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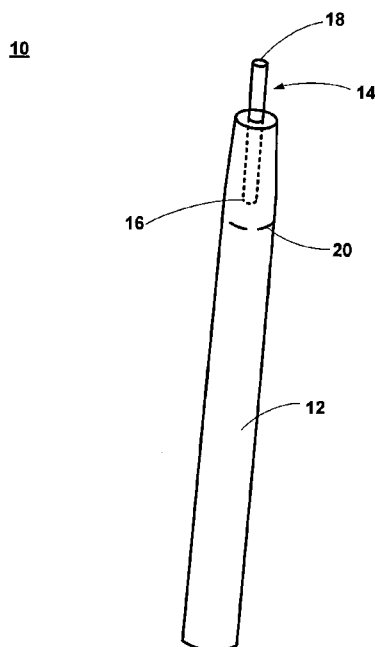


FIG. 1

(57) **Abstract:** There is disclosed an aerosol delivery system comprising: an aerosol-generating device (12) comprising: - a device housing having an open-ended heating chamber configured to receive a carrier cartridge (14); - a heater element (24) disposed within the heating chamber (22) and configured to receive at least a first end of a carrier cartridge (14), said heating element operable to heat a carrier substrate of a carrier unit of said carrier cartridge (14) to cause release of an aerosol-forming precursor therefrom to generate an aerosol when gas is passed through the carrier cartridge (14); and - a carrier cartridge comprising a carrier unit (34), said carrier unit comprising a carrier substrate configured to hold an aerosol-forming precursor comprising a nicotine-containing and/or flavoured fluid, gel, wax, or powder. Also disclosed are a carrier cartridge (14), carrier unit (34), methods of manufacturing one or more components of said system, and a kit-of-parts for assembling the system.



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System, Apparatus and Method

Technical Field

The present invention relates to a system and apparatus for aerosol delivery and methods of manufacturing one or more components of said system. In particular, the present invention relates to a system and method for releasing an aerosol from a carrier substrate holding an aerosol-forming precursor by heating of the carrier substrate.

Background

Aerosol delivery devices and systems fall into two broad categories: a first, non-powered category and a second, powered category.

10 Devices or systems in the first category may comprise nicotine replacement therapy devices such as "inhalators", e.g. Nicorette® Inhalator. Inhalators generally allow nicotine-containing aerosol to be inhaled through an elongate tube in which a container containing a nicotine carrier, for example, a substrate, is located. An air stream caused by suction through the tube by the user carries nicotine vapours into the lungs of the user to satisfy a nicotine craving. The container may comprise a replaceable cartridge, which includes a cartridge housing and a passageway in the housing in which a nicotine reservoir is located. The reservoir holds a measured amount of nicotine in the form of the nicotine carrier. The measured amount of nicotine is an amount suitable for delivering a specific number of "doses". The form of the nicotine carrier is such as to allow nicotine vapour to be released into a fluid stream passing around or through the reservoir. The passageway generally has an opening at each end for communication with the exterior of the housing and for allowing the fluid stream through the passageway. A nicotine-impermeable barrier seals the reservoir from atmosphere. The barrier includes passageway barrier portions for sealing the passageway on both sides of the reservoir.

20 These barrier portions are frangible so as to be penetrable for opening the passageway to atmosphere.

 Devices or systems in the second category can fall into two sub-categories. In both sub-categories, such devices or systems may comprise electronic devices or systems that permit a user to simulate the act of smoking by producing an aerosol mist or vapour that is drawn into the lungs through the mouth and then exhaled. The inhaled aerosol mist or vapour typically bears nicotine and/or other flavourings without, or with fewer of, the

30

odour and health risks associated with traditional smoking and tobacco products. In use, the user experiences a similar satisfaction and physical sensation to those experienced from a traditional smoking or tobacco product, and exhales an aerosol mist or vapour of similar appearance to the smoke exhaled when using such traditional smoking or tobacco products.

Aerosol delivery devices or systems in a first sub-category of the second, powered category generally use heat and/or ultrasonic agitation to vaporize a solution comprising nicotine and/or other flavouring, propylene glycol and/or glycerine-based base into an aerosol mist of vapour for inhalation.

