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(54) SMOKING SUBSTITUTE SYSTEM

(57) Disclosed is a system having a smoking substitute device comprising one or more heaters for heating a consumable engaged with the device, and a controller configured to control the one or more heaters according to first and second heating modes. The first heating mode is for heating a heat-not-burn consumable, and the second heating mode is for heating an e-cigarette consumable.

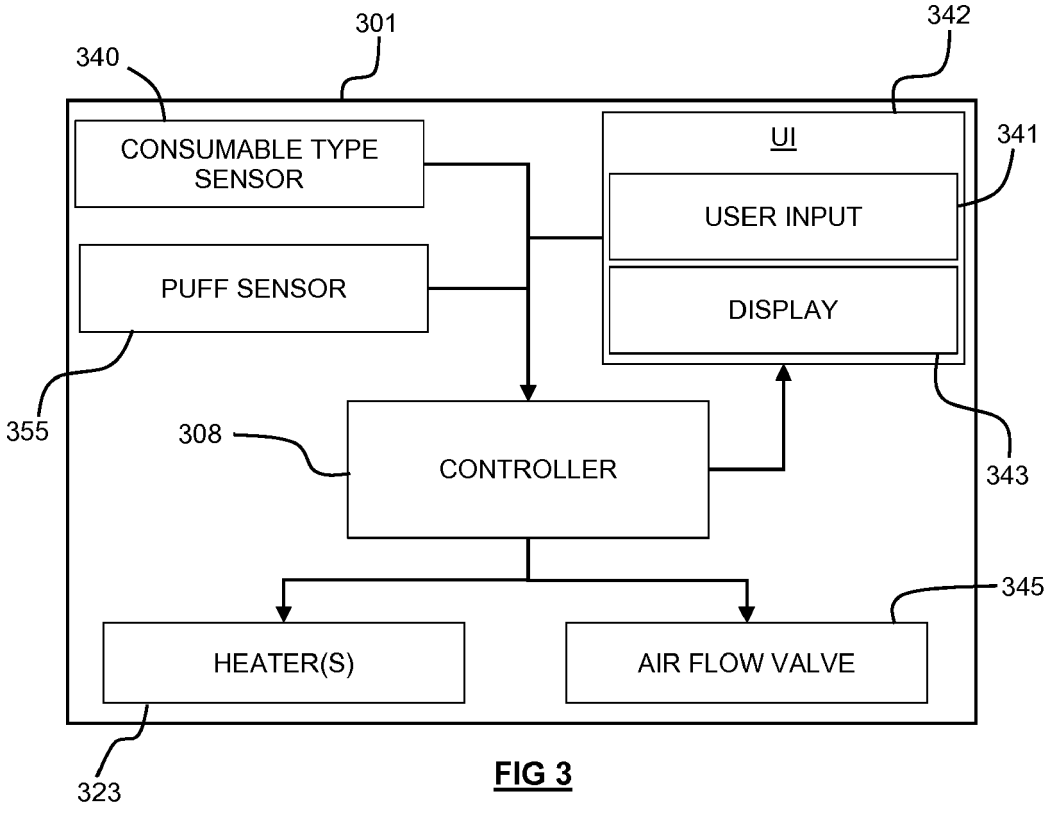

FIG 3

EP 3 711 561 A1

Description

TECHNICAL FIELD

[0001] The present invention relates to a smoking substitute system and particularly, although not exclusively, to a smoking substitute system comprising a device and an aerosol-forming article.

BACKGROUND

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

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

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

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

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

[0007] In general, smoking substitute systems are intended to provide a substitute for the rituals of smoking, whilst providing the user with a similar experience and satisfaction to those experienced with traditional smoking and with combustible tobacco products. Some smoking substitute systems use smoking substitute articles (also referred to as a "consumables") that are designed to resemble a traditional cigarette and are cylindrical in form with a mouthpiece at one end.

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

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

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

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

[0012] As the vapour passes through the consumable (entrained in the airflow) from the location of 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] Another approach is the so-called "vaping" approach, in which a vaporisable liquid, typically referred to (and referred to herein) as "e-liquid", is heated by a heating device (referred to herein as an electronic cigarette or "e-cigarette" device) to produce an aerosol vapour which is inhaled by a user. The e-liquid typically includes a base liquid as well as nicotine and/or a flavourant. The resulting vapour therefore also typically contains nicotine and/or a flavourant. The base liquid may include propylene glycol and/or vegetable glycerine.

[0015] A typical e-cigarette device includes a mouthpiece, a power source (typically a battery), a tank for containing e-liquid, as well as a heating device. In use, elec-

trical energy is supplied from the power source to the heating device, which heats the e-liquid to produce an aerosol (or "vapour") which is inhaled by a user through the mouthpiece.

[0016] E-cigarettes can be configured in a variety of ways. For example, there are "closed system" vaping smoking substitute systems, which typically have a sealed tank and heating element. The tank is pre-filled with e-liquid and is not intended to be refilled by an end user. One subset of closed system vaping smoking substitute systems include a main body which includes the power source, wherein the main body is configured to be physically and electrically coupled to a consumable including the tank and the heating element. In this way, when the tank of a consumable has been emptied, that consumable is disposed of. The main body can be reused by connecting it to a new, replacement, consumable. Another subset of closed system vaping smoking substitute systems are completely disposable, and intended for one-use only.

[0017] There are also "open system" vaping smoking substitute systems which typically have a tank that is configured to be refilled by a user. In this way the entire device can be used multiple times.

[0018] There may be a need for improved design of smoking substitute systems to enhance the user experience and provide more versatility to a user.

[0019] The present disclosure has been devised in the light of the above considerations.

SUMMARY OF THE INVENTION

[0020] At its most general, the present invention relates to a smoking substitute device that is able to operate with both e-cigarette and heat-not-burn consumables.

[0021] According to the present invention, there is provided a smoking substitute device, comprising one or more heaters for heating a consumable, and a controller configured to control the one or more heaters according to first and second heating modes, wherein the first heating mode is for heating a heat-not-burn consumable and the second heating mode is for heating an e-cigarette consumable.

[0022] By providing a smoking substitute device capable of operating under two different heating modes, the device can accommodate multiple consumable types. This means a user does not require two different devices to support heat-not-burn and e-cigarette consumables (i.e. the device provides cross-vaping experience). As is discussed above, a heat-not-burn consumable generally comprises tobacco leaf or reconstituted tobacco in solid form, whilst an e-cigarette consumable comprises an e-liquid (i.e. a liquid) formed of a base liquid and nicotine and/or a flavourant. In this respect, a heat-not-burn consumable generally comprises a solid aerosol-forming substrate, whilst an e-cigarette consumable generally comprises an aerosol-forming liquid contained in e.g. a tank.

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

[0024] The first heating mode and the second heating mode may be operated by a single heater. That is, the controller may control the single heater differently depending on whether the heating mode is the first or second heating mode. This may simplify maintenance of the device and may minimise the cost of producing the device.

