consumable 400 has a solid cylindrical shape defined by an outer circumferential surface 402 and opposing (circular) ends 404a, 404b.

[0150] Like the cleaning consumable 300 of the first embodiment, the cleaning consumable 400 is for cleaning a cavity and/or a heating element of a smoking substitute device. Because the cleaning consumable 400 does not include a bore, it may be configured to be pierced by the heating element for receipt of the heating element therein. The cleaning consumable 400 is formed of a cellulose monoacetate that is formed so as to allow this piercing to occur.

[0151] Like with cleaning consumable 300, the cleaning consumable 400 may comprise the cleaning fluid. The cleaning consumable 400 may comprise a cavity or

reservoir containing the cleaning fluid that may be opened by the piercing into with the heating element. A membrane may contain the cleaning fluid in the unpenetrated situation. After penetration, the cleaning fluid may substantially distribute evenly throughout the material of the cleaning consumable 400. The membrane may provide a seal around the opening of the heating element, when penetrated into the reservoir, thereby avoiding leaking of cleaning fluid. When being removed from the cavity, the membrane may scrape off unwanted substance from the heating element and retain the same in the reservoir. When being removed, the membrane may provide a self-sealing functionality so that remaining cleaning fluid does not leave the reservoir. Again, the cleaning fluid may be as described in relation to cleaning consumable 300, and in particular may be heat activatable.

[0152] The heating element may be surrounded by or immersed in the cleaning fluid contained the reservoir. The membrane may be adapted to remain in contact with the heating element when the heating element is received in the cavity or reservoir of the cleaning consumable, e.g. it forms a peripheral seal around the heating element. This ensures retention of residues in the cavity on removal from the heating element. Furthermore, the membrane may be configured to remain in contact with the heating element during its removal therefrom, and thereby it is configured to scrape residue off the heating element.

[0153] Figure 5A is a front view of a smoking substitute system with a cleaning consumable disengaged from the device; and

[0154] Figures 5B and 5C are front and section views of the smoking substitute system with the cleaning consumable engaged with the device.

[0155] Figures 5A, 5B and 5C illustrate a heated-tobacco (HT) smoking substitute system 505. The system 505 comprises a smoking substitute device 506 and a cleaning consumable 500 that is similar to the cleaning consumables 300, 400 described above and shown in figures 3A to 3C and 4A, 4B. The smoking substitute device 506 is for use with HT consumables 202.

[0156] The smoking substitute device 506 and the cleaning consumable 500 are configured such that the cleaning consumable 500 can be engaged with the smoking substitute device 506 for cleaning. Figure 5A shows the smoking substitute device 506 and the consumable 502 in a disengaged state, whilst Figure 5B shows the smoking substitute device 506 and the cleaning consumable 500 in an engaged state. As will be described further below, and as is shown in Figure 5B, the cleaning consumable 500 can be rotated when engaged with the smoking substitute device 506 for cleaning.

[0157] The smoking substitute device 506 is similar as described before in relation to Figs. 2A and 2B and comprises a body 507 and cap 508. In use, the cap 508 is engaged at an end of the body 507. Although not apparent from the figures, the cap 508 is moveable relative to

the body 507. In particular, the cap 508 is slideable and can slide along a longitudinal axis of the body 507.

[0158] The smoking substitute device 506 also comprises an output means (forming part of the UI of the smoking substitute device 506) in the form of a plurality of light-emitting diodes (LEDs) 509 arranged linearly along the longitudinal axis of the smoking substitute device 506 and on an outer surface of the body 507 of the smoking substitute device 506. A button 510 is also arranged on an outer surface of the body 507 of the smoking substitute device 506 and is axially spaced (i.e. along the longitudinal axis) from the plurality of LEDs 509.

[0159] Figure 5C illustrates a second view of the smoking substitute device 506 with the cleaning consumable 500 in an engaged state. The cap 508 of the smoking substitute device 506 includes an opening 221 to an internal cavity 514 defined by a circumferential internal wall 511 of the cap 508. The opening 221 and the cavity 514 are formed so as to receive a portion of the cleaning consumable 500 therein. That is, during engagement of the cleaning consumable 500 with the smoking substitute device 506, a portion of the cleaning consumable 500 is received through the opening 221 and into the cavity 514. After such engagement, a first axial end 504a of the cleaning consumable 500 protrudes from the cavity 514 (i.e. so as to protrude from the smoking substitute device 506). As will be described further below, this first axial end 504a can be gripped by a user for removing the cleaning consumable 500 from the smoking substitute device 506 and for moving or agitating (e.g. rotating) the cleaning consumable 500 in the smoking substitute device 506.

