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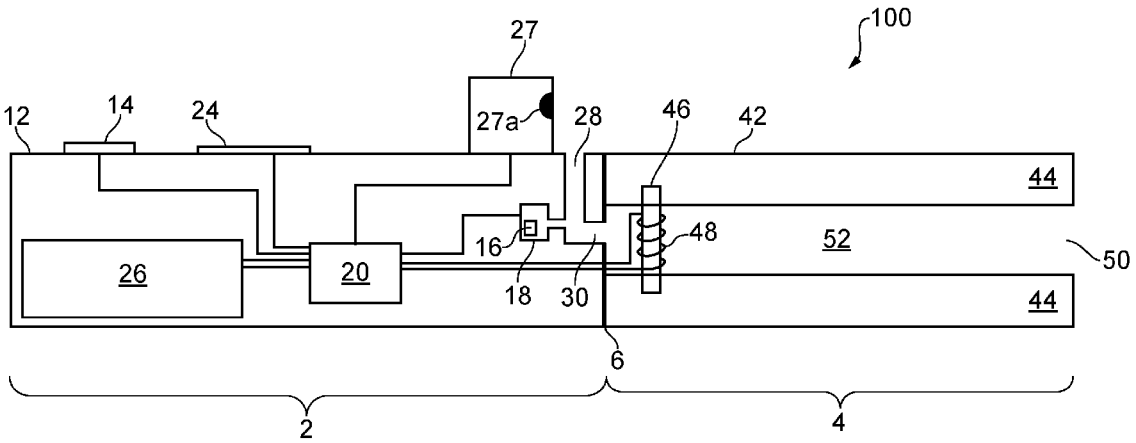


FIG. 1

(57) **Abstract:** An aerosol provision system comprising: an aerosol generator for generating an aerosol from an aerosol-generating material for inhalation by a user; and an ion source configured to provide ions in the vicinity of an air inlet through which air is drawn for mixing with the aerosol generated by the aerosol generator during user inhalation so that the ions are also drawn in through the air inlet during user inhalation.

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AEROSOL PROVISION SYSTEM COMPRISING AN ION SOURCE

FIELD

The present disclosure relates to aerosol provision systems and devices.

BACKGROUND

Aerosol provision systems, such as electronic cigarettes (e-cigarettes) and tobacco-heating products, generally contain an aerosol-generating material, such as a source liquid or a tobacco rod, which may contain an active substance and / or a flavour, from which an aerosol or vapour is generated for inhalation by a user, for example through heat vaporisation or other means. Thus, an aerosol provision system will typically comprise an aerosol generator, such as a heater, arranged to vaporise or aerosolise a portion of aerosol-generating material to generate a vapour or aerosol in an aerosol generation chamber. When a user inhales on the system, air is drawn into the system through an air inlet and into the aerosol generation chamber where the air mixes with vaporised precursor material to form a condensation aerosol that is then drawn out of the system for user inhalation.

SUMMARY

According to a first aspect of the disclosure there is provided an aerosol provision system comprising an aerosol generator for generating an aerosol from an aerosol-generating material for inhalation by a user; and an ion source configured to provide ions in the vicinity of an air inlet through which air is drawn for mixing with the aerosol generated by the aerosol generator during user inhalation so that the ions are also drawn in through the air inlet during user inhalation.

According to a second aspect of the disclosure there is provided an aerosol provision device comprising an ion source configured to provide ions in the vicinity of an air inlet through which air is drawn for mixing with aerosol generated by an aerosol generator during user inhalation so that the ions are also drawn in through the air inlet during user inhalation.

According to a third aspect of the disclosure there is provided aerosol provision means comprising: aerosol generating means for generating an aerosol from an aerosol-generating material for inhalation by a user; air inlet means through which air is drawn for mixing with the aerosol generated by the aerosol generating means during user inhalation; and an ion provision means configured to provide ions in the vicinity of the air inlet means so that the ions are drawn in through the air inlet means during user inhalation. In accordance with some examples the position of the ion source relative to the air inlet may be adjustable.

In accordance with some examples the ion source may be controllable so that at least one characteristic of the ions provided by the ion source can be varied. The at least one

characteristic may in some examples comprise one or more of: ion density, ion energy, ion distribution, and ion charge state

In accordance with some examples the ion source may comprise an ion generator for generating ions in the vicinity of the air inlet.

In accordance with some examples the ion source may comprise an ion generator for generating ions and a guide for guiding the ions generated by the ion generator to the vicinity of the air inlet.

In accordance with some examples the ions may comprise negative ions and in accordance with some other examples the ions may comprise positive ions. In some examples the ions may comprise negative and positive ions

In accordance with some examples the aerosol-generating material may comprise at least one of a liquid aerosol-generating material, a solid aerosol-generating material, an amorphous solid aerosol-generating material, or a gelatinous aerosol-generating material.

In accordance with some examples the aerosol provision device may comprise a controller for controlling the ion source so that at least one characteristic of the ions provided by the ion source is varied in dependence of at least one property of the aerosol-generating material. In some examples the at least one property of the aerosol-generating material may comprise a flavour characteristic of the aerosol-generating material.

In accordance with some examples the aerosol-generating material may comprise an active substance.

BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments of the disclosure will now be described, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 schematically represents an aerosol provision system according to a first embodiment of the disclosure;

Figure 2 schematically represents an aerosol provision system according to a second embodiment of the disclosure;

Figure 3 schematically represents an aerosol provision system according to a third embodiment of the disclosure;

Figure 4 schematically represents an aerosol provision system according to a fourth embodiment of the disclosure;

Figure 5 schematically represents an aerosol provision system according to a fifth embodiment of the disclosure; and

Figure 6 schematically represents an aerosol provision system according to a sixth embodiment of the disclosure.

DETAILED DESCRIPTION

Aspects and features of certain examples and embodiments are discussed / described herein. Some aspects and features of certain examples and embodiments may be implemented conventionally and these are not discussed / described in detail in the interests of brevity. It will thus be appreciated that aspects and features of apparatus and methods discussed herein which are not described in detail may be implemented in accordance with any conventional techniques for implementing such aspects and features.

As used herein, the term “provision system” (which may also sometimes be referred to as a "delivery system") is intended to encompass systems that deliver / provide at least one substance to a user in use, and includes: non-combustible aerosol provision systems that release compounds from an aerosol-generating material without combusting the aerosol-generating material, such as electronic cigarettes, tobacco heating products, and hybrid systems to generate aerosol using a combination of aerosol-generating materials.

According to the present disclosure, a “non-combustible” aerosol provision system is one where a constituent aerosol-generating material of the aerosol provision system (or component thereof) is not combusted or burned in order to facilitate delivery of at least one substance to a user.

In some embodiments, the delivery system is a non-combustible aerosol provision system, such as a powered non-combustible aerosol provision system. In some embodiments, the non-combustible aerosol provision system is an electronic cigarette, also known as a vaping device or electronic nicotine delivery system (END), although it is noted that the presence of nicotine in the aerosol-generating material is not necessary. In some embodiments, the non-combustible aerosol provision system is a system for heating an aerosol-generating material, also known as a heat-not-burn system. An example of such a system is a tobacco heating system.

In some embodiments, the non-combustible aerosol provision system is a hybrid system to generate aerosol using a combination of aerosol-generating materials, one or a plurality of which may be heated. Each of the aerosol-generating materials may be, for example, in the form of a solid, liquid, gel and / or amorphous solid, and may or may not contain nicotine. In some embodiments, a hybrid system may, for example, comprise a liquid or gel aerosol-generating material and a solid aerosol-generating material. The solid aerosol-generating material may comprise, for example, tobacco or a non-tobacco product.

Typically, the non-combustible aerosol provision system may comprise a non-combustible aerosol provision device and a consumable for use with the non-combustible aerosol provision device. In some embodiments, the disclosure relates to consumables comprising aerosol-generating material and configured to be used with non-combustible aerosol provision devices. These consumables are sometimes referred to as articles, cartridges, or cartomisers throughout the disclosure, and these terms should be understood to be interchangeable herein. The "consumable" terminology reflects that this component will include material that is consumed during use. The consumable may be fully disposable and discarded in its entirety once the consumable material in the consumable has been consumed, or in other cases, the consumable material may be replenished after it has been consumed and the consumable retained for further use.

In some embodiments, the non-combustible aerosol provision system, such as a non-combustible aerosol provision device thereof, may comprise a power source and a controller.

In some embodiments, the non-combustible aerosol provision system may comprise an area for receiving the consumable, an aerosol generator, an aerosol generation area, a housing, a mouthpiece, a filter and/or an aerosol-modifying agent. In some embodiments, the consumable for use with the non-combustible aerosol provision device may comprise aerosol-generating material, an aerosol-generating material storage area, an aerosol-generating material transfer component, an aerosol generator, an aerosol generation area, a housing, a wrapper, a filter, a mouthpiece, and/or an aerosol-modifying agent.

In some embodiments, the substance to be delivered may comprise one or more active constituents, one or more flavourants, one or more aerosol-former materials, and/or one or more other functional materials.

In some embodiments, the substance to be delivered may comprise an active substance. The active substance as used herein may be a physiologically active material, which is a material intended to achieve or enhance a physiological response. The active substance may for example be selected from nutraceuticals, nootropics, and / or psychoactives. The active substance may be naturally occurring or synthetically obtained. The active substance may comprise for example nicotine, caffeine, taurine, theine, vitamins such as B6 or B12 or C, melatonin, cannabinoids, or constituents, derivatives, or combinations thereof. The active substance may comprise one or more constituents, derivatives or extracts of tobacco, cannabis or another botanical.