[0025] The heater may comprise first and second heating tracks for heating the consumable. The first and second tracks may be configured to heat to different temperatures (e.g. when the same voltage is applied to both tracks). The first and second tracks may be configured to heat at different rates (e.g. when the same voltage is applied to both tracks). The first and second tracks may be located at different regions of the heating element. The first and second tracks may be different shapes and/or sizes. The first and second tracks may be formed of different materials. The first and second tracks may be configured so as to have different impedance. Both tracks may be electrically connected to the same power source. Both tracks may be electrically connected to one another.

[0026] The first heating track may be configured for direct contact with an aerosol-forming substrate of the consumable. The second heating track may be configured for contact with a heating element of the consumable such that the second heating track may be configured to heat the aerosol-forming substrate of the consumable indirectly.

[0027] In the first heating mode, the first track may be active and the second track may be inactive. In the second heating mode, the first track may be inactive and the second track may be active. In other words, in each of the two heating modes only one of the tracks may be active. Thus, each track may be configured for operating in one of the two heating modes. For example, the first track may be configured for heating a heat-not-burn consumable and the second track may be configured for heating an e-cigarette consumable (or vice versa).

[0028] In one of the first and second heating modes, the first and second tracks may be active, and in the other of the first and second heating modes, the first track may be active and the second track may be inactive. In other words, in one heating mode, a single track may be active and in the other heating mode both tracks may be active. This may be suitable where one of the two heating modes requires more heating than the other, or where one of the two heating modes requires more rapid heating than the other. For example, in the second heating mode both heating tracks may be active and in the first heating mode only one heating track may be active (or vice versa).

[0029] The device may comprise first and second heaters. In this case, in one of the first and second heating modes, the first and second heaters may be active, and in the other of the first and second heating modes, the first heater may be active and the second heater may be

inactive. In other words, in one heating mode only one of the heaters may be active and in the other heating mode, both heaters may be active. As above, this may be suitable where one of the two heating modes requires more heating than the other, or where one of the two heating modes requires more rapid heating than the other. For example, in the second heating mode both heaters may be active and in the first heating mode only one heater may be active (or vice versa).

[0030] The device may comprise a first heater configured to operate according to the first heating mode and a second heater configured to operated according to the second heating mode. In this embodiment the heaters may only operate separately (and not concurrently). The first and second heaters may be configured to heat to different temperatures (e.g. when the same voltage is applied to both heaters). The first and second heaters may be configured to heat at different rates (e.g. when the same voltage is applied to both heaters). The first and second heaters may be different shapes and/or sizes and/or may have different arrangements of heater tracks. The first and second heaters may be formed of different materials. One of the first and second heaters may be an internal heater (e.g. for insertion into the consumable) and the other of the first and second heaters may be an external heater (e.g. contact with, but not insertion into, the consumable).

[0031] The first heater may be configured for direct contact with an aerosol-forming substrate of the consumable. The second heater may be configured for contact with a heating element of the consumable such that the second heater may heat the aerosol-forming substrate of the consumable indirectly.

[0032] The device may comprise a consumable detection sensor for detecting the type of consumable engaged with the device. The controller may be configured to control the one or more heaters in response to the detected consumable type. For example, the consumable detection sensor may be a switch or button that is activated by one consumable type but not the other. Alternatively, the sensor may be an RFID reader or a barcode reader. In this respect, consumables may be provided with barcodes or RFID tags for reading by the device. The sensor may detect the shape, size, and/or colour (e.g. by light sensor) of the consumable. The controller may switch between the first and second heating modes depending on the type of the detected consumable.

[0033] The device may comprise a user input module configured to receive a selection of consumable type from a user. The user input module may form part of a user interface (UI) of the device. The controller may be configured to control the one or more heaters in response to the selected consumable type. The input module may comprise, for example, a switch, a button, a touchscreen, etc. When the input module comprises a touchscreen, the user may be presented with two consumable type selections and may be able to select a consumable type by touching the screen at the appropriate location. The controller may switch between the first and second modes depending on the consumable type selected by the user.

[0034] The user input module may allow the user to control further aspects of the operation of the device. For example, the user input module may comprise a power button to switch the device between an on state and an off state. In some embodiments the UI may additionally or alternatively comprise output means to convey information to the user (i.e. which may include the touchscreen). The output means may be configured to indicate the current mode of the device (i.e. whether the heaters are operating according to the first or second mode). 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 at least one heater (i.e. the mode of the at least one heater). The condition may also comprise whether the heater is in an off state or an on state. 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.

[0035] The device may comprise a valve for controlling airflow through the consumable. For example, the device may comprise an inlet for supplying air to the consumable (i.e. when inhaled by a user). The valve may be located in a passageway connecting the inlet to the consumable. The valve may be configured to alter the airflow through the passageway (e.g. by changing the size of a portion of the passageway). The valve may comprise an actuator for altering the position of the valve. The actuator may be controllable by the controller. The controller may cause the actuator to move the valve between a first position and a second position depending on whether the one or more heaters are operating according to the first or second heating mode. For example, greater airflow may be provided through the consumable when the device is in the second mode (i.e. when heating an e-cigarette consumable). That is, the controller may be configured to move the valve to a first position in the first mode and a second position in the second mode and the valve may allow a greater airflow in the second position.

[0036] The device may further comprise a puff sensor (e.g. airflow sensor). The puff sensor may be configured to detect user inhalation through the consumable. 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). The second heating mode may comprise controlling the at least one heater in response to the detection of user inhalation. For example, when in the second heating mode,

the controller may only activate the at least one heater or particular heating tracks when an inhalation is detected (or for a period of time when inhalation is detected).

[0037] In some embodiments, rather than altering the airflow through the device via a valve, the e-cigarette and heat not burn consumables may be configured to permit different airflows therethrough. For example, the consumables may comprise different opening sizes, or other means for providing different airflows. In this case, the puff sensor may instead provide means for detecting which type of consumable is engaged with the device. The puff sensor may detect a characteristic of the airflow that may be different between the different types of consumable. This information may be provided to the controller and in response the controller may switch between the first and second modes.

[0038] The first heating mode may comprise activating the at least one heater for a predetermined period of time. The first heating mode may comprise activating the heater for a predetermined maximum period of time. That is, the controller may be configured to deactivate the heater prior to the predetermined period of time completing if e.g. a user turns the device off.

[0039] The device may comprise a body supporting the heater, and cap that is removably engagable with the body. The cap may be configured for receipt of a consumable such that, when engaged with the body, the heater is able to heat the consumable (e.g. by insertion into, or contact with, the consumable). The cap may be interchangeable with a further (separate) cap. One of the caps may be configured for receipt of a heat-not-burn consumable and the other may be configured for receipt of an e-cigarette consumable.

[0040] The body of the device may be elongate. An end of the elongate body may be configured for engagement with the 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).

[0041] The at least one heater may comprise a heating element, which may be in the form of a rod that extends from the body of the device. Only one heating element is described below for brevity, but as is provided above, the device may comprise multiple heating elements and that some or all of these heating elements may be as described below.

[0042] The at least one 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.

[0043] 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.

[0044] 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. As is discussed above, the heating element may comprise one or more heating tracks, which may extend longitudinally along the heating element. The heating track(s) may be sandwiched between the outer layer and the core of the heating element. The heating track(s) may comprise tungsten and/or rhenium. The heating track(s) may have a thickness of around 20 μm.

[0045] 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 at least one 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.