[0160] The smoking substitute device 506 comprises a heater 512 comprising heating element 513. In normal use, the heater 512 projects into a HT consumable so as to heat e.g. a tobacco portion of the HT consumable. This produces an aerosol that can be inhaled by a user. Once the tobacco portion is consumed, the HT consumable can be removed. In some cases, unwanted material like residue from the HT consumable may remain (e.g. stuck) on the heating element 513 and the walls of cavity 514 when the HT consumable is removed. As will be described further below, the cleaning consumable 500 may be used to remove this unwanted material from the heating element 513 and/or the cavity walls.

[0161] The heater 512 is rigidly mounted to the body 508 and projects into the cavity 514 defined by the circumferential internal wall 511. In the illustrated embodiment, the heater 512 is a rod heater and the heating element 513 has a circular transverse profile. The heating element 513 projects from an internal base of the cavity 514 along a longitudinal axis towards the opening. As is apparent from Figure 5C, the length (i.e. along the longitudinal axis) of the heating element 513 is less than a depth of the cavity 514. In this way, the heating element 513 does not protrude from or extend beyond the opening (i.e. beyond the end of the smoking substitute device 506). In general, the shape and size of the cleaning consumable 500 is substantially the same as the shape and

size of a HT consumable for use with the smoking substitute device 506. In this way, the cleaning consumable 500 can replace a HT consumable in packaging containing a plurality of HT consumables without necessitating changes to the packaging.

[0162] When the cleaning consumable 500 is received in the cavity 514, the heating element 513 is received in the bore 501 of the cleaning consumable 500. Substantially the entire length of the heating element 513 is received in the bore 501. The diameter of the bore 501 is substantially the same as the diameter of the heating element 513 such that the heating element 513 closely fits within the bore 501. In this way, an outer circumferential surface of the heating element 513 contacts (i.e. lies against) the inner circumferential surface 503 of the cleaning consumable 500. Thus, when the cleaning consumable 500 is moved relative to the heating element 513, when received in the cavity 514, the inner circumferential surface 503 may move across an outer surface of the heating element 513 so as to scour or abrade residue that has collected on the heating element 513 (e.g. through use of the smoking substitute device 506). Likewise an outer circumferential surface 502 of the cleaning consumable may move across an inner surface or wall of the cavity so as to scour or abrade residue that has collected on the walls of the cavity (e.g. through use of the smoking substitute device 506). For example, such movement may be in the form of a rotation (i.e. twisting) of the cleaning consumable 500 about the longitudinal axis of the heating element 513, and generally along the longitudinal axis of the smoking substitute device 506. This movement may be performed by a user gripping an end of the consumable 500 projecting from the cavity 514 (when the consumable 500 is received therein)

[0163] The outer circumferential surface 502 of the cleaning consumable 500 has substantially the same diameter (and shape) as the cavity 514 such that the cleaning consumable 500 substantially fills the cavity 514. In this way the cleaning consumable 500 closely fits within the cavity 514 such that the outer circumferential surface 502 of the cleaning consumable 500 contacts and lies against the inner wall 511 of the smoking substitute device 506. This, when the cleaning consumable 500 is moved relative to the smoking substitute device 506, the outer circumferential surface 502 moves across the inner wall 511 of the smoking substitute device 506 so as to scour or abrade residue that has collected on the inner wall 511. Again, such movement may be in the form of rotation of the cleaning consumable about a longitudinal axis of the heating element 513.

[0164] The smoking substitute device 506 further comprises an electronics cavity 515. A power source, in the form of a rechargeable battery 516 (a lithium ion battery), is located in electronics cavity 515. The smoking substitute device 506 includes a controller (not shown) located in the electronics cavity 515, which comprises a micro-controller mounted on a printed circuit board (PCB). The controller is configured to control at least one function of

the smoking substitute device 506. For example, the controller is configured to control the operation of the heater 512. Such control of the operation of the heater 512 may be accomplished by the controller toggling the electrical connection of the rechargeable battery 516 to the heater 512. For example, the controller is configured to control the heater 512 in response to the user depressing the button 510. Depressing the button 510 may cause the controller to allow a voltage (from the rechargeable battery 516) to be applied to the heater 512 (so as to cause the heating element 513 to be heated).