Aerosol delivery devices or systems in a second sub-category of the second, powered category may typically comprise devices or systems in which tobacco is heated rather than combusted. During use, volatile compounds may be released from the tobacco by heat transfer from the heat source and entrained in air drawn through the aerosol delivery device or system. Direct contact between a heat source of the aerosol delivery device or system and the tobacco heats the tobacco to form an aerosol. As the aerosol containing the released compounds passes through the device, it cools and condenses to form an aerosol for inhalation by the user. In such devices or systems, heating, as opposed to burning, the tobacco may reduce the odour and health risks that can arise through combustion and pyrolytic degradation of tobacco.

Although use of aerosol delivery devices or systems of the second sub-category of powered devices or systems may have fewer associated health risks than use of traditional smoking or tobacco products, the health risks to users may be greater than those experienced through use of aerosol delivery devices or systems of the first sub-category of powered devices or systems. However, aerosol delivery devices or systems of the second sub-category of powered devices or systems may be preferable over those of the first sub-category to some users because of the user experience that devices in this sub-category provide, i.e. a perceived similar satisfaction and perceived similar physical sensations to those experienced from using a traditional smoking or tobacco product. These similarities may be perceived due to the user inhaling a warmed aerosol resulting from the heating of tobacco.

Aerosol delivery devices or systems falling into the second sub-category of powered devices or system may typically comprise a powered unit, comprising a heating element, into which can be inserted a cartridge comprising tobacco. The cartridge may resemble a traditional cigarette and may be generally cylindrical in form with a “mouthpiece” at one end through which the user can draw the aerosol mist or vapour for inhalation. The heating element penetrates an end of the cartridge remote from the mouthpiece end and directly contacts the tobacco within the cartridge. The cartridge may provide for a limited number of inhalations or “puffs” before the tobacco content is depleted. The cartridges, therefore, are disposable and replaceable.

A potential drawback associated with aerosol delivery devices or systems falling within the second sub-category of powered devices or systems may arise due to heating of tobacco. Whilst the health risks to users of such devices may be lessened somewhat compared to use of traditional smoking or tobacco products, potentially harmful by-products may be released during the heating of tobacco and so some health risks may remain.

A further potential drawback may arise due to the arrangement of the tobacco around the heating element when the cartridge is in-situ in the device. It may not be possible to achieve uniform heating of the tobacco across the width of the cartridge, because of a decreasing temperature gradient away from the heating element. That is, tobacco in direct contact with the heating element will be heated by a greater amount than tobacco that is further away from the heating element. To ensure that volatile compounds are extracted from all of the tobacco in the cartridge, the heating element must be heated by an amount to ensure that heat sufficient to cause release of the volatile compounds from the tobacco reaches even the outermost parts of the tobacco “charge”. However, the temperature that the heating element provides to ensure that the outermost regions of the tobacco “charge” are heated sufficiently may be great enough to cause pyrolysis in regions of the tobacco “charge” that directly contact or are closer to the heating element.

Aspects and embodiments of the invention were devised with the foregoing in mind.

Brief Summary of the Present Invention

According to an aspect of the present invention, there is provided an aerosol delivery system comprising:

5 an aerosol-generating device comprising:

a device housing having an open-ended heating chamber configured to receive a carrier cartridge;

a heater element disposed within the heating chamber and configured to receive at least a first end of a carrier cartridge, said heating element operable to
10 heat a carrier substrate of a carrier unit of said carrier cartridge to cause release of an aerosol-forming precursor therefrom to generate an aerosol when gas is passed through the carrier cartridge; and

a carrier cartridge comprising a carrier unit, said carrier unit comprising a carrier substrate configured to hold an aerosol-forming precursor comprising a nicotine-
15 containing and/or flavoured fluid, gel, wax, or powder.

Optionally, the heating element may be configured to penetrate the carrier substrate.

Optionally, the carrier substrate may comprise a sheet material formed from heat-resistant material.

20 Employing a heat-resistant material may prevent degradation (e.g. by pyrolysis) occurring in the substrate material when heat is applied to the substrate material. This is because production of smoke (caused by pyrolysis of a substrate matrix material) may be undesirable.

Optionally, the sheet material may be folded in a substantially concertina
25 arrangement.

Optionally, the sheet material may be folded in a random manner to form folds of said sheet material that are randomly oriented with respect to other folds of said sheet material.

Optionally, the substrate may comprise a plurality of layers of sheet material, each
30 layer oriented in a random manner with respect to other layers of said material.