[0046] Where the at least one heater is configured for insertion into the consumable, the distal end (i.e. distal from a base of the heating element where it is mounted to the device) of the heating element of the at least one heater may comprise a tapered portion, which may facilitate insertion of the heating element into the consumable. The heating element may fully penetrate a consumable when the consumable is received in the cavity. That is, the entire length, or substantially the entire length, of the heating element may be received in the consumable.

[0047] The heating element may have a length that is less than, or substantially the same as, an axial length of an aerosol-forming substrate or aerosol-forming liquid (i.e. or tank) part of the consumable. Thus, when such a consumable is engaged with the device, the heating element of the at least one heater may only penetrate into the aerosol-forming substrate or tank, rather than other components of the consumable. The heating element may penetrate the aerosol-forming substrate or tank for substantially the entire axial length of the aerosol form-

ing-substrate or tank of the consumable. Thus, heat may be transferred from (e.g. an outer circumferential surface of) the heating element to the surrounding aerosol-forming substrate or aerosol-forming liquid, 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).

[0048] Where the at least one heater is e.g. an external tube heater, the heating element of the tube heater may surround at least a portion of the cavity. When the portion of the consumable is received in the cavity, the heating element may surround a portion of the consumable (i.e. so as to heat that portion of the consumable). In particular, the heating element may surround an aerosol forming substrate or aerosol-forming liquid (tank) of the consumable. That is, when a consumable is engaged with the device, the aerosol forming substrate or aerosol-forming liquid tank of the consumable 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 or aerosol-forming liquid of the consumable.

[0049] 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 consumable. 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 consumable. Thus, heat may be conducted from the heating element, through the cavity wall (or walls), to the aerosol-forming substrate or aerosol-forming liquid of a consumable received in the cavity.

[0050] In some embodiments the heater may be configured to provide heat to a heating element of the consumable (rather than heating an aerosol-forming substrate or aerosol-forming liquid of the consumable directly). In such cases the at least one heater may comprise a heat transfer plate for contact with a corresponding heat transfer plate of the consumable. This transfer of heat may, for example, be suited to e-cigarette systems in which the consumable comprises a tank containing an aerosol-forming liquid (e.g. an e-liquid).

[0051] The cap may be disposed at the end of the body that is configured for engagement with an aerosol-forming article. The cap may at least partially enclose the at least one heater when engaged with the body. The cap may be moveable between an open position in which access is provided to the heater, and a closed position in which the cap at least partially encloses the at least one heater. The cap may be slideably engaged with the body of the device, and may be slideable between the open and closed positions.

[0052] 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 at least one heater in 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 the consumable. That is, the consumable may be inserted through the opening and into the cavity (so as to be engaged with the device). The opening and cavity may be configured for receipt of both e-cigarette consumables and heat-not-burn consumables.

[0053] The cap may be configured such that when a consumable is engaged with the device (e.g. received in the cavity), only a portion of the consumable is received in the cavity. That is, a portion of the consumable (not received in the cavity) may protrude from (i.e. extend beyond) the opening. This (protruding) portion of the consumable may be a terminal (e.g. mouth) end of the consumable, which may be received in a user's mouth for the purpose of inhaling aerosol formed by the device.

[0054] 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 at least one heater. In that respect, altering (e.g. toggling) the electrical connection of the power source to the at least one heater may affect a state of the at least one heater. For example, toggling the electrical connection of the power source to the at least one heater may toggle the at least one 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).

[0055] 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.

[0056] 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.

[0057] 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.

[0058] The controller may be configured to control the

voltage applied by the 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 (i.e. that may differ depending on the heating mode).

[0059] 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.

[0060] As is discussed above, 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, in addition to controlling the mode of the at least one heater, the controller may be configured to receive "on" and "off command signals from the UI and, in response, may control the at least one heater so as to be in a corresponding on or off state.

[0061] The controller may be configured to send output signals to a component of the UI. The UI may be configured to convey information to a user, via an output means, in response to such output signals (received from the controller). For example, where the device comprises one or more LEDs, the LEDs may be operatively connected to the controller. Hence, the controller may configured to control the illumination of the LEDs (e.g. in response to an output signal). For example, the controller may be configured to control the illumination of the LEDs according to (e.g. an on or off) state of the at least one heater and the mode of the at least one heater.

[0062] 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.

[0063] 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.

[0064] 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.

[0065] 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).

[0066] In a second aspect there is provided a smoking substitute kit comprising: a device as described above with respect to the first aspect, a first cap that is removably engagable with the device, the first cap configured for receipt of a heat-not-burn consumable such that, when engaged with the device, the heater is able to heat the heat-not-burn consumable; and a second cap that is removably engagable with the device, the cap component configured for receipt of an e-cigarette consumable such that, when engaged with the device, the heater is able to heat the e-cigarette consumable.

[0067] In a third aspect, there is provided a system (e.g. a smoking substitute system) comprising a device according to the first aspect and a smoking substitute consumable. The system may comprise a further consumable. The system may comprise a heat-not-burn consumable and an e-cigarette consumable.

[0068] 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. The heat not burn consumable may comprise an aerosol-forming substrate.

[0069] 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.

[0070] In order to generate an aerosol, the aerosol-forming substrate comprises at least one volatile compound that is intended to be vaporised/aerosolised and that may provide the user with a recreational and/or medicinal effect when inhaled. Suitable chemical and/or physiologically active volatile compounds include the group consisting of: nicotine, cocaine, caffeine, opiates and opoids, cathine and cathinone, kavalactones, mysticin, beta-carboline alkaloids, salvinorin A together with any combinations, functional equivalents to, and/or synthetic alternatives of the foregoing.

[0071] The aerosol-forming substrate may comprise plant material. The plant material may comprise least one plant material selected from the list including *Amaranthus dubius, Arctostaphylos uva-ursi* (Bearberry), *Argemone mexicana, Amica, Artemisia vulgaris,* Yellow Tees, *Galea zacatechichi, Canavalia maritima* (Baybean), *Cecropia mexicana* (Guamura), *Cestrum noctumum, Cynoglossum virginianum* (wild comfrey), *Cytisus scoparius, Damiana, Entada rheedii, Eschscholzia califomica* (California Poppy), *Fittonia albivenis, Hippobroma longiflora, Humulus japonica* (Japanese Hops), *Humulus lu-*

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

[0072] 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.

[0073] 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).

[0074] The aerosol-forming substrate of the heat-not-burn consumable may comprise a gathered sheet of homogenised (e.g. paper/slurry recon) tobacco or gathered shreds/strips formed from such a sheet.

[0075] The aerosol-forming substrate of the heat-not-burn consumable may comprise one or more additives selected from humectants, flavourants, fillers, aqueous/non-aqueous solvents and binders.

[0076] 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.

[0077] The aerosol-forming substrate of the heat-not-burn consumable 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.

[0078] The heat-not-burn consumable may comprise at least one filter element. There may be a terminal filter element at the downstream/mouth end of the article/consumable.

[0079] The or at least one of the filter element(s) (e.g. the terminal filter element) may be comprised of cellulose acetate or polypropylene tow. The at least one filter element (e.g. the terminal filter element) may be comprised of activated charcoal. The at least one filter element (e.g. the terminal element) may be comprised of paper. The or each filter element may be at least partly (e.g. entirely) circumscribed with a plug wrap e.g. a paper plug wrap.