[0165] Whilst not shown, the smoking substitute device 506 comprise a sensor for detecting the presence of the cleaning consumable 500 in the cavity 514. The sensor is, in particular, configured to detect between the presence of a cleaning consumable 500 in the cavity 514 and a HT consumable. For example, the cleaning consumable 500 may comprise a colour indicator, bar code, magnetic strip etc. that may be detected by the sensor and that, when detected, is indicative of the cleaning consumable being received in the cavity 514. The sensor may provide a signal to the controller that is indicative of a cleaning consumable 500 (as opposed to a HT consumable) being received in the cavity 514. The controller may be configured such that, in response, the controller prevents activation of the heater 512 (i.e. even when requested by a user via the button 310. Thus, activation of the heater 512 may be prevented whilst the smoking substitute device 506 is being cleaned (which could otherwise present a safety issue).

[0166] In some cases, the controller may instead be configured to initiate a heater protocol representative of a cleaning cycle. Alternatively, when a cleaning consumable is detected in the cavity, the button 510 may be used to initiate the cleaning, e.g. to start a predetermined cleaning cycle. The cleaning cycle may be dependent on the type of cleaning fluid being arranged in the consumable. In other words, dependent on the cleaning fluid type, different cleaning cycles may be initiated. E.g. it may be conceivable that one type of cleaning fluid is used for regular cleaning, while a different cleaning fluid may be used for a less regular intensive cleaning. Each type of cleaning fluid may be associated with a defined activation (or the absence of activation) of the heating element to heat (or not heat) the cleaning fluid, e.g. a heat activatable cleaning fluid.

[0167] It can be appreciated, with the use of cleaning consumable, the heating element can be cleaned and does not require user to clean the heating element by a cleaning tool. This not only ensure easy and efficient cleaning but also reduces the chances of damaging of the heating element during cleaning by the cleaning tool.

[0168] The controller is also configured to control the LEDs 509 in response to (e.g. a detected) a condition of the smoking substitute device 506. For example, the controller may control the LEDs to indicate whether the smoking substitute device 506 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 smoking substitute device 506 is in an on state).

[0169] 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.

[0170] 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.

[0171] 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.

[0172] Any section headings used herein are for organizational purposes only and are not to be construed as limiting the subject matter described.

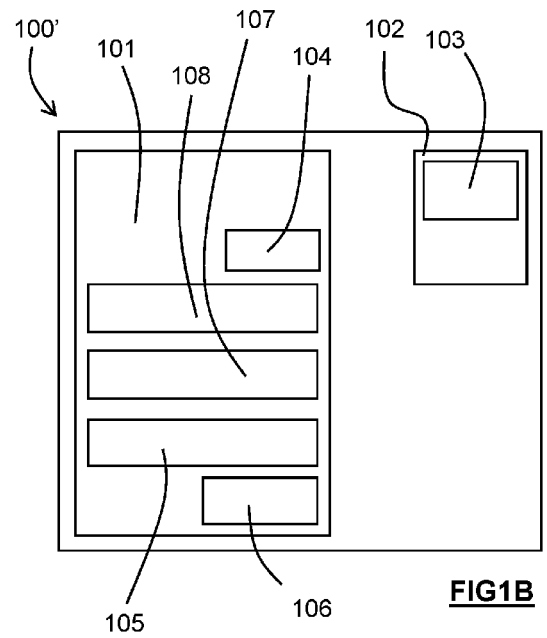
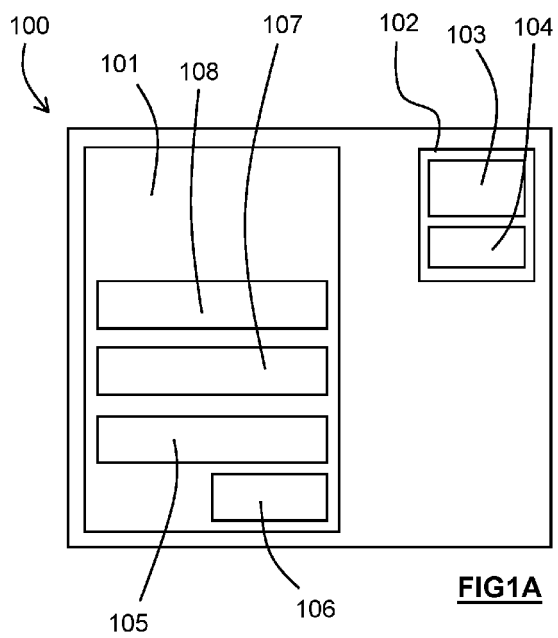
[0173] Throughout this specification, including the claims which follow, unless the context requires otherwise, the words "have", "comprise", and "include", and variations such as "having", "comprises", "comprising", and "including" will be understood to imply the inclusion of a stated integer or step or group of integers or steps but not the exclusion of any other integer or step or group of integers or steps.