Optionally, the carrier cartridge may be tubular and may comprise sheet material, and wherein a second end of the carrier cartridge may be configured to form a mouthpiece for a user.

5 Optionally, the heat-resistant material may comprise a paper or paper matrix composite.

Optionally, the heat-resistant material may comprise a plastic or plastic matrix composite.

Optionally, the heat-resistant material may comprise comprises a ceramic or ceramic matrix composite.

10 The ceramic or ceramic matrix composite may provide a level of resilience to prevent damage to the substrate during insertion of the heater element into the aerosol carrier cartridge. This resilience may also assist with easing insertion of the heater element into the substrate of the aerosol carrier cartridge, because the material may deflect away from the heater element as it is being inserted, but return back towards its
15 starting point to form a contact around the heater element, when so inserted. This may enhance the thermal contact of the substrate to the heater element and may improve heat transfer from the heater element to the substrate of the aerosol carrier cartridge.

Further optionally, the ceramic composite may comprise alumina-silicate fibres.

20 Optionally, the carrier substrate may be impregnated with said aerosol-forming precursor.

Optionally, the carrier substrate may be coated with said aerosol-forming precursor.

Optionally, the carrier substrate may be configured to hold and release extracts from a tobacco plant.

25 Optionally, the carrier cartridge may comprise a cooling element disposed adjacent to the carrier unit for cooling fluid released from said aerosol-forming precursor during heating.

Optionally, the cooling element may comprise a plurality of cooling formations.

30 Optionally, the carrier cartridge may further comprise a housing for said carrier unit, or said carrier unit and said cooling element.

Optionally, an exterior surface of the carrier unit may be formed from heat-resistant material configured to surround said carrier substrate.

Optionally, the carrier unit may comprise a first substrate comprising the aerosol-generating precursor and a thermally conductive second substrate configured to conduct
5 heat from the heater element to the first substrate to cause release of said aerosol-forming precursor therefrom.

Optionally, the first substrate may comprise an annular ring disposed around the second substrate.

Optionally, the second substrate may comprise an opening for receiving the
10 heating element.

Optionally, the carrier unit may further comprise an isolation layer that separates the first substrate and the second substrate to isolate the heating element from aerosol-generating precursor.

According to another aspect of the present invention, there is provided a carrier
15 cartridge for a system for aerosol delivery, the carrier cartridge at an end thereof configured for insertion into a heating chamber of a device operative to initiate and maintain release of an aerosol from a carrier unit in said carrier cartridge, and another end of said carrier cartridge configured for insertion into a mouth of a user, the carrier cartridge comprising:

20 a carrier unit, said carrier unit comprising a carrier substrate configured to hold an aerosol-forming precursor comprising a nicotine-containing and/or flavoured fluid, gel, wax, or powder.

Optionally, the carrier substrate may be configured to be penetrable by a heater element of said device.

25 Optionally, the carrier substrate may comprise sheet material formed from heat-resistant material.

Optionally, the sheet material may be folded in a substantially concertina arrangement.

Optionally, the sheet material may be folded in a random manner to form folds of
30 said sheet material that are randomly oriented with respect to other folds of said sheet material.

Optionally, the substrate may comprise a plurality of layers of sheet material, each layer oriented in a random manner with respect to other layers of said material.

Optionally, the carrier cartridge may be tubular and may comprise sheet material,
5 and wherein a second end of the carrier cartridge is configured to form a mouthpiece for a user.

Optionally, the heat-resistant material may comprise a paper or paper matrix composite.

Optionally, the heat-resistant material may comprise a plastic or plastic matrix
10 composite.

Optionally, the heat-resistant material may comprise a ceramic or ceramic matrix composite.

Optionally, the ceramic composite may comprise alumina-silicate fibres.

Optionally, the carrier substrate may be impregnated with said aerosol-forming
15 precursor.

Optionally, the carrier substrate may be coated with said aerosol-forming precursor.

Optionally, the carrier substrate may be configured to hold and release extracts from a tobacco plant.

Optionally, the carrier cartridge may comprise a cooling element disposed
20 adjacent to the carrier unit for cooling fluid released from said aerosol-forming precursor during heating.

Optionally, the cooling element may comprise a plurality of cooling formations.

Optionally, the carrier cartridge may further comprise a housing for said carrier
25 unit, or for said carrier unit and said cooling element.

Optionally, an exterior surface of said carrier unit may be formed from heat-resistant material configured to surround said carrier substrate.