[0080] 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.

[0081] In some embodiments, the heat-not-burn 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.

[0082] The heat-not-burn 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.

[0083] The e-cigarette consumable may be configured to be received and retained in the cavity of the device (i.e. so as to be engaged with the device). The e-cigarette consumable may be retained by way of e.g. an interference fit, screwing one onto (or onto) the other, a bayonet fitting, or by way of a snap engagement mechanism.

[0084] The e-cigarette consumable may comprise a tank, which may define a reservoir for the storage of an aerosol former. The aerosol former may be in the form of an e-liquid (stored in the reservoir).

[0085] The e-cigarette consumable may be a "single-use" consumable. That is, upon exhausting the e-liquid in the tank, the intention may be that the user disposes of the entire consumable. Alternatively, the e-liquid may be the only part of the system that is truly "single-use". For example, the tank may be refillable with e-liquid or another component of the system (internal to the device or external to the device e.g. a refillable cartomizer) may define a reservoir for the e-liquid.

[0086] As set forth above, the e-cigarette consumable may comprise a heating element configured to receive heat from the heater of the device to heat and vaporise the e-liquid. The e-cigarette consumable may comprise a porous wick that conveys e-liquid from the tank to the heating element. The heating element of the e-cigarette consumable may be a heating filament that is wound (e.g. helically) around at least a portion of the porous wick, such that when the heating element is heated by the heater of the device, heat may be transferred from the heating element to the e-liquid conveyed by the wick. This trans-

fer of heat may vaporise the e-liquid and the resultant vapour may be entrained in an airflow passing through the consumable.

[0087] As is discussed above, the e-cigarette consumable may further comprise one or more heater connectors for thermally connecting the heater of the device to the heating element of the consumable. The heater connectors may be in the form of thermally conductive element or contacts (e.g. metal plates) and may be disposed on an in-use device-facing surface of the e-cigarette consumable.

[0088] The invention includes the combination of the aspects and preferred features described except where such a combination is clearly impermissible or expressly avoided.

[0089] 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

[0090] So that the invention may be understood, and so that further aspects and features thereof may be appreciated, embodiments illustrating the principles of the invention will now be discussed in further detail with reference to the accompanying figures, in which:

Figure 1 is a schematic of a smoking substitute system;

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

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

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

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

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

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

Figure 3 is a schematic providing a general overview of a smoking substitute device;

Figure 4A is a front view of a second embodiment of a smoking substitute system with the consumable engaged with the device; and

Figure 4B is a front view of a second embodiment of the smoking substitute system with the consumable disengaged from the device.

DETAILED DESCRIPTION OF THE INVENTION

[0091] 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.

[0092] Figure 1 is a schematic providing a general overview of a smoking substitute system 100. The system 100 includes a substitute smoking device 101 and an aerosol-forming article in the form of a consumable 102, which comprises an aerosol former 103. The system is configured to vaporise the aerosol former by heating the aerosol former 103 (so as to form a vapour/aerosol for inhalation by a user).

[0093] The heater 104 forms part of the device 101 and is configured to heat the aerosol former 103 of the consumable 102. The heater 104 is electrically connected to a power source 105. 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.

[0094] The power source 105 may form part of the device 101 or may be external to (but connectable to) the device 101. The power source 105 is electrically connected to the heater 104 such that it is able to supply power to the heater 104 (i.e. for the purpose of heating the aerosol former 103). Thus, control of the electrical connection of the power source 105 to the heater 104 provides control of the state of the heater 104. The power source 105 may be a power store, for example a battery or rechargeable battery (e.g. a lithium ion battery).

[0095] 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).

[0096] 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.

[0097] 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.

[0098] 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.

[0099] 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.

[0100] 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.

[0101] 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 108 also comprises a memory, which is a non-volatile memory. The memory includes instructions, which, when implemented, cause the controller to perform certain tasks or steps of a method.

[0102] Figures 2A and 2B illustrate a smoking substitute system 200. The system 200 is an example of the system 100 described in relation to Figure 1. The illustrated system 200 includes a device 201 and a consumable 202. As will be described further below, the device 201 is compatible with both heat-not-burn consumables and e-cigarette consumables. In this case, the heat-not-burn consumables and e-cigarette consumables that are of similar shape may be used with the device 201. The description of Figure 1 above is applicable to the system 200 of Figures 2A and 2B, and will thus not be repeated.

[0103] 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.

[0104] 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. The cap 210 is configured for receipt of both heat-not-burn consumable and e-cigarette consumables. In other embodiments of the system, different caps may be fitted to the device depending on whether the device is to be used with a heat-not-burn consumable or an e-cigarette consumable.

[0105] 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.

[0106] Figure 2C shows a detailed section view of an exemplary heat-not-burn consumable of 202 of the system 200. The heat-not-burn 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.

[0107] 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.

[0108] 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.

[0109] 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.

[0110] 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.

[0111] 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.

[0112] 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.

[0113] 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.

[0114] Figure 2D illustrates an exemplary e-cigarette consumable 202' for use with the device 201. As is apparent from the figure, the e-cigarette consumable 202' comprises a similar external form to the heat-not-burn consumable 202 described above. The e-cigarette consumable 202' comprises an aerosol-former in the form of a tank 213' filled with e-liquid. This tank 213' comprises a passage 230 extending longitudinally therethrough. This passage 230 is in fluid connection with inlets 231 and an outlet 232 of the consumable 202' such that air inhaled by a user at the outlet 232 is drawn through the passage 230 from the inlets 231 (as illustrated by arrow).

[0115] The consumable 202' further comprises a recess 233 for receipt of a heating element 223 of the device 201 (discussed further below). The recess 233 is lined with a heat transfer element 234 in the form of a metallic tube. The heat transfer element 234 is connected to a heating filament (not shown) that is wound about a porous wick 235, and comprises apertures therethrough (not shown) that allow air to pass from the inlets 231 to the passage 230. The porous wick 235 extends transversely across the passage 230 such that the ends of the porous wick 235 are submerged in e-liquid stored in the tank 213' and a central portion of the wick 235 is exposed to air flowing through the passage 230. Thus, in operation, heat is transferred from the heating element 223 of the device to the porous wick 235 (via the heat transfer element 234). This causes e-liquid held in the porous wick 235 to vaporise, so as to be entrained in the air flowing through the passage 230. This vapour entrained in the air may subsequently cool so as to form an aerosol that is inhaled by the user.

[0116] Returning now to the device 201, Figure 2E illustrates a detailed view of the end of the device 201 that is configured to engage with the consumable 202 (either in the form of an e-cigarette consumable 202' or in the form of a heat-not-burn 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.

[0117] Figure 2F shows a cross section through a central longitudinal plane through the device 201. The device 201 is shown with a consumable 202 engaged therewith (in this case, a heat-not-burn consumable 202).

[0118] 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).

[0119] 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.

[0120] 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.

[0121] 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.

[0122] 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.

[0123] The device 201 includes a controller 208 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).

[0124] As will be described further below, 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 (e.g. in first and second heating modes). 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).

[0125] 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).

[0126] 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).