As noted herein, the active substance may comprise one or more constituents, derivatives or extracts of cannabis, such as one or more cannabinoids or terpenes. As noted herein, the

active substance may comprise or be derived from one or more botanicals or constituents, derivatives or extracts thereof. As used herein, the term "botanical" includes any material derived from plants including, but not limited to, extracts, leaves, bark, fibres, stems, roots, seeds, flowers, fruits, pollen, husk, shells or the like. Alternatively, the material may comprise an active compound naturally existing in a botanical, obtained synthetically. The material may be in the form of liquid, gas, solid, powder, dust, crushed particles, granules, pellets, shreds, strips, sheets, or the like.

Example botanicals are tobacco, eucalyptus, star anise, hemp, cocoa, cannabis, fennel, lemongrass, peppermint, spearmint, rooibos, chamomile, flax, ginger, ginkgo biloba, hazel, hibiscus, laurel, licorice (liquorice), matcha, mate, orange skin, papaya, rose, sage, tea such as green tea or black tea, thyme, clove, cinnamon, coffee, aniseed (anise), basil, bay leaves, cardamom, coriander, cumin, nutmeg, oregano, paprika, rosemary, saffron, lavender, lemon peel, mint, juniper, elderflower, vanilla, wintergreen, beefsteak plant, curcuma, turmeric, sandalwood, cilantro, bergamot, orange blossom, myrtle, cassis, valerian, pimento, mace, damien, marjoram, olive, lemon balm, lemon basil, chive, carvi, verbena, tarragon, geranium, mulberry, ginseng, theanine, theacrine, maca, ashwagandha, damiana, guarana, chlorophyll, baobab or any combination thereof. The mint may be chosen from the following mint varieties: Mentha Arventis, Mentha c.v.,Mentha niliaca, Mentha piperita, Mentha piperita citrata c.v.,Mentha piperita c.v, Mentha spicata crispa, Mentha cardifolia, Memtha longifolia, Mentha suaveolens variegata, Mentha pulegium, Mentha spicata c.v. and Mentha suaveolens.

In some embodiments, the active substance comprises or is derived from one or more botanicals or constituents, derivatives or extracts thereof and the botanical is tobacco. In some embodiments, the active substance comprises or is derived from one or more botanicals or constituents, derivatives or extracts thereof and the botanical is selected from eucalyptus, star anise, cocoa and hemp. In some embodiments, the active substance comprises or is derived from one or more botanicals or constituents, derivatives or extracts thereof and the botanical is selected from rooibos and fennel.

As noted above, in some embodiments, the substance to be delivered comprises a flavour. As used herein, the terms "flavour" and "flavourant" refer to materials which, where local regulations permit, may be used to create a desired taste, aroma or other somatosensorial sensation in a product for adult consumers. They may include naturally occurring flavour materials, botanicals, extracts of botanicals, synthetically obtained materials, or combinations thereof (e.g., tobacco, cannabis, licorice (liquorice), hydrangea, eugenol, Japanese white bark magnolia leaf, chamomile, fenugreek, clove, maple, matcha, menthol, Japanese mint, aniseed (anise), cinnamon, turmeric, Indian spices, Asian spices, herb,

wintergreen, cherry, berry, red berry, cranberry, peach, apple, orange, mango, clementine, lemon, lime, tropical fruit, papaya, rhubarb, grape, durian, dragon fruit, cucumber, blueberry, mulberry, citrus fruits, Drambuie, bourbon, scotch, whiskey, gin, tequila, rum, spearmint, peppermint, lavender, aloe vera, cardamom, celery, cascarilla, nutmeg, sandalwood, bergamot, geranium, khat, naswar, betel, shisha, pine, honey essence, rose oil, vanilla, lemon oil, orange oil, orange blossom, cherry blossom, cassia, caraway, cognac, jasmine, ylang-ylang, sage, fennel, wasabi, piment, ginger, coriander, coffee, hemp, a mint oil from any species of the genus Mentha, eucalyptus, star anise, cocoa, lemongrass, rooibos, flax, ginkgo biloba, hazel, hibiscus, laurel, mate, orange skin, rose, tea such as green tea or black tea, thyme, juniper, elderflower, basil, bay leaves, cumin, oregano, paprika, rosemary, saffron, lemon peel, mint, beefsteak plant, curcuma, cilantro, myrtle, cassis, valerian, pimento, mace, damien, marjoram, olive, lemon balm, lemon basil, chive, carvi, verbena, tarragon, limonene, thymol, camphene), flavour enhancers, bitterness receptor site blockers, sensorial receptor site activators or stimulators, sugars and/or sugar substitutes (e.g., sucralose, acesulfame potassium, aspartame, saccharine, cyclamates, lactose, sucrose, glucose, fructose, sorbitol, or mannitol), and other additives such as charcoal, chlorophyll, minerals, botanicals, or breath freshening agents. They may be imitation, synthetic or natural ingredients or blends thereof. They may be in any suitable form, for example, liquid such as an oil, solid such as a powder, or gas.

In some embodiments, the flavour comprises menthol, spearmint and/or peppermint. In some embodiments, the flavour comprises flavour components of cucumber, blueberry, citrus fruits and/or redberry. In some embodiments, the flavour comprises eugenol. In some embodiments, the flavour comprises flavour components extracted from tobacco. In some embodiments, the flavour comprises flavour components extracted from cannabis.

In some embodiments, the flavour may comprise a sensate, which is intended to achieve a somatosensorial sensation which are usually chemically induced and perceived by the stimulation of the fifth cranial nerve (trigeminal nerve), in addition to or in place of aroma or taste nerves, and these may include agents providing heating, cooling, tingling, numbing effect. A suitable heat effect agent may be, but is not limited to, vanillyl ethyl ether and a suitable cooling agent may be, but not limited to eucalyptol, WS-3.

Aerosol-generating material is a material that is capable of generating aerosol, for example when heated, irradiated or energized in any other way. Aerosol-generating material may, for example, be in the form of a solid, liquid, gel which may or may not contain an active substance and/or flavourants. In some embodiments, the aerosol-generating material may comprise an “amorphous solid”, which may alternatively be referred to as a “monolithic solid” (i.e. non-fibrous). In some embodiments, the amorphous solid may be a dried gel. The

amorphous solid is a solid material that may retain some fluid, such as liquid, within it. In some embodiments, the aerosol-generating material may for example comprise from about 50wt%, 60wt% or 70wt% of amorphous solid, to about 90wt%, 95wt% or 100wt% of amorphous solid.

The aerosol-generating material may comprise one or more active substances and/or flavours, one or more aerosol-former materials, and optionally one or more other functional material.

The aerosol-former material may comprise one or more constituents capable of forming an aerosol. In some embodiments, the aerosol-former material may comprise one or more of glycerol, propylene glycol, diethylene glycol, triethylene glycol, tetraethylene glycol, 1,3-butylene glycol, erythritol, meso-Erythritol, ethyl vanillate, ethyl laurate, a diethyl suberate, triethyl citrate, triacetin, a diacetin mixture, benzyl benzoate, benzyl phenyl acetate, tributyrin, lauryl acetate, lauric acid, myristic acid, and propylene carbonate.

The one or more other functional materials may comprise one or more of pH regulators, colouring agents, preservatives, binders, fillers, stabilizers, and/or antioxidants.

The material may be present on or in a support, to form a substrate. The support may, for example, be or comprise paper, card, paperboard, cardboard, reconstituted material, a plastics material, a ceramic material, a composite material, glass, a metal, or a metal alloy. In some embodiments, the support comprises a susceptor. In some embodiments, the susceptor is embedded within the material. In some alternative embodiments, the susceptor is on one or either side of the material.

Thus, a consumable is an article comprising or consisting of aerosol-generating material, part or all of which is intended to be consumed during use by a user. A consumable may comprise one or more other components, such as an aerosol-generating material storage area, an aerosol-generating material transfer component (e.g. a wicking element), an aerosol generation area, a housing, a wrapper, a mouthpiece, a filter and/or an aerosol-modifying agent. A consumable may also comprise an aerosol generator, such as a heater, that emits heat to cause the aerosol-generating material to generate aerosol in use. The heater may, for example, comprise a material heatable by electrical conduction, or a susceptor.

A susceptor is a material that is heatable by penetration with a varying magnetic field, such as an alternating magnetic field. The susceptor may be an electrically-conductive material, so that penetration thereof with a varying magnetic field causes induction heating of the heating material. The heating material may be magnetic material, so that penetration thereof with a varying magnetic field causes magnetic hysteresis heating of the heating material.

The susceptor may be both electrically-conductive and magnetic, so that the susceptor is heatable by both heating mechanisms. The device that is configured to generate the varying magnetic field is referred to as a magnetic field generator, herein.

An aerosol-modifying agent is a substance, typically located downstream of the aerosol generation area, that is configured to modify the aerosol generated, for example by changing the taste, flavour, acidity or another characteristic of the aerosol. The aerosol-modifying agent may be provided in an aerosol-modifying agent release component that is operable to selectively release the aerosol-modifying agent. The aerosol-modifying agent may, for example, be an additive or a sorbent. The aerosol-modifying agent may, for example, comprise one or more of a flavourant, a colourant, water, and a carbon adsorbent. The aerosol-modifying agent may, for example, be a solid, a liquid, or a gel. The aerosol-modifying agent may be in powder, thread or granule form. The aerosol-modifying agent may be free from filtration material.