Optionally, the carrier unit may comprise a first substrate comprising said aerosol-generating precursor and a thermally conductive second substrate configured to conduct
30 heat from the heater element to the first substrate to cause release of said aerosol-forming precursor therefrom.

Optionally, the first substrate may comprise an annular ring disposed around the second substrate.

Optionally, the second substrate may comprise an opening for receiving the heating element.

5 Optionally, the carrier unit may further comprise an isolation layer that separates the first substrate and the second substrate to isolate the heating element from aerosol-generating precursor.

10 According to another aspect of the present invention, there is provided a carrier unit for a nicotine carrier cartridge, the nicotine carrier unit comprising a carrier substrate that comprises an aerosol-forming precursor comprising a nicotine-containing and/or flavoured fluid, gel, wax, or powder.

Optionally, the carrier substrate may be configured to be penetrable by a heater element of a device operative to initiate and maintain release of an aerosol from said carrier unit.

15 Optionally, the carrier substrate may comprise sheet material formed from heat-resistant material.

Optionally, the sheet material may be folded in a substantially concertina arrangement.

20 Optionally, the sheet material may be folded in a random manner to form folds of said sheet material that are randomly oriented with respect to other folds of said sheet material.

Optionally, the substrate may comprise a plurality of layers of sheet material, each layer oriented in a random manner with respect to other layers of said material.

25 Optionally, the heat-resistant material may comprise a paper or paper matrix composite.

Optionally, the heat-resistant material may comprise a plastic or plastic matrix composite.

Optionally, the heat-resistant material may comprise a ceramic or ceramic matrix composite.

30 Optionally, the ceramic composite may comprise alumina-silicate fibres.

Optionally, the carrier substrate may be impregnated with said aerosol-forming precursor.

Optionally, the carrier substrate may be coated with said aerosol-forming precursor.

5 Optionally, the carrier substrate may be configured to hold and release extracts from a tobacco plant.

Optionally, an exterior surface of said carrier unit may be formed from heat-resistant material configured to surround said carrier substrate.

10 Optionally, the carrier unit may comprise a first substrate comprising said aerosol-generating precursor and a thermally conductive second substrate configured to conduct heat from a heater element of a device operative to initiate and maintain release of an aerosol from said carrier unit to the first substrate to cause release of said aerosol-forming precursor therefrom.

15 Optionally, the first substrate may comprise an annular ring disposed around the second substrate.

Optionally, the second substrate may comprise an opening for receiving the heater element.

20 Optionally, the carrier unit may further comprise an isolation layer that separates the first substrate and the second substrate to isolate the heater element from aerosol-generating precursor.

According to another aspect of the present invention, there is provided a method of manufacturing a sheet material for forming a carrier substrate of a carrier unit, comprising:

25 combining, to form a mixture, a sheet precursor material and an aerosol-forming precursor comprising a nicotine-containing and/or flavoured fluid, gel, wax, or powder; forming from said mixture a sheet material.

Optionally, said sheet material may comprise a heat-resistant sheet material.

30 According to another aspect of the present invention, there is provided a method of manufacturing a carrier unit, comprising folding sheet material manufactured as

described above and hereinafter in at least one of: a substantially concertina arrangement; and a random manner to form folds of said sheet material that are randomly oriented with respect to other files of said sheet material.

Optionally, the method may further comprise layering a plurality of layers of said
5 sheet material, each layer oriented in a random manner with respect to other layers of said material.

Optionally, said sheet material may comprise at least one of: a paper or paper matrix composite.

Optionally, said sheet material may comprise at least one of: a paper or paper
10 matrix composite; a plastic or plastic matrix composite; and a ceramic or ceramic matrix composite.

Optionally, the ceramic composite or ceramic matrix composite may comprise alumina-silicate fibres.

Optionally, the method may further comprise impregnating said sheet material
15 with an aerosol-forming precursor.

Optionally, the method may further comprise coating said sheet material with an aerosol-forming precursor.

Optionally, the aerosol-forming precursor may comprise extracts from a tobacco plant.

Optionally, the method may further comprise forming an exterior surface of said
20 carrier unit from heat-resistant material configured to surround said sheet material.

Optionally, the method may further comprise forming a first substrate comprising an aerosol-generating precursor and forming a thermally conductive second substrate configured to conduct heat to the first substrate to cause release of said aerosol-forming
25 precursor therefrom.