[0127] Figure 3 is a schematic depicting how the various components of a device 301 (i.e. such as the device 201 described above) may be operatively connected. The device 301 comprises a controller 308 that is able to control one or more heaters 323 of the device 301. In particular, the controller 308 is configured to control the heaters 323 according to one of two heating modes. A first of the heating modes is for heating a heat-not-burn consumable and a second of the heating modes is for heating an e-cigarette consumable. Thus, the device 301 is capable of operating with both types of consumable.

[0128] The controller 308 is configured to switch between these two modes both automatically and manually. To switch automatically, the controller 308 is connected to a consumable type sensor 340. This sensor 340 is able to detect the type of consumable (i.e. e-cigarette or heat-not-burn) that is engaged with the device 301. The sensor 340 may take a number of forms including, for example, a barcode scanner, RFID sensor, light detector, colour detector, mechanical switch/button. The sensor 340 provides a signal to the controller 308 that is indicative of the consumable type. The controller switches between the two heating modes based on this signal.

[0129] Manual switching may be provided by a user input 341 forming part of a UI 342 of the device 301. The user input 341 may be in the form of a button, switch or e.g. a touch screen. In this case, a user can select between the two heating modes, and a signal that is indicative of the selection is provided from the user input 341 to the controller. This may be used to override the automatic selection made by the controller, or may be used in the absence of an automatic selection.

[0130] The controller 308 is operatively connected to a display 343 of the device 301 and can therefore control the display 343 to indicate (to a user) the current heating mode. When in the first heating mode the controller 308 is configured to, on receipt of a "start" signal, activate the one or more heaters 323 for a predetermined period of time (e.g. 4 minutes). This "start" signal is received from the user input 341. At any point during the predetermined time period, if a "stop" signal is received from the user input 341, the controller 308 will deactivate the one or more heaters 323.

[0131] In the second heating mode, the controller 308 is configured to activate the one or more heaters 323 in response to a signal received from a puff sensor 355 of the device 301. The puff sensor 355 may, for example, be in the form of a pressure sensor or an acoustic sensor, and is configured to detect inhalation by a user (i.e.

through a mouthpiece of the device or consumable). In this second mode, the one or more heaters 323 are only activated whilst an inhalation is detected.

[0132] The controller 308 is further operatively connected to an air flow valve 345. This valve 345 controls airflow to a consumable engaged with the device 301. The controller 308 is configured to move this valve 345 to different positions (i.e. resulting in different air flows) in the first and second heating modes. In particular, the controller 308 is configured to control the valve 345 to allow a larger airflow in the second heating mode.

[0133] As should be appreciated, the control of the one or more heaters 323 is dependent on the nature of the one or more heaters 323. For example, where there are multiple heaters 323, different combinations of heaters 323 may be activated in the first and second heating modes. Further, the or each heater 323 may have a plurality of heating tracks and different combinations of heating tracks may be activated in the first and second heating modes.

[0134] Figures 4A and 4B illustrate a further smoking substitute system 400. The system 300 is an example of the system 100 of Figures 1 and comprises a device 401 that is compatible with e-cigarette and heat-not-burn consumables. In the present case, only the e-cigarette consumable 402 is illustrated and described. The description of Figure 1 above is applicable to the system of Figures 4A and 4B, and will not be repeated.

[0135] The device 401 and the consumable 402 are configured such that the consumable 402 can be engaged with the device 401. Figure 4A shows the device 401 and the consumable 402 in an engaged state, whilst Figure 4B shows the device 401 and the consumable 402 in a disengaged state. During engagement a portion of the consumable 402 is received in a cavity 422 of the device 401. The consumable 402 is retained in the device 401 via an interference fit (although in other embodiments, the device and consumable could be engaged by screwing one onto (or onto) the other, through a bayonet fitting, or by way of a snap engagement mechanism).

[0136] The e-cigarette consumable 402 includes a tank 427. The tank 427 defines a reservoir for the storage of an aerosol-former, which in this embodiment, is in the form of e-liquid.

[0137] In this present embodiment, the consumable 402 is a "single-use" consumable. That is, upon exhausting the e-liquid in the tank 427, the intention is that the user disposes of the whole consumable 402. In other embodiments, the e-liquid (i.e. aerosol former) may be the only part of the system that is truly "single-use". In such embodiments, the tank may be refillable with e-liquid or the e-liquid may be stored in a non-consumable component of the system. For example, the e-liquid may be stored in a tank located in the device or stored in another component that is itself not single-use (e.g. a refillable cartomizer).

[0138] In the illustrated system 400, a heat transfer element is located in the consumable 402 and is configured to heat and vaporise the e-liquid (stored in the tank 427). Although not shown, the heat transfer element provides heat to a porous wick via a resistive heating element. The porous wick conveys e-liquid from the tank 427 to the heating element. The heating element is a heating filament that is helically wound around a portion of the porous wick, such that when the heating element is heated, heat is transferred from the heating element to the e-liquid conveyed by the wick. This transfer of heat vaporises the e-liquid and the resultant vapour is entrained in an airflow passing through the consumable 402 (i.e. driven by a user drawing on a downstream end 418 of the consumable 402). Between the vaporisation point at the coil and the downstream end 418 (i.e. the mouth end), the vapour condenses into an aerosol, and is subsequently inhaled by the user.

[0139] Like the previously described embodiment, the device 401 comprises a power source in the form of a rechargeable battery (not shown) and a connector in the form of a USB port (not shown). The device 401 further comprises controller (also not shown). The rechargeable battery, connector and controller are similar (and operate in a similar manner) to the corresponding components of the embodiment described above with respect to figures 2A to 2F and Figure 3.

[0140] The consumable 402 includes a pair of heater transfer contacts 428 disposed on a device-facing end surface of the consumable 402. The heater transfer contacts 428 form part of the heat transfer element, such that heat received from a heater of the device 401 (when the consumable is engaged with the device) is transferred to the heat transfer element via the heat transfer contacts 428.

[0141] The device 401 includes an output means (forming part of the UI of the system 400) in the form of a single light-emitting diode ("LED") 411. The LED 411 is operatively connected to the controller, such that controller can control the illumination of the LED 411. The controller is configured to illuminate the LED when then the heater 404 is active.

[0142] The device 401 also includes an input means in the form of a puff sensor (not shown). The puff sensor is the same as that described above with respect to the embodiment shown in figures 2A to 2F and Figure 3.

[0143] 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.

[0144] 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 illus-

trative and not limiting. Various changes to the described embodiments may be made without departing from the spirit and scope of the invention.

[0145] 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.

[0146] Any section headings used herein are for organizational purposes only and are not to be construed as limiting the subject matter described.

[0147] 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.

[0148] 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%.

[0149] 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 smoking substitute device comprising:

one or more heaters for heating a consumable engaged with the device; and
a controller configured to control the one or more heaters according to first and second heating modes, wherein the first heating mode is for heating a heat-not-burn consumable, and the second heating mode is for heating an e-cigarette consumable.

2. A smoking substitute device according to claim 1, wherein the first heating mode and the second heating mode are operated by a single heater.

3. A smoking substitute device according to claim 1 or 2, wherein the heater comprises first and second heating tracks for heating the consumable.

4. A smoking substitute device according to claim 3, wherein:

in the first heating mode, the first track is active and the second track is inactive; and
in the second heating mode, the first track is inactive and the second track is active.