An aerosol generator is an apparatus configured to cause aerosol to be generated from the aerosol-generating material. In some embodiments, the aerosol generator is a heater configured to subject the aerosol-generating material to heat energy, so as to release one or more volatiles from the aerosol-generating material to form an aerosol. In some embodiments, the aerosol generator is configured to cause an aerosol to be generated from the aerosol-generating material without heating. For example, the aerosol generator may be configured to subject the aerosol-generating material to one or more of vibration, increased or decreased pressure, or electrostatic energy. As is common in the technical field, the terms "aerosol" and "vapour", and related terms such as "vaporise", "volatilise" and "aerosolise", may generally be used interchangeably.

Aerosol provision systems often, though not always, comprise a modular assembly comprising a reusable device part and a replaceable (disposable/consumable) cartridge part. For systems that have a liquid aerosol-generating material, the consumable / cartridge will sometimes comprise a reservoir of the liquid aerosol-generating material and the aerosol generator (although the aerosol generator can in other examples be in the device), and for systems that have a solid aerosol-generating material, the consumable/cartridge will sometimes comprise a cigarette-like tobacco rod which is heated by a heater (aerosol generator) in the device (although the aerosol generator can in other examples be, at least in part, in the consumable, such as in the form of a susceptor (heating element) in a tobacco rod).

If a consumable comprises the aerosol-generating material and the vaporiser / atomizer / aerosol generator, it may sometimes be referred to as a ‘cartomizer’. The reusable device

part may comprise the power supply (e.g. rechargeable power source) and control circuitry. It will be appreciated these different parts may comprise further elements depending on functionality. For example, the reusable device part will often comprise a user interface for receiving user input and displaying operating status characteristics, and the replaceable consumable device part in some cases comprises a temperature sensor for helping to control temperature. Consumables are often electrically and mechanically coupled to the control unit for use, for example using a screw thread, bayonet, or magnetic coupling with appropriately arranged electrical contacts, but in other examples a consumable may not include a mechanical coupling (e.g. it may simply be located in a predefined position for use - such as for a tobacco rod consumable) and / or may not include an electrical coupling (e.g. power may be transferred wirelessly, such as with induction heating, or by thermal conduction, or the aerosol generator might not be powered electrically or it might be located in the reusable device part). When the aerosol-generating material in a consumable is exhausted, or the user wishes to switch to a different consumable having a different aerosol-generating material, the consumable may be removed from the reusable part (device) and a replacement consumable (cartridge) attached in its place. Systems conforming to this type of two-part modular configuration may generally be referred to as two-part systems. Aerosol provision systems may alternatively comprise a single unit which does not comprise a consumable part and separate reusable device part configured to be detachably coupled together by a user. Such an aerosol provision system may be referred to as a 'single part' aerosol provision system or device. In such a system / device, which may be intended to be disposed of after a supply of electrical power in a battery and / or a supply of aerosol-generating material supplied with the system / device is exhausted, without refilling or recharging the device, components including a reservoir of aerosol-generating material, an aerosol generator, a power supply (e.g. a battery), and control circuitry, may all be housed within a single housing. Such an aerosol provision system or device may be referred to as 'disposable'.

It is common for electronic cigarettes to have a generally elongate shape. For the sake of providing a concrete example, certain embodiments of the disclosure will be taken to comprise this kind of generally elongate two-part system employing disposable consumables. However, it will be appreciated that the underlying principles described herein may equally be adopted for different configurations, for example single-part systems or modular systems comprising more than two parts, refillable devices and single-use disposables, as well as other overall shapes, for example based on so-called box-mod high performance devices that typically have a boxier shape. More generally, it will be appreciated certain embodiments of the disclosure are based on aerosol provision systems

which are operationally configured to provide new functionality in accordance with the principles described herein, and other constructional aspects of the systems configured to provide the new functionality are not of primary significance.

Figure 1 is a cross-sectional view through an example aerosol provision system 100 in accordance with certain embodiments of the disclosure. The system 100 comprises two main components, namely a device part 2 and a consumable part 4. The device part 2 may alternatively be referred to as a reusable part, control unit, aerosol provision device, and so on, and the consumable part 4 may alternatively be referred to as a replaceable part / disposable part / cartridge. The device part 2 and consumable part 4 together may be referred to as a system (e.g. an aerosol provision system / aerosol delivery system). The fact this example is a two-part device is not in itself directly significant to the system's functionality as described further herein.

In normal use the device 2 and the consumable 4 are releasably coupled together at an interface 6. When the consumable is exhausted or the user simply wishes to switch to a different consumable, the consumable may be removed from the device and a replacement consumable attached to the device in its place. The interface 6 provides a structural, electrical and air path connection between the two parts and may be established in accordance with conventional techniques, for example based around a screw thread, latch mechanism, magnetic, friction or bayonet fixing, with appropriately arranged electrical contacts and openings for establishing the electrical connection and air path between the two parts as appropriate. The specific manner in which the consumable 4 couples to the device 2 is not significant to the principles described herein, but for the sake of a concrete example is assumed here to comprise a resilient latch mechanism, for example with a portion of the consumable being received in a corresponding receptacle in the device with cooperating latch engaging elements (not represented in Figure 1). It will also be appreciated the interface 6 in some implementations may not support an electrical connection between the respective parts. For example, in some implementations a vaporiser may be provided by the device rather than in the consumable, or the transfer of electrical power from the device to the consumable may be wireless (e.g. based on electromagnetic induction), so that an electrical connection between the device and the consumable is not needed. It will further be appreciated the interface 6 in some implementations may not support an air path connection between the respective parts. For example, in some implementations an air inlet may be provided as an opening in the body of the consumable itself or by a gap between the consumable and the device, so that the airflow during use does not pass across the interface between the device and the consumable.

The consumable 4 may in accordance with certain embodiments of the disclosure be broadly conventional. In Figure 1, the consumable 4 comprises a consumable housing 42 formed of a plastics material. The consumable housing 42 supports other components of the consumable and provides the mechanical interface 6 with the device 2. The consumable housing in this example is generally circularly symmetric about a longitudinal axis along which the consumable couples to the device 2. In this example, the consumable has a length of around 4 cm and a diameter of around 2 cm. However, it will be appreciated the specific geometry, and more generally the overall shapes and materials used, may be different in different implementations.

Within the consumable housing 42 is a reservoir 44 that contains a liquid aerosol-generating material (vapour precursor material). The liquid aerosol-generating material may be conventional, and may be referred to as e-liquid. The liquid reservoir 44 in this example has an annular shape with an outer wall defined by the consumable housing 42 and an inner wall 58 that defines an air path 52 through the consumable 4. The reservoir 44 is closed at each end with end walls to contain the e-liquid. The reservoir 44 may be formed in accordance with conventional techniques, for example, it may comprise a plastics material and be integrally moulded with the consumable housing 42.

The consumable 4 further comprises a wick 46 and an aerosol generator (vaporiser) 48 in the form of a heater located towards an end of the reservoir 44 opposite to a mouthpiece outlet 50. In this example, the wick 46 extends transversely across the consumable air path 52 with its ends extending into the reservoir 44 of e-liquid through openings in the inner wall of the reservoir 44. The openings in the inner wall of the reservoir 44 are sized to broadly match the dimensions of the wick 46 to provide a reasonable seal against leakage from the liquid reservoir into the consumable air path without unduly compressing the wick, which may be detrimental to its fluid transfer performance.

The wick 46 and aerosol generator 48 are arranged in the consumable air path 52 such that a region of the consumable air path 52 around the wick 46 and aerosol generator 48 in effect defines an aerosol generating region or vaporisation region for the consumable. The e-liquid in the reservoir 44 infiltrates the wick 46 through the ends of the wick extending into the reservoir 44 and is drawn along the wick by surface tension / capillary action (i.e. wicking). The aerosol generator 48 in this example comprises an electrically resistive wire coiled around the wick 46. In this example the aerosol generator 48 comprises a nickel chrome alloy (Cr20Ni80) wire and the wick 46 comprises a glass fibre bundle, but it will be appreciated the specific aerosol generator configuration is not significant to the principles described herein. For example, in some cases the aerosol generator may comprise a

resistive heater track that is deposited on a porous ceramic block in fluid communication with the reservoir of liquid aerosol-generating material.

In use electrical power may be selectively, e.g. in response to detecting user inhalation, supplied to the aerosol generator 48 to vaporise an amount of e-liquid (aerosol-generating material) that is drawn to the vicinity of the aerosol generator 48 by the wick 46. Vaporised e-liquid may then become entrained in air drawn along the consumable air path from the vaporisation region and out the mouthpiece outlet 50 for user inhalation.

The rate at which aerosol-generating material is vaporised by the aerosol generator (heater) 48 will typically depend on the amount (level) of power supplied to the aerosol generator 48 during use (among other things). Thus electrical power can be applied to the aerosol generator to selectively generate vapour from the aerosol-generating material in the consumable 4, and furthermore, the rate of vapour generation can be changed by changing the amount of power supplied to the aerosol generator 48, for example through pulse width and/or frequency modulation techniques.

The device 2 comprises an outer housing 12 with an opening that defines an air inlet 28 for the system, a battery 26 for providing operating power, control circuitry 20 for controlling and monitoring the operation of the system, a user input button 14, an inhalation sensor (puff detector) 16, which in this example comprises a pressure sensor located in a pressure sensor chamber 18, a visual display 24, and an ion source 27.