Optionally, the first substrate may comprise an annular ring disposed around the second substrate.

Optionally, the method may further comprise forming an opening in said second substrate for receiving a heater element of a device operative to initiate and maintain
30 release of an aerosol from said carrier unit.

Optionally, the method may further comprise forming an isolation layer between said first substrate and said second substrate.

According to another aspect of the present invention, there is provided a kit-of-parts for assembling a system for aerosol delivery, comprising:

5 an aerosol-generating device comprising:

a device housing having an open-ended heating chamber configured to receive a carrier cartridge;

10 a heater element disposed within the heating chamber and configured to receive at least a first end of a carrier cartridge, said heating element operable to heat a carrier substrate of a carrier unit of said carrier cartridge to cause release of an aerosol-forming precursor therefrom to generate an aerosol when gas is passed through the carrier cartridge; and

a carrier cartridge comprising a carrier unit, said carrier unit comprising a carrier substrate configured to hold an aerosol-forming precursor comprising a nicotine-
15 containing and/or flavoured fluid, gel, wax, or powder.

Brief Description of the Drawings

One or more embodiments in accordance with aspects of the present invention will be described, by way of example only, and with reference to the following drawings
20 in which:

Fig. 1 is a perspective view illustration of a system for aerosol delivery according to one or more embodiments of the present invention;

Fig. 2 is a cross-sectional side view illustration of part of a device of the system for aerosol delivery of Fig. 1;

25 Fig. 3 is a cross-sectional side view illustration of the system and device for aerosol delivery of Fig. 1;

Fig. 4 is a perspective view illustration of an aerosol carrier cartridge for use in the system for aerosol delivery according to one or more embodiments of the present invention;

30 Fig. 5 is perspective view illustration of internal elements of the aerosol carrier cartridge of Fig. 4; and

Fig. 6 is an exploded perspective view illustration of the aerosol carrier cartridge of Fig. 4;

Fig. 7 is an exploded perspective view illustration of a kit-of-parts for assembling a system according to one or more embodiments of the present invention; and

5 Fig. 8 is a perspective view illustration of an optional arrangement of a carrier unit of a carrier cartridge according to one or more embodiments of the present invention.

Detailed Description of the Invention

In general outline, one or more embodiments in accordance with the present
10 invention provide a system for aerosol delivery in which an end, or an end portion, of an aerosol carrier cartridge may be inserted into a heating chamber of a device for initiating and maintaining release of an aerosol from the aerosol carrier cartridge. Another end, or another end portion, of the aerosol carrier cartridge protrudes from the device and can be inserted into the mouth of a user for the inhalation of aerosol released from the aerosol
15 carrier cartridge during operation of the device.

Hereinafter, and for convenience only, "system for aerosol delivery" shall be referred to as "aerosol delivery system".

Referring now to Fig. 1, there is a perspective view of an aerosol delivery system
10 comprising a device 12 operative to initiate and maintain release of aerosol from a carrier unit in an aerosol carrier cartridge and an aerosol carrier cartridge 14. In Fig. 1, the aerosol carrier cartridge 14 is shown with a first end 16 thereof and a portion of the length of the aerosol carrier cartridge 14 located within a heating chamber of the device 12. A remaining portion of the aerosol carrier cartridge 14 extends out of the heating chamber. This remaining portion of the aerosol carrier cartridge 14, terminating at a
20 second end 18 of the aerosol carrier cartridge, is configured for insertion into a user's mouth. A vapour and/or aerosol is produced when a heater element (not shown) of the device 12 heats an aerosol carrier unit in the aerosol carrier cartridge 14 to release a vapour and/or an aerosol, and this can be delivered to the user, when the user sucks or inhales, via a fluid passage through the aerosol carrier cartridge 14 from the aerosol
25 carrier unit to the second end 18.
30

The device 12 also comprises air-intake apertures 20 in the housing of the device 12 to provide a passage for air to be drawn into the interior of the device 12 (when the user sucks or inhales) for delivery to the first end 16 of the aerosol carrier cartridge 14, so that the air can be drawn through the aerosol carrier cartridge 14 during use. Optionally,
5 these apertures may be perforations in the housing of the device 12.