5. A smoking substitute device according to claim 3 wherein:

in one of the first and second heating modes, the first and second tracks are active; and
in the other of the first and second heating modes, the first track is active and the second track is inactive.

6. A smoking substitute device according to claim 1 comprising first and second heaters and wherein:

in one of the first and second heating modes, the first and second heaters are active; and
in the other of the first and second heating modes, the first heater is active and the second heater is inactive.

7. A smoking substitute device according to claim 1 comprising a first heater configured to operate according to the first heating mode and a second heater configured to operated according to the second heating mode.

8. A smoking substitute device according to claim 7, wherein one of the first and second heaters is an internal heater and the other of the first and second heaters is an external heater.

9. A smoking substitute device according to any of the preceding claims, comprising a consumable detection sensor for detecting the type of consumable engaged with the device, and wherein the controller is configured to control the one or more heaters in response to the detected consumable type.

10. A smoking substitute device according to any of the preceding claims, wherein the device comprises a user input module configured to receive a selection of consumable type from a user, the controller configured to control the one or more heaters in response to the selected consumable type.

11. A smoking substitute device according to any of the preceding claims comprising a valve for controlling airflow through the consumable depending on whether the one or more heaters are operating according to the first or second heating mode.

12. A smoking substitute device according to any of the preceding claims, wherein the device comprises a puff sensor for detecting user inhalation through the consumable, and wherein the second heating mode comprises controlling the at least one heater in response to the detection of user inhalation.

13. A smoking substitute device according to any one of the preceding claims wherein the first heating mode comprises activating the at least one heater for a predetermined period of time.

14. A smoking substitute device according to any of the preceding claims, comprising a body supporting the heater, and a cap that is removably engagable with the body, the cap configured for receipt of a consumable such that, when engaged with the body, the heater is able to heat the consumable.

15. A smoking substitute kit comprising:

a device according to any one of claims 1 to 13; and

a first cap that is removably engagable with the device, the first cap configured for receipt of a heat-not-burn consumable such that, when engaged with the device, the heater is able to heat the heat-not-burn consumable; and

a second cap that is removably engagable with the device, the cap component configured for receipt of an e-cigarette consumable such that, when engaged with the device, the heater is able to heat the e-cigarette consumable.