The outer housing 12 may be formed, for example, from a plastics or metallic material and in this example has a circular cross-sectional area generally conforming to the shape and size of the consumable 4 so as to provide a smooth transition between the two parts at the interface 6. In this example, the device has a length of around 6 cm so the overall length of the system when the consumable and device are coupled together is around 10 cm. However and as already noted, it will be appreciated that the overall shape and scale of a device implementing an embodiment of the disclosure is not significant to the principles described herein.

The air inlet 28 connects to an air path 30 through the device 2. The device air path 30 in turn connects to the consumable air path 52 across the interface 6 when the device 2 and consumable 4 are connected together. The pressure sensor chamber 18 containing the pressure sensor 16 is in fluid communication with the air path 30 in the device 2 (i.e. the pressure sensor chamber 18 branches off from the air path 30 in the device 2). Thus, when a user inhales on the mouthpiece opening 50, there is a drop in pressure in the pressure sensor chamber 18 that may be detected by the pressure sensor 16 and also air is drawn in through the air inlet 28, along the device air path 30, across the interface 6, through the

vapour generation region in the vicinity of the aerosol generator 48 (where vaporised aerosol-generating material becomes entrained in the airflow when the aerosol generator is active), along the consumable air path 52, and out through the mouthpiece opening 50 for user inhalation.

The battery 26 in this example is rechargeable and may be of a conventional type, for example of the kind normally used in systems and other applications requiring provision of relatively high currents over relatively short periods. The battery 26 may be recharged through a charging connector in the device housing 12, for example a USB connector.

The user input button 14 in this example is a conventional mechanical button, for example comprising a spring mounted component which may be pressed by a user to establish an electrical contact. In this regard, the input button may be considered to provide a manual input mechanism for the terminal device, but the specific manner in which the button is implemented is not significant. For example, different forms of mechanical button or touch-sensitive button (e.g. based on capacitive or optical sensing techniques) may be used in other implementations. The specific manner in which the button is implemented may, for example, be selected having regard to a desired aesthetic appearance.

The display 24 is provided to give a user with a visual indication of various characteristics associated with the system, for example current power setting information, ion source settings, remaining battery power, and so forth. The display may be implemented in various ways. In this example the display 24 comprises a conventional pixilated LCD screen that may be driven to display the desired information in accordance with conventional techniques. In other implementations the display may comprise one or more discrete indicators, for example LEDs, that are arranged to display the desired information, for example through particular colours and / or flash sequences. More generally, the manner in which the display is provided and information is displayed to a user using the display is not significant to the principles described herein. Some embodiments may not include a visual display and may include other means for providing a user with information relating to operating characteristics of the system, for example using audio signalling or haptic feedback, or may not include any means for providing a user with information relating to operating characteristics of the system.

The control circuitry 20 is suitably configured / programmed to control the operation of the system to provide functionality in accordance with embodiments of the disclosure as described further herein, as well as for providing conventional operating functions of the system in line with the established techniques for controlling such devices. The control circuitry (processor circuitry) 20 may be considered to logically comprise various sub-units /

circuitry elements associated with different aspects of the system's operation in accordance with the principles described herein and other conventional operating aspects of systems, such as display driving circuitry and user input detection. It will be appreciated the functionality of the control circuitry 20 can be provided in various different ways, for example using one or more suitably programmed programmable computer(s) and / or one or more suitably configured application-specific integrated circuit(s) / circuitry / chip(s) / chipset(s) configured to provide the desired functionality.

In this example the vapour provision system 1 comprises a user input button 14 and an inhalation sensor 16. The control circuitry 20 may be configured to receive signalling from the inhalation sensor 16 and to use this signalling to determine if a user is inhaling on the system and also to receive signalling from the input button 14 and to use this signalling to determine if a user is pressing (i.e. activating) the input button. These aspects of the operation of the system (i.e. puff detection and button press detection) may be performed in accordance with established techniques (for example using conventional inhalation sensor and inhalation sensor signal processing techniques and using conventional input button and input button signal processing techniques). Other example vapour provision systems may have only one of a user input button 14 and an inhalation sensor 16. In further examples, a vapour provision system may have neither a user input button or an inhalation sensor depending on the configuration and operation of the system.

Although the example of Figure 1 is a two-part system, in other embodiments the aerosol provision system 1 may comprise a single-part device in which a power source, ion generator, controller, atomiser / aerosol generator, and aerosol-generating material may be provided in a single housing. It will be understood that aspects of the present disclosure not relating to the interface between the reusable device part 2 and a consumable part 4 apply equally for single-part device embodiments.

It will be appreciated that in a two-part device such as shown in the example of Figure 1, the aerosol generator may be in either of the device part 2 or the consumable part 4. For example, an aerosol generator (e.g. a heater) may be located in the reusable device part and brought into proximity with a portion of aerosol-generating material in the consumable part when the consumable is engaged with the reusable device part. In some examples the aerosol generator may be in effect split across the device part and the consumable part. For example the aerosol generator may comprise an inductive drive coil in the device part that is configured to electromagnetically couple with a susceptor (heating element) within the consumable.

As noted above, and unlike conventional aerosol provision systems, the aerosol provision system 100 of Figure 1 includes an ion source 27. The ion source 27 comprises an ion generator 27a that is configured to generate ions such that the ion source 27 provide the ions to the vicinity of the air inlet 28 through which air is drawn for mixing with the aerosol generated by the aerosol generator during user inhalation. Thus, when the ion source is activated the generated ions are drawn in through the air inlet from the ambient air / environment around the aerosol provision device during user inhalation.

The ion generator 27a may be based on any conventional ion generating technology, for example based on corona discharge techniques. The ion generator 27a may be taken from the technologies used in commercially available ion generators such as those from Airvida, for example the Airvida M1, which can generate ions at a density of around two-million per cubic centimetre in 0.6 seconds, and also technologies such as those disclosed in US2021128776 [1]. The specific technology underlying the operation of the ion generator 27a in the ion source 27 is not of primary significance to the operation of the aerosol provision system / device.

In this example the ion generator 27a is configured to generate negative ions. However, in other examples the ion generator 27a may be configured to generate positive ions, or both negative and positive ions. The ion source 27 is arranged so that the ion generator generates ions in the vicinity of the air inlet 28. That is to say, the ion source 27 provides (delivers) ions to the vicinity of the air inlet 28 so that they can be drawn from the air surrounding the aerosol provision system into the air inlet when a user inhales on the aerosol provision system. The aerosol provision device is thus configured to activate the ion source 27 to cause the ion generator 27a to generate ions when a user is inhaling on the system. For example, the ion source 27 may be activated in parallel with the aerosol generator 48. Thus, when a user inhales on the mouthpiece end of the system 100, the control circuitry / controller 20 is configured to detect the associated drop in pressure based on signalling received from the puff sensor 16, and in response supplies power to the aerosol generator 48 and to the ion source 27. Because the ion source 27 is arranged to provide ions to the vicinity of the air inlet 28, as the user inhales on the system 100, the air that is drawn into the air inlet 28 includes ions from the ion generator 27a. The incoming air bearing the ions then mixes with aerosol generated by the aerosol generator within the aerosol provision system and modifies the aerosol as it travels down the air path 52 before exiting the system through the mouthpiece outlet 50 where it may be inhaled by a user. Depending on the specific implementation, the ion source 27 may be activated every time the user inhales on the aerosol provision system (e.g. every time the aerosol generator is

activated), or it may be active selectively, for example in response to user input, so the user can choose whether to use the aerosol resistant with or without the ion generator active.

The inventors have found that providing air containing ions (hereafter ionised air) to the air around the inlet of the aerosol provision system such that the air which is drawn into the system to mix with the aerosol generated by the aerosol generator comprises ions, impacts the manner in which the aerosol is formed and how the characteristics of the aerosol are perceived by a user.

In particular, it has been found that the presence of ions can modify the perceived organoleptic properties of the aerosol for the user. For example, in blind testing, users have identified that the aerosol generated by the aerosol provision device when the ion source is activated, as compared to the aerosol generated by the same aerosol provision device when the ion source is not activated, has characteristics such as:

- increased sweetness
- more intense flavour
- a smoother taste
- increased aerosol plume
- increased perceived cooling (for example in relation to mint flavours)
- consistency
- reduced deposition of nicotine in mouth and increased in lung

Without wishing to be bound by theory, it is considered the impact of the negative ions on how the condensation aerosol forms in the aerosol provision system contributes to a modification in the perceived organoleptic properties of the aerosol.

The specific positioning of the ion generator 27a with respect to the air inlet 28 can be chosen to ensure ions from the ion generator 27a are provided to a region from which air is drawn when a user is inhaling on the aerosol provision system. The specific relative position will depend, for example, on the position of the air inlet and the distribution over which ions are generated by the specific ion generator 27a used in a given implementation. For example, if the distribution of ions from the ion generator 27a is relatively directional, the ion generator 27a might be positioned further from the air inlet than if the distribution of ions from the ion generator 27a is more diffuse. In general, the position of the ion source relative to the air inlet 28 can be determined empirically during a design phase for the aerosol provision system 100. As discussed further below, in some examples the position of the ion source relative to the air inlet may be adjustable.

In accordance with some embodiments of the disclosure, various aspects of the operation of the ion source 27 may be controllable by the control circuitry 20 so that at least one characteristic of the ions provided by the ion source can be varied. For example, the control circuitry 20 may be configured to adjust one or more of ion density, ion energy, ion distribution, and ion charge state in order to adjust the impact of the ions on the user experience. The control circuitry 20 may, for example, be configured to adjust a characteristic of the ions provided by the ion source in response to user input and / or automatically in response to detecting an identifier indicating a certain type of consumable is coupled to the device. For example, the control circuitry 20 may be configured to adjust a characteristic of the ions provided by the ion source in dependence on a one or more properties of the aerosol-generating material, such as a flavour characteristic or a nicotine level for the aerosol-generating material.