[0174] 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%.

[0175] 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. A cleaning consumable (300,400,500) for cleaning a smoking substitute device (201,506), the cleaning consumable comprising a cleaning fluid for cleaning at least one of a consumable receiving cavity (222,514) and a heating element (223) of a smoking substitute device (201,506). 5
2. The cleaning consumable according to the preceding claim, further comprising a substrate formed of cellulose monoacetate and in particular having an elongate bore extending longitudinally at least partly therethrough for receipt of the heating element. 10
3. The cleaning consumable according to at least one of the preceding claims, wherein the cleaning fluid is configured to be heated by the heating element. 15
4. The cleaning consumable according to at least one of the preceding claims, wherein the cleaning consumable is configured to contact a surface (511) of the cavity and/or of the heating element during its insertion into, rotation in and/or removal from the cavity, and thereby scrape off residue that is formed on said surface. 20 25
5. The cleaning consumable according to any one of the preceding claims, wherein the cleaning consumable comprises a similar cross sectional profile and size of an aerosol-forming article. 30
6. The cleaning consumable according to at least one of the preceding claims, wherein the cleaning fluid comprises a heat activatable fluid that is configured to activate upon heating. 35
7. The cleaning consumable according to at least one of the preceding claims, wherein the cleaning fluid comprises a heat activatable fluid comprising a gel that is configured to phase change into a liquid upon heating. 40
8. The cleaning consumable according to at least one of the preceding claims, wherein the cleaning fluid comprises a cleaning alcohol component, in particular isopropyl alcohol. 45
9. A smoking substitute system (505) comprising: 50
 - a smoking substitute device (201,506) comprising a body (209,507) and an elongate heating element (223,513) projecting along a longitudinal axis from the body and into a consumable receiving cavity (222,514); and
 - a cleaning consumable (300,400,500) according to at least one of the preceding claims. 55
10. The smoking substitute system according to the preceding claim, wherein a longitudinal length of the cleaning consumable is greater than a longitudinal length of the heating element, in particular greater than the depth of the cavity.
11. The smoking substitute system according to at least one of claims 9 and 10, wherein the cleaning consumable comprises a bore extending longitudinally therethrough, and wherein in particular the bore (301,401,501) has a transverse cross-section that is substantially the same as a transverse cross-section of the heating element.
12. A method of cleaning a substitute smoking device, the method comprising:
 - inserting a cleaning consumable (300,400,500) according to at least one of claims 1 to 8 into an aerosol-forming article receiving cavity (222,514) of a smoking substitute device (201,506); and
 - scouring at least one of the cavity and a heating element (223,513) arranged in the cavity by agitating the cleaning consumable.
13. The method according to claim 12, wherein agitating the cleaning consumable comprises rotating the cleaning consumable about a longitudinal axis of the smoking substitute device, in particular about a longitudinal axis of the heating element.
14. The method according to at least one of claims 12 and 13,
 - wherein the heating element projects within the aerosol-forming article receiving cavity of the device,
 - the method further comprising
 - inserting the cleaning consumable into the cavity for receipt of the heating element into the cleaning consumable, the method further comprising scouring one or more walls defining the cavity by agitating the cleaning consumable in the cavity.
15. The method according to at least one of claims 12 to 14, further comprising
 - scouring the heating element and the walls of the cavity concurrently, and/or
 - removing the cleaning consumable from the smoking substitute device, and thereby scraping off residue formed on at least one of the walls of the cavity and the heating element.