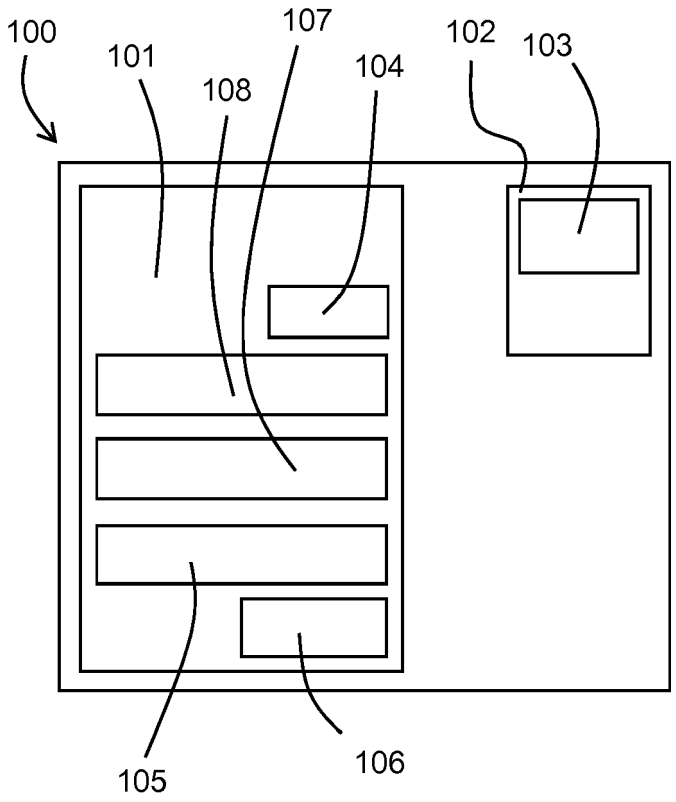

FIG1

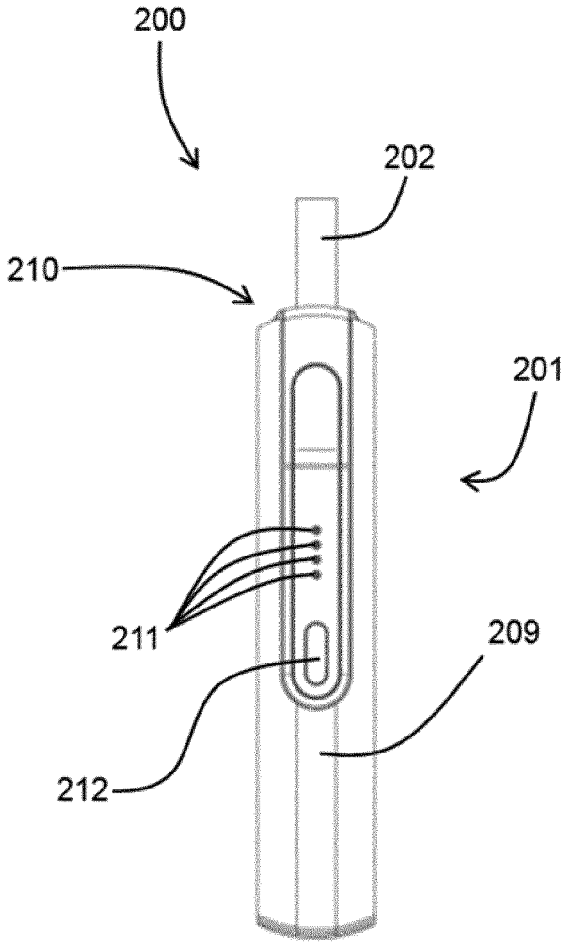

FIG 2A

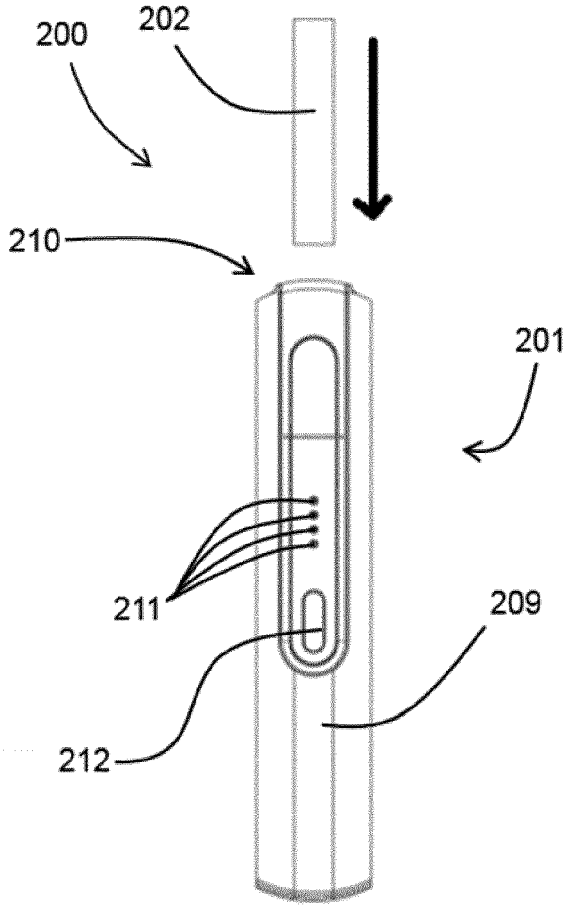

FIG 2B

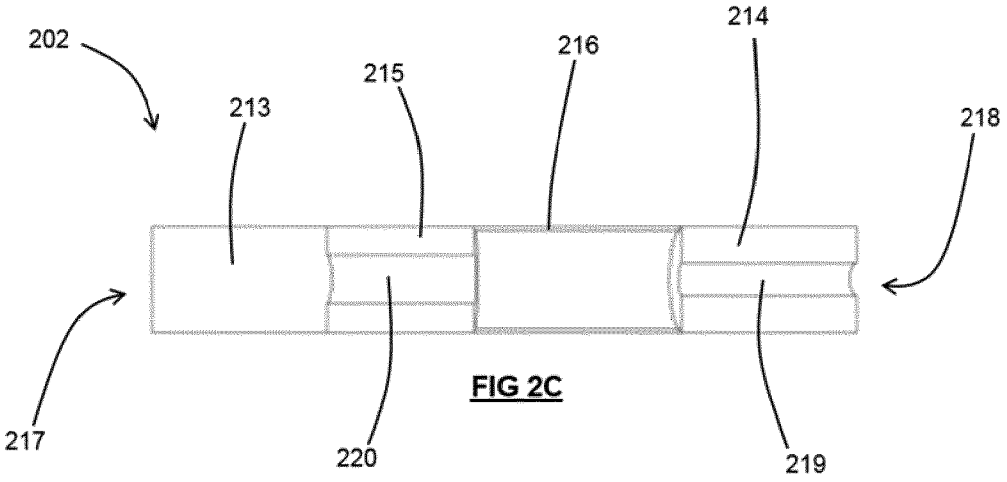

FIG 2C

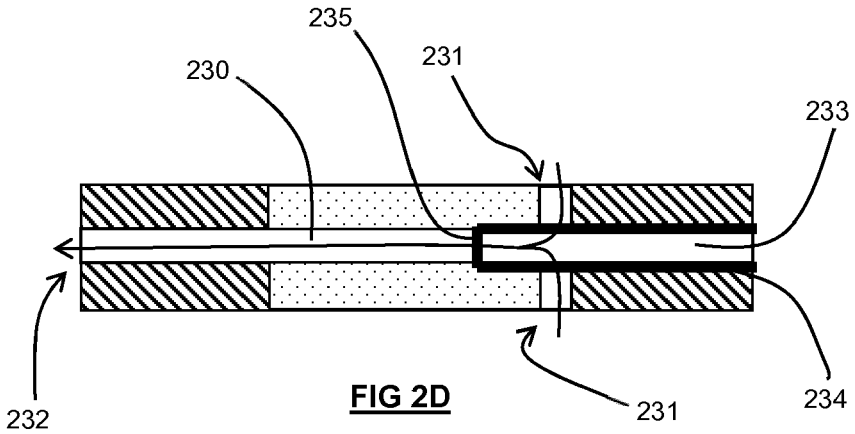

FIG 2D

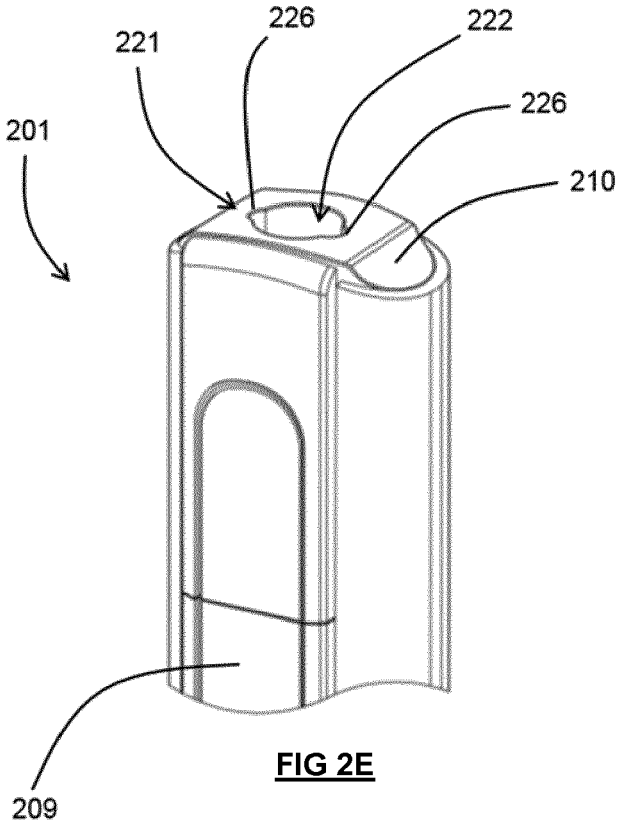

FIG 2E

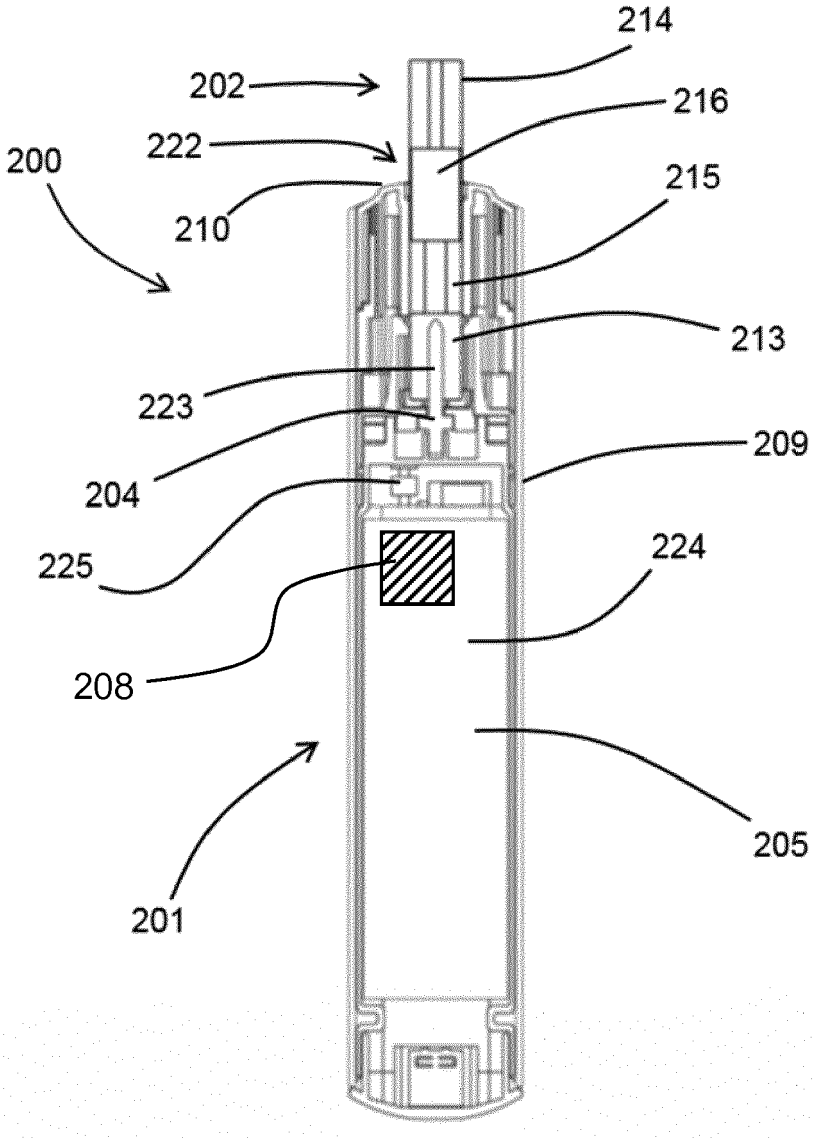

FIG 2F

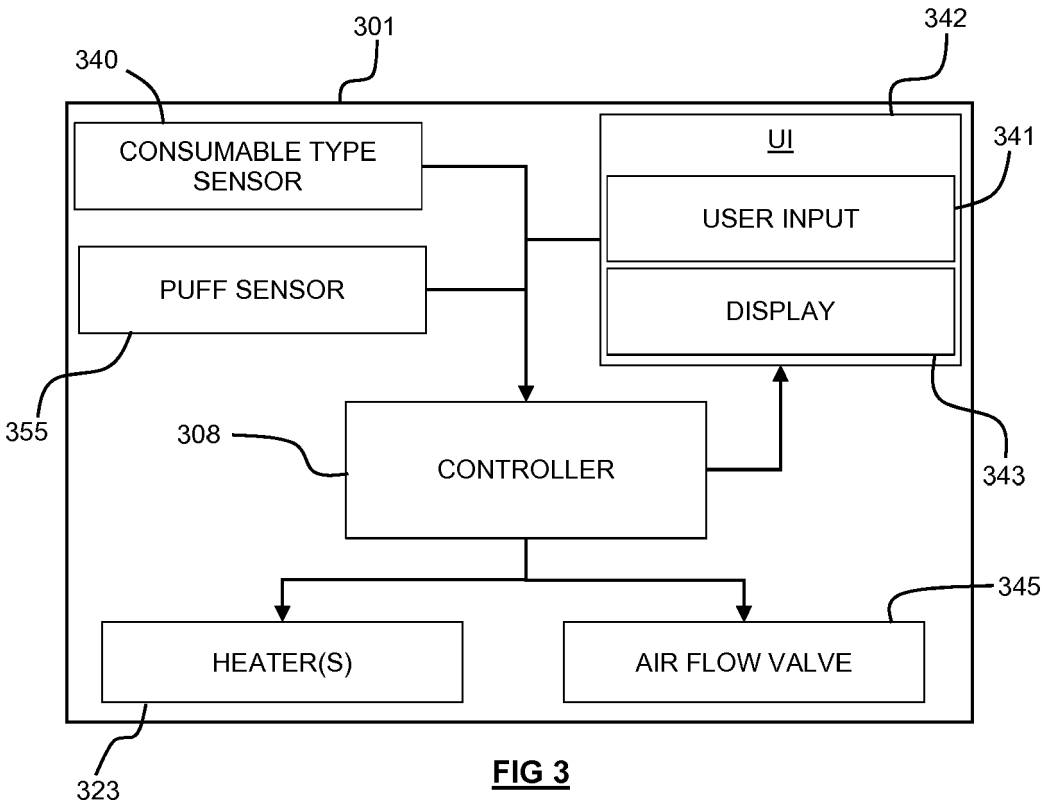
301
342
340
CONSUMABLE TYPE SENSOR
UI
341
USER INPUT
PUFF SENSOR
DISPLAY
355
308
CONTROLLER
343
345
HEATER(S)
AIR FLOW VALVE
323

FIG 3

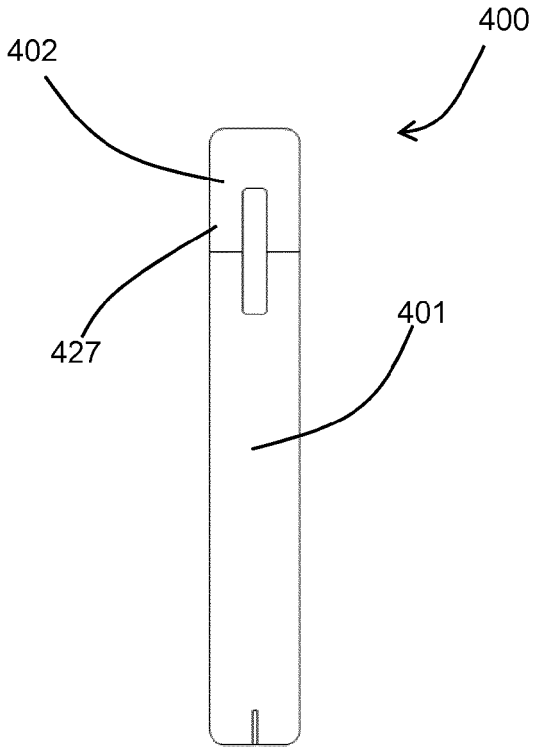