An aerosol carrier unit (not shown in Fig. 1, but see Figs. 5 and 6), such as, for example, an aerosol capsule, is located at the first end 16 of the aerosol carrier cartridge 14. The carrier unit contains at least one of: nicotine; a nicotine precursor material; a nicotine compound; and one or more flavourings, and is configured to allow air drawn
10 into the aerosol carrier cartridge 14 from the first end 16 to flow therethrough. The nicotine, nicotine precursor material, nicotine compound, and/or one or more flavourings may be contained in an aerosol precursor material. The aerosol precursor material may comprise one or more of: a fluid; a gel; a wax; or a powder. As air passes through the carrier unit, an aerosol may be entrained in the air stream from a carrier substrate within
15 the aerosol carrier unit bearing the nicotine, nicotine precursor material, nicotine compound and/or one or more flavourings, e.g. via diffusion.

The aerosol carrier cartridge 14 is removable from the device 12 so that it may be disposed of when expired. After removal of a used aerosol carrier cartridge 14 a replacement aerosol carrier cartridge 14 can be inserted into the device 12 to replace the
20 used aerosol carrier cartridge 14.

Figure 2 is a cross-sectional side view illustration of a part of device 12 of the aerosol delivery system 10.

The device 12 comprises a heating chamber 22 in which is located a portion of the aerosol carrier cartridge 14. The device 12 also comprise a heater element 24, which
25 extends into the heating chamber 22, and which is configured to penetrate the aerosol carrier cartridge 14 through the first end 16 of the aerosol carrier cartridge 14.

The aerosol carrier cartridge 14 can be inserted into the heating chamber 22 such that the heater element 24 penetrates the first end 16 of the aerosol carrier cartridge 14 and extends into the aerosol carrier unit (not shown) of the aerosol carrier cartridge 14.

30 As described above, air flows into the device 12 (in particular, into a closed end of the heating chamber 22) via the air-intake apertures 20. From the closed end of the

heating chamber 22, the air is drawn through the aerosol carrier cartridge 14 (under the action of the user inhaling or sucking on the second end 18) and expelled at second end 18. As the air flows through the aerosol carrier unit (heated by operation of the heater element 14), aerosol released, or liberated, from the aerosol carrier unit through the heating action, is drawn from the material of the aerosol carrier unit by the air flowing therethrough and is transported in the air flow to the second end 18. The direction of air flow is illustrated by arrows in Fig. 2.

To achieve release of the captive aerosol from the aerosol carrier unit, the aerosol carrier unit of the aerosol carrier cartridge 14 is heated by the heater element 24. As a user sucks or inhales on second end 18 of the aerosol carrier cartridge 14, the aerosol released from the aerosol carrier unit is drawn through the aerosol carrier cartridge 14 towards the second end 18 and onwards into the user's mouth.

Turning now to Fig. 3, a cross-sectional side view of the aerosol delivery system 10 is schematically illustrated showing the features described above in relation to Figs. 1 and 2 in more detail.

As can be seen, device 12 comprises a housing 26, in which are located the heating chamber 22 and heater element 24. The housing 26 also contains control circuitry (not shown) operative by a user, or upon detection of air and/or vapour being drawn into the device 12 through air-intake apertures 20, i.e. when the user sucks or inhales. Additionally, the housing 26 comprises an electrical energy supply 28, for example a battery. Optionally, the battery comprises a rechargeable lithium ion battery. The housing 26 also comprises a coupling 30 for electrically (and optionally mechanically) coupling the electrical energy supply 28 to control circuitry (not shown) for powering and controlling operation of the heater element 24.

Responsive to activation of the control circuitry of device 12, the heater element 24 heats the aerosol carrier unit (not shown) of aerosol carrier cartridge 14. This heating process initiates (and, through continued operation, maintains) release of vapour and/or an aerosol from the aerosol carrier unit. The vapour and/or aerosol formed as a result of the heating process is entrained into a stream of air being drawn therethrough (as the user sucks or inhales). The stream of air with the entrained vapour and/or aerosol exits the aerosol carrier cartridge 14 at second end 18 for delivery to the user.

This process is briefly described above in relation to Fig. 2., where arrows schematically denote the flow of the air stream into the device 12 and through the aerosol carrier cartridge 14, and the flow of the air stream with the entrained vapour and/or aerosol through the aerosol carrier cartridge 14.