Figure 2 is a cross-sectional view through another example aerosol provision system 200 in accordance with certain embodiments of the disclosure. Elements and features of the aerosol provision system 200 represented in Figure 2 which are functionally similar to, and will be understood from, corresponding elements and features of the aerosol provision system 100 represented in Figure 1 are identified with corresponding reference numerals and are not discussed again in detail in the interests of brevity. The aerosol provision system 200 of Figure 2 differs from the aerosol provision system 100 of Figure 1 by the manner in which the air inlet 28 for the aerosol provision device is provided. Whereas in the example of Figure 1 the air inlet 28 is provided by an opening in the housing of the device that connects to the air path 30 through the device 2 before coupling into the consumable, in the example of Figure 2 the air inlet for the device / system is provided by a gap that is formed between the device 2 and the consumable 4 when the consumable 4 is coupled to the device for use. Since the air inlet 28 in this example is at least partially defined by the device part, it may still be referred to as an air inlet for the device.

Thus, in the example of Figure 2, the air inlet 28 is provided by an annular gap around the end of the consumable 4 that couples to the device 2. Ambient air (with ions from the ion source) thus enters the system 100 through the gap 28 between the device 2 and the consumable 4, and then couples into the air path 52 in the consumable and into the sensor chamber 18 containing the inhalation sensor 16 in the device.

Thus, Figures 1 and 2 schematically represent two different arrangements of air inlet for an aerosol provision system. In yet other examples, the air inlet may, instead of being provided by an opening into the body of the device as in Figure 1, or by a gap between the device and the consumable is in Figure 2, be provided by an opening into the body of the consumable.

Thus, an air inlet for the system in the consumable may couple directly into the air path in which the aerosol is generated. The air inlet for the system in the consumable may also couple across the interface between the consumable and the device so as to provide fluid communication with an inhalation sensor in the device. This assumes there is an inhalation sensor in the system, since it will be appreciated in some examples of the present disclosure, and regardless of where in the system the air inlet is provided, the system might not include an inhalation sensor, for example because the system is manually activated by a user pressing a button or automatically activated based on other technologies, such as motion sensing.

More generally, the specific configuration of the air inlet 28 is not significant to the principles underlying the embodiments of the disclosure as described herein. Rather what is significant is that the ion source is configured to provide the ions to the vicinity of the air inlet so the ions are drawn into the system and mixed with aerosol generated by the aerosol generator during user inhalation.

Apart from the different arrangement for how air enters the system, the operation of the aerosol provision system 200 represented in Figure 2 can otherwise in essence be the same as the operation of the aerosol provision system 100 represented in Figure 1.

Figure 3 is a cross-sectional view through another example aerosol provision system 300 in accordance with certain embodiments of the disclosure. Elements and features of the aerosol provision system 300 represented in Figure 3 which are functionally similar to, and will be understood from, corresponding elements and features of the aerosol provision system 100 represented in Figure 1 are identified with corresponding reference numerals and are not discussed again in detail in the interests of brevity. The aerosol provision system 300 of Figure 3 differs from the aerosol provision system 100 of Figure 1 by the manner in which the ion source 27 is accommodated in the device part 2 of the system 300. Whereas in the example of Figure 1 the ion source 27 is represented as being mounted to the outside of a housing for the other components of the device 2, in the example of Figure 3 the ion source 27 is represented as being mounted within the body of the device 2. Thus, the arrangement seen in Figure 1 might represent an adaptation of an existing aerosol provision system in order to provide the operational functionality disclosed herein in relation to the provision of ions that are drawn into the system during use, whereas the arrangement seen in Figure 3 might represent an aerosol provision system that was originally designed to incorporate the operational functionality disclosed herein in relation to the provision of ions for drawing into the system during use.

Thus, in the example of Figure 3, the ion source 27 is included within the main body of the device 2 with its ion generator 27a arranged adjacent to an ion outlet opening 27b in the device housing 12 through which the ions are provided when the ion source 27 is activated. The ion outlet opening 27b in the device housing is arrange relative to the air inlet 28 so that ions are provided by the ion source to the vicinity of the air inlet such that ions are drawn into the air inlet when a user inhales on the system 300 in the same manner as discussed above for Figure 1.

Thus, Figures 1 and 2 schematically represent two different arrangements for accommodating an ion source in an aerosol provision system. However, the specific configuration of the ion source 27 within the system is not significant to the principles underlying the embodiments of the disclosure as described herein. Rather what is significant is that the ion source is configured to provide the ions to the vicinity of the air inlet through which air is drawn into the system during use so the ions are mixed with aerosol generated by the aerosol generator during user inhalation.

Apart from the different arrangement for accommodating the ion source 27 in the aerosol provision system, the operation of the aerosol provision system 300 represented in Figure 3 can in essence be the same as the operation of the aerosol provision system 100 represented in Figure 1.

Figure 4 is a cross-sectional view through another example aerosol provision system 400 in accordance with certain embodiments of the disclosure. Elements and features of the aerosol provision system 400 represented in Figure 4 which are functionally similar to, and will be understood from, corresponding elements and features of the aerosol provision system 300 represented in Figure 3 are identified with corresponding reference numerals and are not discussed again in detail in the interests of brevity. The aerosol provision system 400 of Figure 4 differs from the aerosol provision system 300 of Figure 3 by the manner in which the ion source 27 is arranged to provide ions to the vicinity of the air inlet so as to be drawn into the air inlet during use (i.e. during user inhalation). In the example of Figure 3 the ion source 27 has an ion outlet opening 27b in the device housing which is positioned to directly provide ions from the ion generator 27a in the ion source 27 to the vicinity of the air inlet 28. However, in the example of Figure 4 the ion source 27 has an ion outlet opening 27b in the device housing that is more remote from the air inlet 28 than in Figure 3, and instead an ion guide / channel 27c is used to guide ions from the ion generator 27a to the vicinity of the air inlet. The ion channel 27c may, for example, simply be a plastic tubular structure that has an inlet aligned with the ion outlet opening 27b in the device housing and an ion guide outlet 27d at the end in the vicinity of the air inlet. Thus, the ion source 27 comprises an ion generator 27a, an ion outlet opening 27b in the device housing, an ion

channel 27c, and a ion guide outlet 27d for delivering ions generated by the ion generator 27a to the vicinity of the air inlet so they can be drawn into the air inlet when a user inhales on the system 400.

Thus, Figures 3 and 4 schematically represent two different arrangements of an ion source 27 for providing / delivering ions from an ion generator to the region around an air inlet for the system so the ions can be drawn into the air inlet during use. However, it will be appreciated the specific configuration by which the ion source 27 provides the ions to the vicinity of the air inlet is not significant to the principles underlying the embodiments of the disclosure as described herein.

Apart from the different arrangement for delivering the ions from the ion generator to the vicinity of the air inlet, the operation of the aerosol provision system 400 represented in Figure 4 can in essence be the same as the operation of the aerosol provision system 300 represented in Figure 3, and indeed the operation of the aerosol provision system 100 represented in Figure 1.

Figure 5 is a cross-sectional view through another example aerosol provision system 500 in accordance with certain embodiments of the disclosure. Elements and features of the aerosol provision system 500 represented in Figure 5 which are functionally similar to, and will be understood from, corresponding elements and features of the aerosol provision system 400 represented in Figure 4 are identified with corresponding reference numerals and are not discussed again in detail in the interests of brevity. The aerosol provision system 500 of Figure 5 differs from the aerosol provision system 400 of Figure 4 in respect of the functionality provided by the ion guide 27c in providing ions to the vicinity of the air inlet so as to be drawn into the air inlet during use (i.e. during user inhalation). In the example of Figure 4 the ion guide outlet 27d part of the ion source 27 is fixed in position relative to the air inlet 28. However, in the example of Figure 5 the ion guide outlet 27d part of the ion source 27 is moveable relative to the air inlet. That is to say, the position of the ion source that provides ions to the vicinity of the air inlet is adjustable relative to the air inlet.

In the example of Figure 5 the ion guide 27c is slidably mounted to the housing 12 so that it can be moved longitudinally back and forth as schematically indicated by the double-headed arrow in Figure 5, while remaining open to the ion outlet opening 27b in the device housing. This allows the relative position of the ion source and the air inlet to be adjusted, for example to change the density of ions in the vicinity of the air inlet. The density of ions at the air inlet 28 will be lower when the ion guide outlet 27d is further away from the air inlet 28 than when the ion guide outlet 27d is closer to the air inlet 28. Thus, the ability to move the relative position of the ion source and the air inlet provides the user with a simple way to moderate

the number of ions that are drawn into the aerosol provision system during use, for example to allow the user to adjust the extent to which the ions impact the inhaled aerosol.

It will be appreciated there are many other ways in which the relative position of the ion source and the air inlet can be adjusted relative to each other. For example, in an embodiment such as that represented in Figure 1, the ion source may be simply movable along the device so that it can be located at different positions relative to the air inlet. In another example which is more similar to the example of Figure 5, rather than have the ion guide channel 27c slidably mounted to the housing, the ion guide may instead simply comprise two or more nested tubes which can be slid longitudinally to move the position of the ion guide outlet 27d relative to the air inlet by changing the effective length of the ion guide channel 27c. It will also be appreciated that in other examples the position of the ion source 27 may be fixed relative to the device, and instead the position of the air inlet 28 may be adjusted, for example by providing the opening for the air inlet on a movable element. Also, whilst Figure 5 represents an approach for changing the relative position of the ion source and the air inlet by moving the ion guide outlet longitudinally, in other examples the air inlet and the ion guide outlet may be azimuthally movable relative to each other to change their separation. For example, referring to Figure 5, instead of moving the ion guide 27c longitudinally, in another example the air inlet 28 may be rotatable about the central longitudinal axis of the system so that its distance relative to the ion source can be changed.