FIG 4A

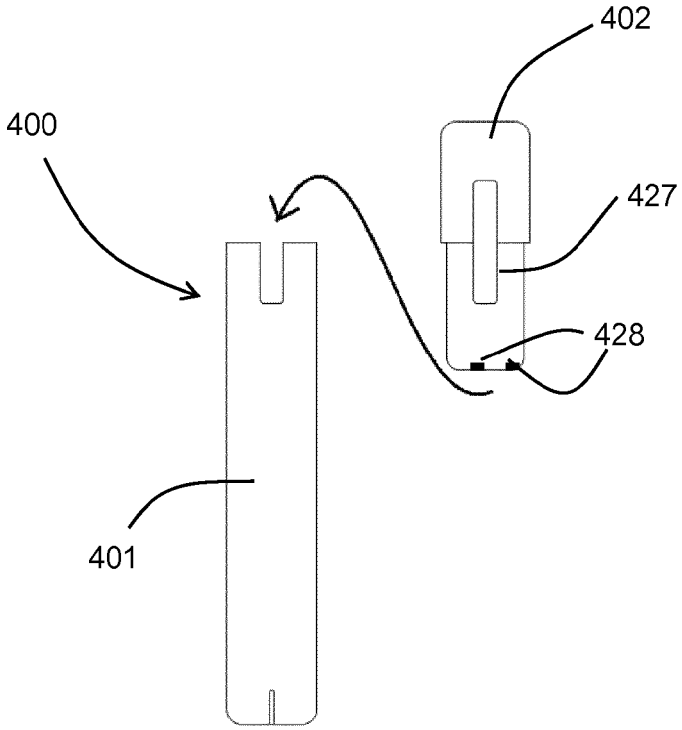

FIG 4B

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EUROPEAN SEARCH REPORT

Application Number
EP 19 02 0193

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Place of search	Date of completion of the search	Examiner
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X : particularly relevant if taken alone
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E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

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