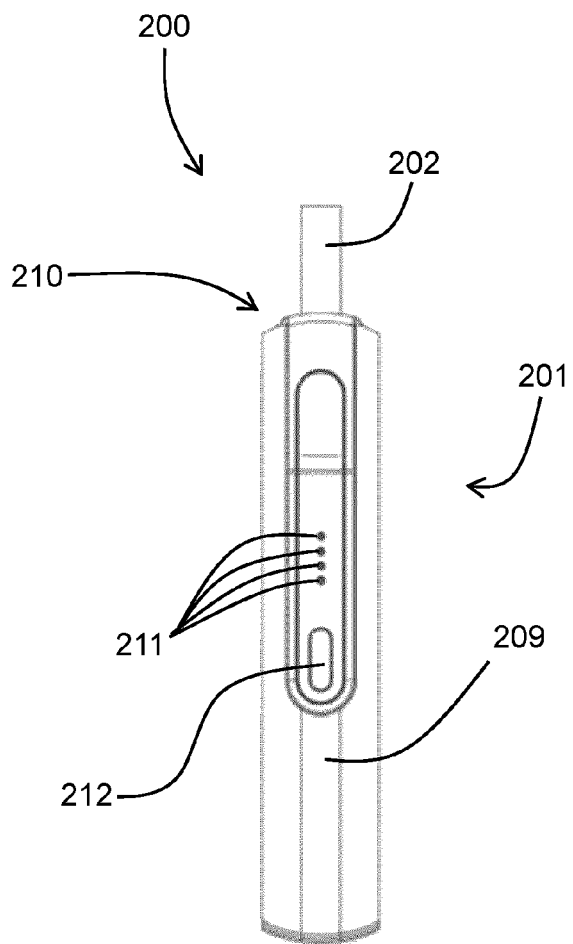


FIG 2A

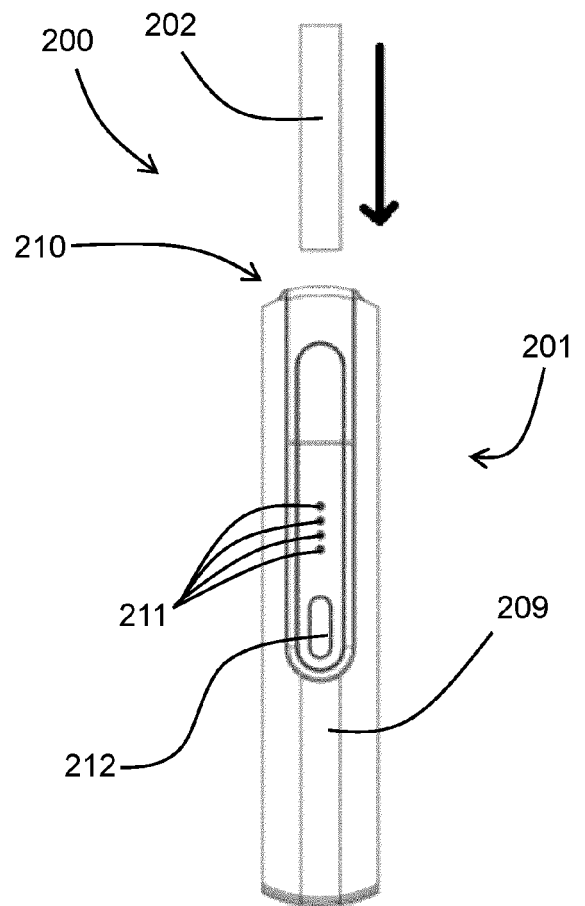