Apart from the different arrangement for delivering the ions from the ion generator to the vicinity of the air inlet, the operation of the aerosol provision system 500 represented in Figure 5 can in essence be the same as the operation of the aerosol provision system 400 represented in Figure 4, and indeed the operation of the aerosol provision system 100 represented in Figure 1.

Figure 6 is a cross-sectional view through another example aerosol provision system 600 in accordance with certain embodiments of the disclosure. Elements and features of the aerosol provision system 600 represented in Figure 6 which are functionally similar to, and will be understood from, corresponding elements and features of the aerosol provision system 400 represented in Figure 4 are identified with corresponding reference numerals and are not discussed again in detail in the interests of brevity. The aerosol provision system 600 of Figure 6 differs from the aerosol provision system 400 of Figure 4 primarily in relation to the nature of the consumable 4. In the example of Figure 4 the consumable 4 comprises a housing 42 including a reservoir 44 of liquid and the aerosol generator 48. However, in the example of Figure 6 the consumable 4 comprises a paper wrapped tobacco rod 43 and mouthpiece 45. That is to say, while the example of Figure 4 represents a liquid-based aerosol provision system (sometimes called an e-cigarette or vaping system), the example of

Figure 6 represents a solid-based aerosol written system (sometimes called a heat-not-burn system or tobacco heating product system). The specific configuration for the solid-based consumable 2 is not significant for the principles described herein and in general the consumable may be of any conventional form.

In the example of Figure 6 the device 2 includes a receptacle 47 into which the consumable 4 is received for use. As is common for tobacco heating product systems, the consumable 4 is a close fit in the receptacle 47 so as to ensure good thermal contact between the consumable 4 and the inner wall of the receptacle 47. In that sense the consumable 4 and device 2 are in a loose friction fit relationship when coupled together for use. The aerosol generator 48 in the example of Figure 6 comprises a heating element arranged around the receptacle 47 so that when the heating element is activated, heat is transferred to the tobacco in the consumable 43. The tobacco is heated to a temperature to liberate vapours which a user inhales by inhaling on the mouthpiece 45. The air inlet of the device 2 of Figure 6 through which air is drawn into the system 600 when a user inhales on the consumable is provided by the annular gap around the consumable at the end of the open end of the receptacle 47. Thus, when a using inhales on the mouthpiece 45, air is drawn in through the inlet 28, along the outside of the tobacco rod 43, and enters the consumable at the end of the tobacco rod 43 at the closed end of the receptacle 47.

As with the example of Figure 4, the aerosol provision device 2 of Figure 6 comprises an ion source 27 that comprises an ion generator 27a in the body of the device 2, a ion outlet opening 27b aligned with the ion generator to allow ions from the ion generator 27a to enter an ion guide 27c that extends from the ion outlet opening 27b to the vicinity of the end of the receptacle 47 where the ion guide 27c terminates in an ion guide outlet 27d so that ions from the ion generator 27a are delivered to the vicinity of the air inlet through so the ions are drawn into the device when a user inhales on the consumable.

Apart from the different nature of the consumable, the operation of the aerosol provision system 600 represented in Figure 6 can in essence be the same as the operation of the aerosol provision system 400 represented in Figure 4, and indeed the operation of the aerosol provision system 100 represented in Figure 1. However, in some examples there may be some differences resulting from the different nature of the consumable. For example, the aerosol generator for a tobacco heating product will sometimes be activated for a relatively extended period compared to the duration of individual inhalations. Thus, the aerosol generator might not be puff-activated, and as such the aerosol provision device might not include an inhalation sensor, and indeed, it is assumed the example of Figure 6 does not include an inhalation sensor. Instead, the aerosol generator might be activated for a period of several minutes, for example by user input. In some examples the ion source

may be activated for the same relatively extended duration as the aerosol generator. However, in other examples the ion source may be selectively activated at desired times during the period of time that the aerosol generator is activated. For example, the ion source may be responsive to a user pressing a button, or in other examples there may still be an inhalation sensor provided and the ion source may be activated when the inhalation sensor detects that a user is inhaling on the system. More generally, apart from the additional functionality provided by the ion source, the aerosol provision system represented in Figure 6, and indeed all of the aerosol provision systems discussed herein, may function in accordance with broadly conventional techniques.

Thus there has been described an aerosol provision device comprising an aerosol generator for generating an aerosol from an aerosol-generating material for inhalation by a user; an air inlet through which air is drawn for mixing with the aerosol generated by the aerosol generator during user inhalation; and an ion source configured to provide ions in the vicinity of the air inlet so that the ions are drawn in through the air inlet during user inhalation.

There has also been described an aerosol provision system comprising an aerosol generator for generating an aerosol from an aerosol-generating material for inhalation by a user; an air inlet through which air is drawn for mixing with the aerosol generated by the aerosol generator during user inhalation; and an ion source configured to provide ions in the vicinity of the air inlet so that the ions are drawn in through the air inlet during user inhalation in combination with the aerosol forming substrate.

The various embodiments described herein are presented only to assist in understanding and teaching the claimed features. These embodiments are provided as a representative sample of embodiments only, and are not exhaustive and/or exclusive. It is to be understood that advantages, embodiments, examples, functions, features, structures, and/or other aspects described herein are not to be considered limitations on the scope of the invention as defined by the claims or limitations on equivalents to the claims, and that other embodiments may be utilised and modifications may be made without departing from the scope of the claimed invention. Various embodiments of the invention may suitably comprise, consist of, or consist essentially of, appropriate combinations of the disclosed elements, components, features, parts, steps, means, etc, other than those specifically described herein. In addition, this disclosure may include other inventions not presently claimed, but which may be claimed in future. The delivery system described herein can be implemented as a combustible aerosol provision system, a non-combustible aerosol provision system or an aerosol-free delivery system.

REFERENCES

[1] US2021128776 - IBLE TECH INC

CLAIMS

1. An aerosol provision system comprising:

an aerosol generator for generating an aerosol from an aerosol-generating material for inhalation by a user; and

an ion source configured to provide ions in the vicinity of an air inlet through which air is drawn for mixing with the aerosol generated by the aerosol generator during user inhalation so that the ions are also drawn in through the air inlet during user inhalation.

2. The aerosol provision system of claim 1, wherein the position of the ion source relative to the air inlet is adjustable.

3. The aerosol provision system of claim 1 or 2, wherein the ion source is controllable so that at least one characteristic of the ions provided by the ion source can be varied.

4. The aerosol provision system of claim 3, wherein the at least one characteristic comprises one or more of: ion density, ion energy, ion distribution, and ion charge state

5. The aerosol provision system of any of claims 1 to 4, wherein the ion source comprises an ion generator for generating ions in the vicinity of the air inlet.

6. The aerosol provision system of any of claims 1 to 4, wherein the ion source comprises an ion generator for generating ions and a guide for guiding the ions generated by the ion generator to the vicinity of the air inlet.

7. The aerosol provision system of any of claims 1 to 6, wherein the ions comprise negative ions.

8. The aerosol provision system of any of claims 1 to 7, wherein the ions comprise positive ions.

9. The aerosol provision system of any of claims 1 to 8, further comprising the aerosol-generating material.

10. The aerosol provision system of claim 9, wherein the aerosol-generating material comprises at least one of a liquid aerosol-generating material, a solid aerosol-generating

material, an amorphous solid aerosol-generating material, or a gelatinous aerosol-generating material.

11. The aerosol provision system of claim 9 or 10, wherein the aerosol provision system comprises a controller for controlling the ion source so that at least one characteristic of the ions provided by the ion source is varied in dependence of at least one property of the aerosol-generating material.

12. The aerosol provision system of claim 11, wherein the at least one property of the aerosol-generating material comprises a flavour characteristic of the aerosol-generating material.

13. The aerosol provision system of any of claims 9 to 12, wherein the aerosol-generating material comprises an active substance.

14. An aerosol provision device comprising:

an ion source configured to provide ions in the vicinity of an air inlet through which air is drawn for mixing with aerosol generated by an aerosol generator during user inhalation so that the ions are also drawn in through the air inlet during user inhalation.

15. Aerosol provision means comprising:

aerosol generating means for generating an aerosol from an aerosol-generating material for inhalation by a user; and

an ion provision means configured to provide ions in the vicinity of an air inlet means through which air is drawn for mixing with the aerosol generated by the aerosol generating means during user inhalation so that the ions are also drawn in through the air inlet means during user inhalation.