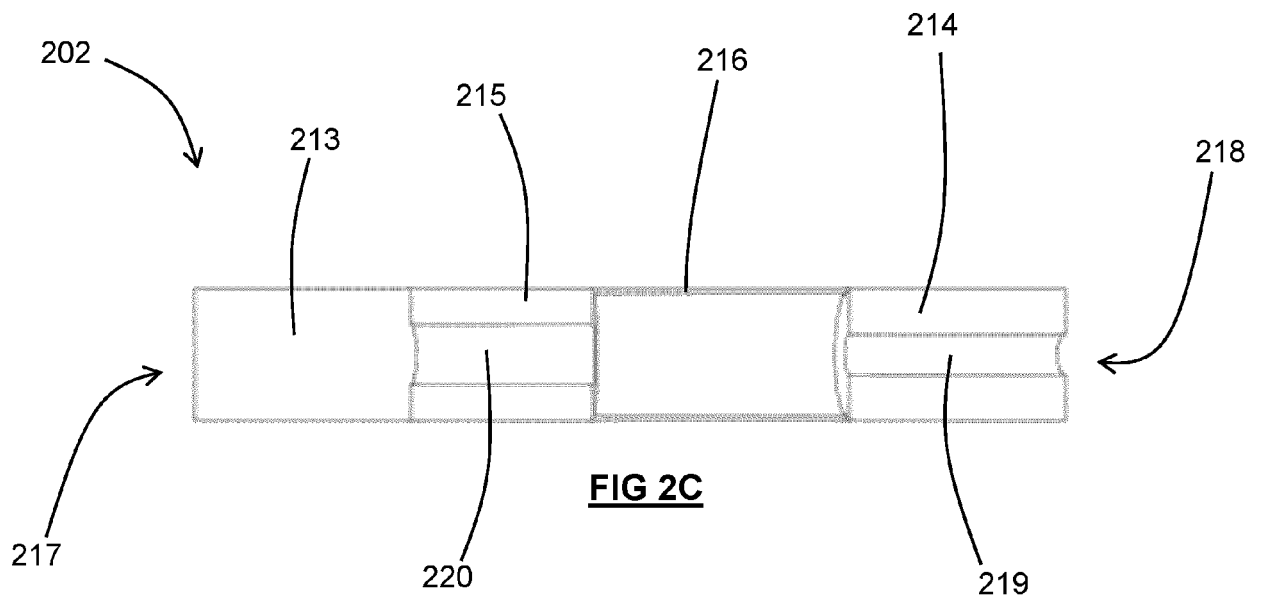
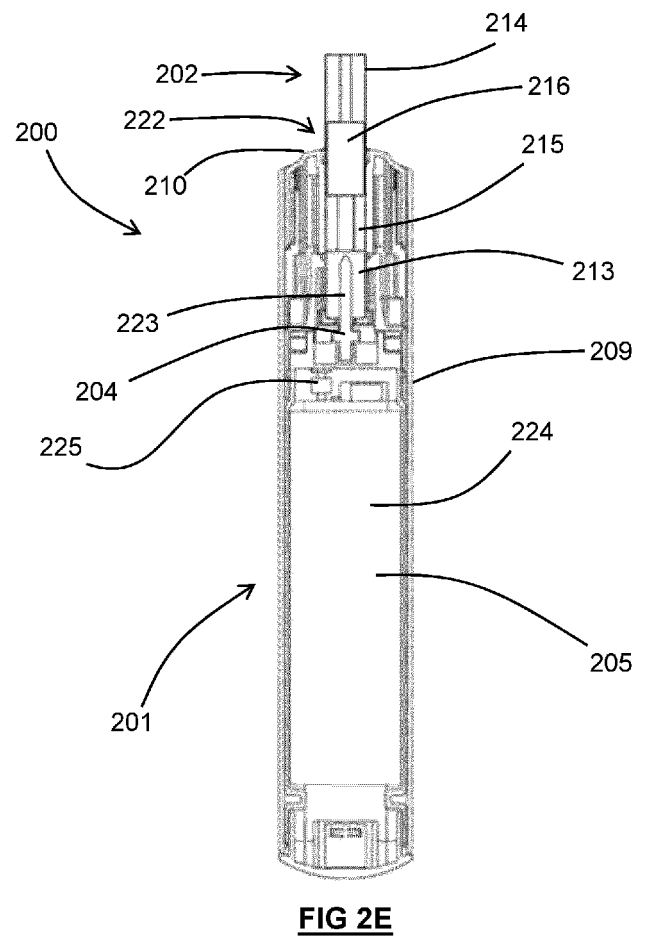
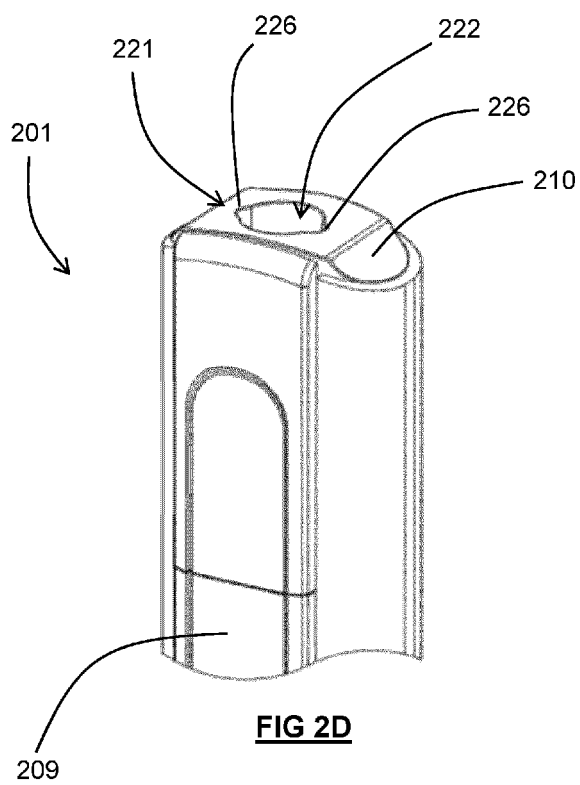