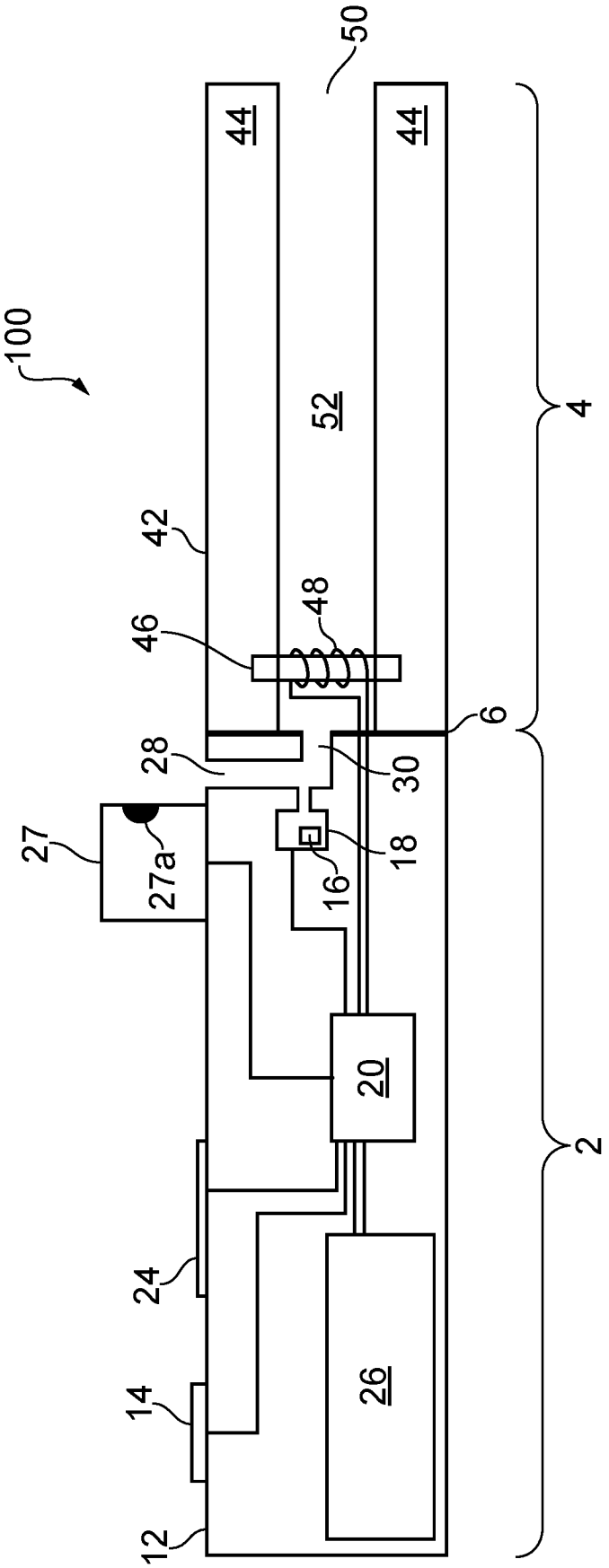


FIG. 1

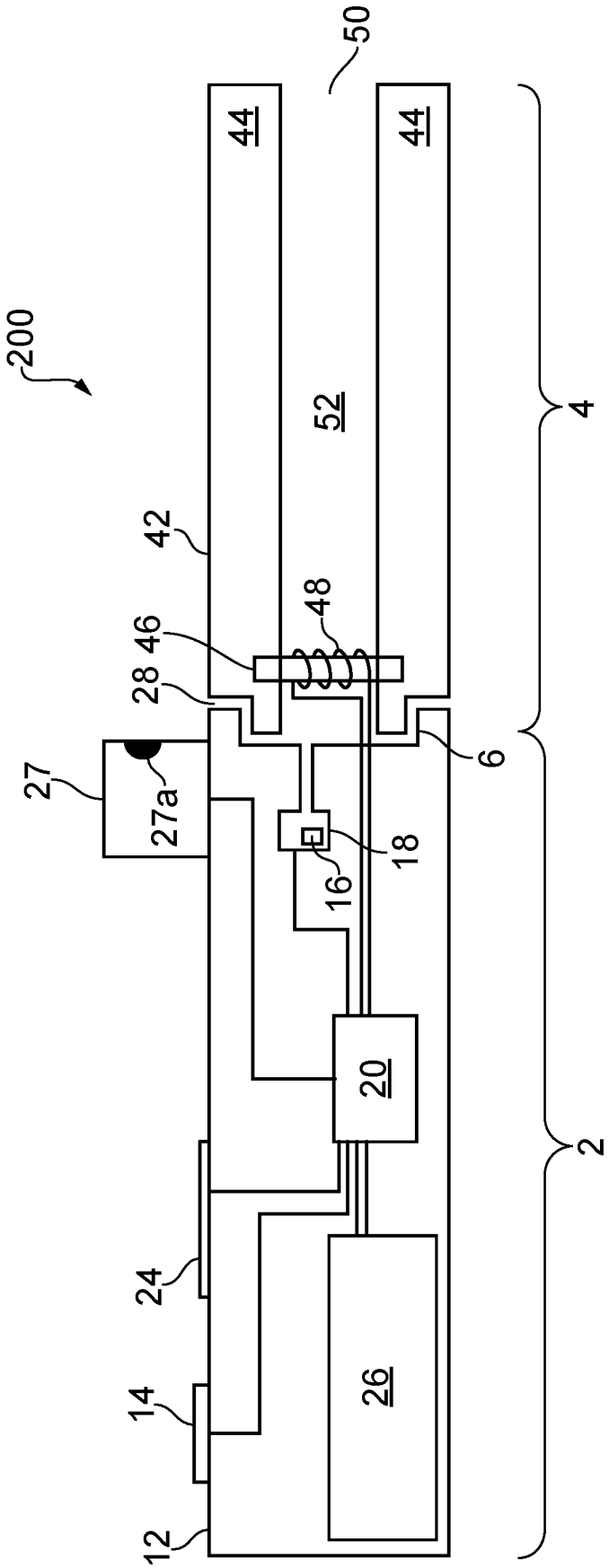


FIG. 2

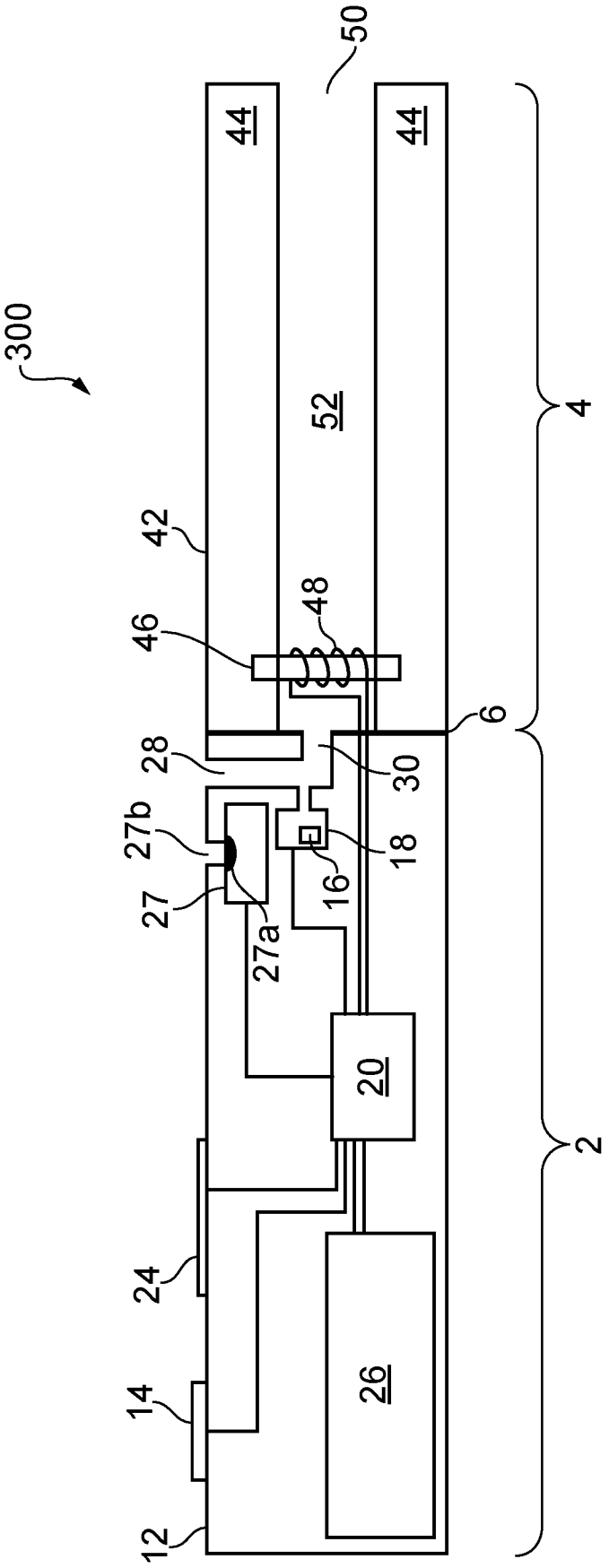


FIG. 3

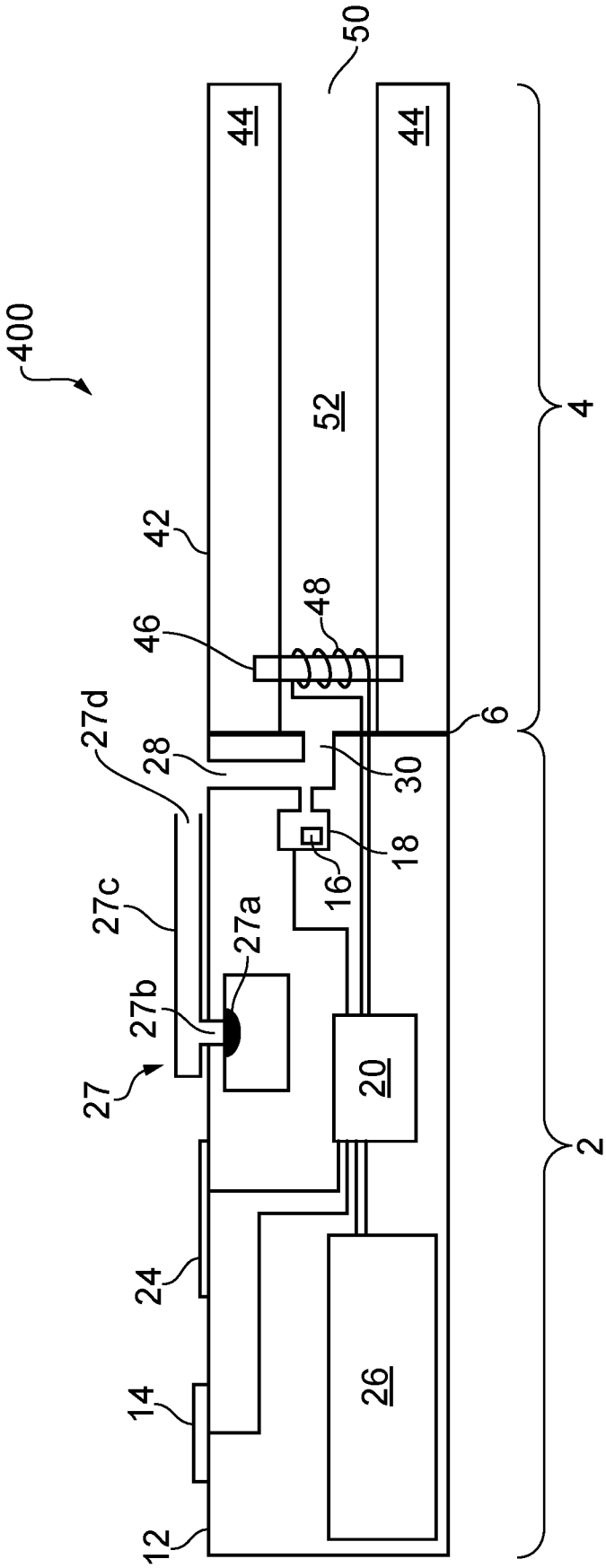

400
50
44
44
52
4
42
48
46
6
27d
28
30
18
16
27c
27a
27b
27
20
2
24
26
14
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FIG. 4

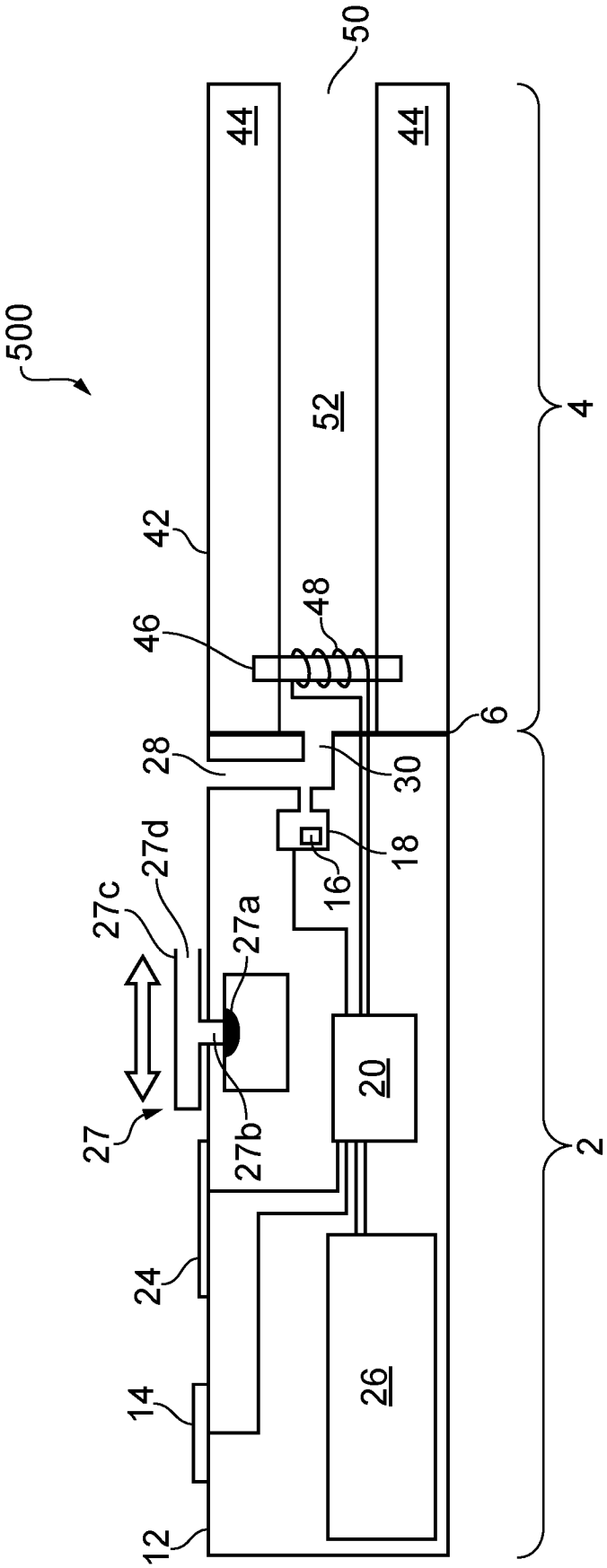

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FIG. 5

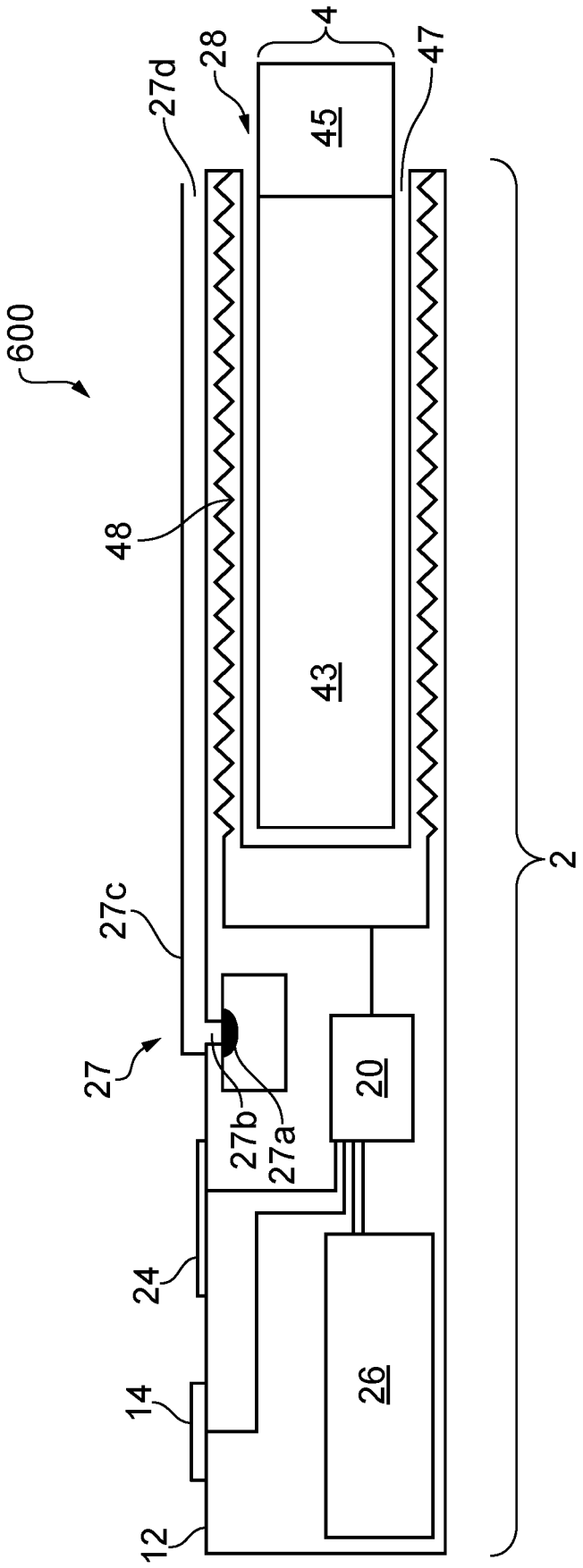


FIG. 6

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2024/052542

A. CLASSIFICATION OF SUBJECT MATTER
INV. A24F40/48 A24F40/50 A61M15/02
ADD.

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A24F A61M A61L

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

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	KR 2012 0090737 A (EBACO CO LTD) 17 August 2012 (2012-08-17)	1-7,9-15
Y	the whole document	8
	- - - - -	
X	CN 205 390 308 U (XIE HONGYI) 27 July 2016 (2016-07-27)	1,3,4,6, 7,9-15
Y	the whole document	8
	- - - - -	
X	CN 115 104 768 A (SHENZHEN CITY HENGERCHUANG TECH CO LTD) 27 September 2022 (2022-09-27)	1,3-5,7, 9-15
Y	the whole document	8
	- - - - -	
Y	JP 2006 087446 A (SHARP KK) 6 April 2006 (2006-04-06)	8
A	the whole document	1-7,9-15
	- - - - -	

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
15 January 2025	04/02/2025

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

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

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/GB2024/052542

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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CN 205390308 U	27-07-2016	NONE	
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JP 2006087446 A	06-04-2006	JP 4527483 B2	18-08-2010
		JP 2006087446 A	06-04-2006