FIG 2B





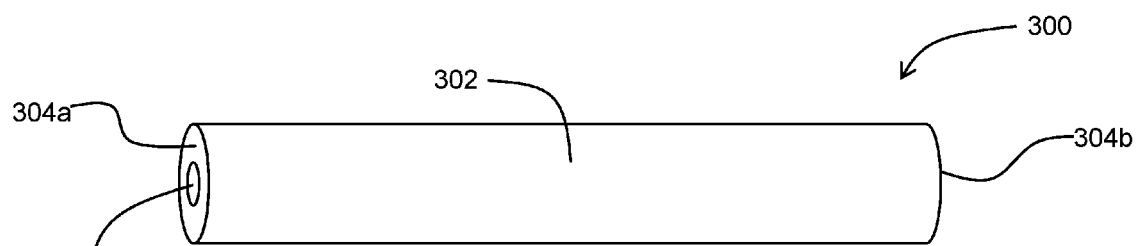


FIG 3A

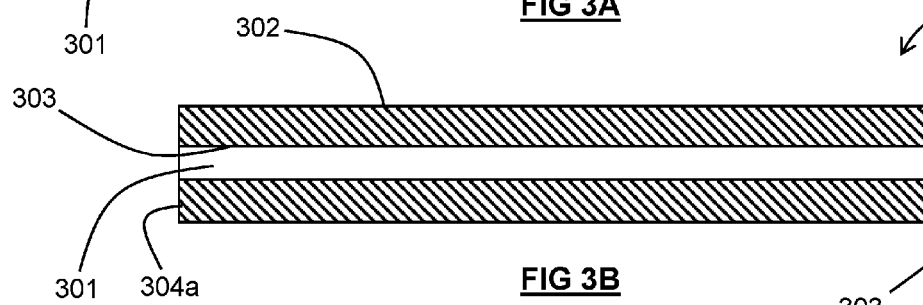


FIG 3B

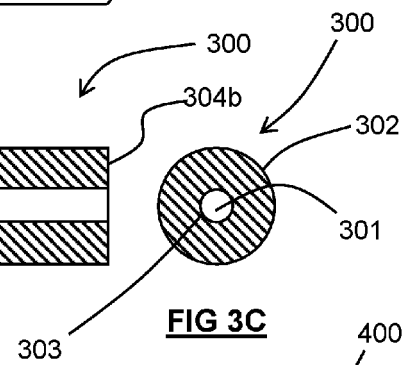


FIG 3C

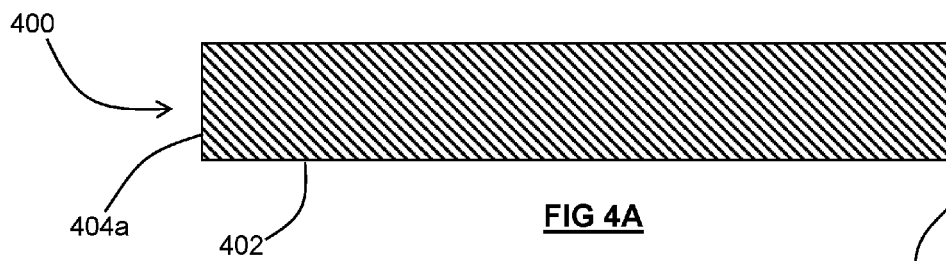


FIG 4A

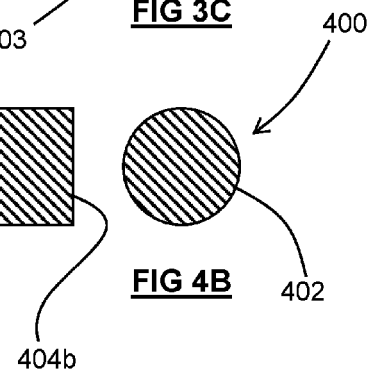


FIG 4B

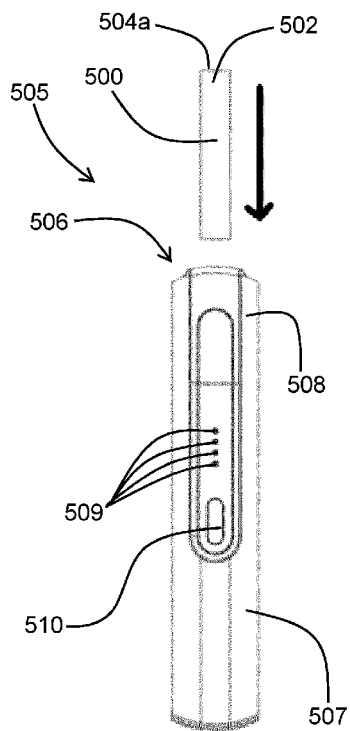


FIG 5A

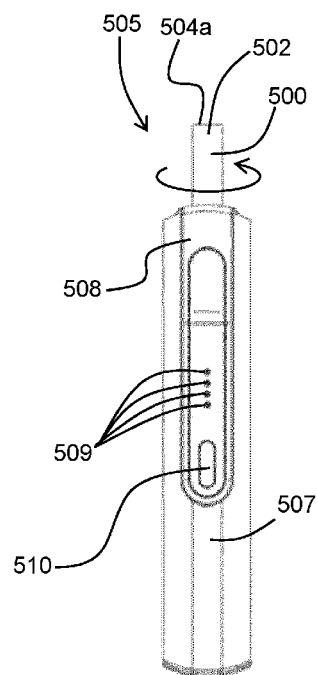


FIG 5B

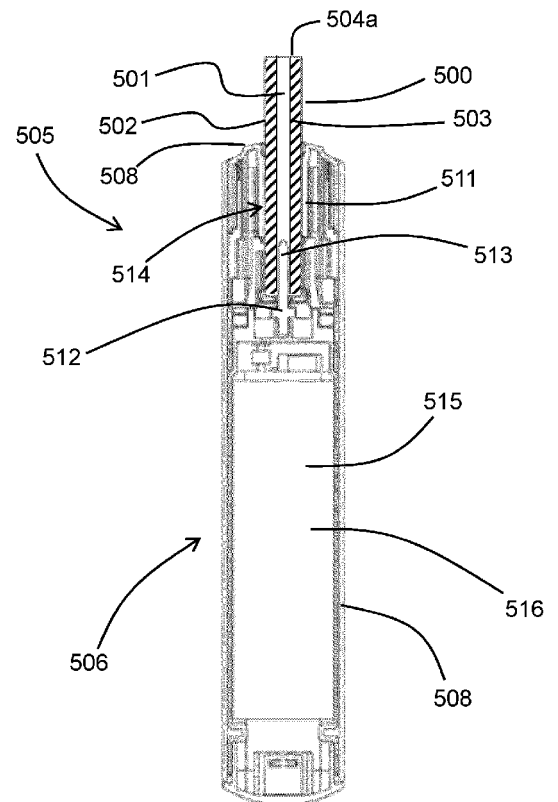


FIG 5C



EUROPEAN SEARCH REPORT

 Application Number
 EP 20 15 7496

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Y	* page 1, lines 1-4 page 2, lines 17-30 page 7, lines 7-12 page 10, line 31 - page 11, line 5 *	8	
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Y	* page 1, line 15 - line 32 *	8	
The present search report has been drawn up for all claims			
Place of search			
Date of completion of the search			
Examiner			
Munich			
4 August 2020			
Cardan, Cosmin			
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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

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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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