5 Figs. 4 to 6 schematically illustrate the aerosol carrier cartridge 14 in more detail. Fig. 4 illustrates an exterior of the aerosol carrier cartridge 14, Fig. 5 illustrates internal components of the aerosol carrier cartridge 14 in one or more embodiments of the present invention, and Fig. 6 illustrates all components of the aerosol carrier cartridge 14 in an exploded view.

10 Fig. 4 illustrates the exterior of the aerosol carrier unit 14, which comprises housing 32 for housing said aerosol carrier unit (not shown) and at least one other internal component. The housing 32 comprises a hollow tubular member, or sleeve, which may be cylindrical in form.

Fig. 5 illustrates internal components of the aerosol carrier cartridge 14. As
15 described above, the aerosol carrier cartridge 14 comprises an aerosol carrier unit 34, but optionally may also further comprise a cooling element. Further optional components may comprise a compression-resistant spacer and/or a filter element. In an optional arrangement, the aerosol carrier cartridge 14 comprises the aerosol carrier unit 34 only. In another optional arrangement, the aerosol carrier cartridge 14 comprises the aerosol
20 carrier unit 34 and the cooling element. In yet another optional arrangement, the aerosol carrier cartridge 14 comprises the aerosol carrier unit 34, the cooling element and at least one of the compression-resistant spacer and the filter element.

In Fig. 5, aerosol carrier cartridge 14 is shown as comprising the aerosol carrier unit 34, a compression-resistant spacer 36, a cooling element 38 and a filter element 40 in
25 coaxial alignment. As can be seen, the components are arranged sequentially such that a first end of the compression-resistant spacer 36 abuts a second end of the aerosol carrier unit 34, a first end of the cooling element 38 abuts a second end of the compression-resistant spacer 36 and a first end of the filter element 40 abuts a second end of the cooling element 38. A first end of the aerosol carrier unit 34 corresponds to the first end
30 of the aerosol carrier cartridge 14 and a second end of the filter element 40 corresponds to the second end of the aerosol carrier cartridge.

Housing 32 of the aerosol carrier cartridge 14 (illustrated in Fig. 4) is configured to house the components illustrated in Fig. 5.

The aerosol carrier unit 34 is located at an “upstream” end of the aerosol carrier cartridge 14.

5 For the avoidance of doubt, the term “upstream” defines a position towards the point at which air will be drawn into the aerosol carrier cartridge 14 when it is in use, i.e. a point from which air is drawn into aerosol carrier cartridge 14 from an interior of the device 12 (but which has been drawn into the device 12 from atmosphere). The term “downstream” defines a position from the point at, or after, which air containing the
10 vapour and/or aerosol exits the aerosol carrier cartridge 14.

In one or more embodiments of the present invention, the aerosol carrier unit 32 comprises a substrate that holds aerosol-forming precursor. The precursor may comprise nicotine and/or flavours. The precursor may comprise at least one of: fluid; gel; wax; and powder. The substrate optionally may comprise a heat-resistant carrier material.
15 Employing a heat-resistant carrier may prevent pyrolysis occurring in the substrate material. This is because production of smoke (caused by pyrolysis of a substrate matrix material) may be undesirable. The heat-resistant carrier optionally may comprise a plurality of pores and/or spaces and/or channels and/or conduits for holding the aerosol-forming precursor. In one or more embodiments, the aerosol-forming precursor
20 comprises nicotine and/or nicotine compounds and/or flavours. The precursor material is configured to release an aerosol and/or vapour upon heating. Thus, as the substrate matrix material containing the precursor material is heated, the substances within the precursor material, and captively held, are released into an air stream flowing through the nicotine carrier unit 34 as an aerosol and/or vapour.

25 Optionally, the precursor material comprises a tobacco-plant extract material. The tobacco-plant extract material may comprise nicotine-containing wax extracted from a tobacco-plant starting material. The nicotine-containing wax may also include flavours. The tobacco-plant extract material may be extracted from tobacco plant starter material using a supercritical fluid extraction process, which may employ a conventional
30 supercritical fluid extraction process or otherwise.

The substrate optionally comprises a sheet material formed from the heat-resistant carrier material. This sheet material may be folded in a random manner to form folds of said sheet material that are randomly oriented with respect to other folds of said sheet material (e.g. with spaces between adjacent layers caused by the folding providing the spaces, conduits and/or channels). Alternatively, or additionally, the sheet material may comprise a plurality of layers of sheet material formed from the heat-resistant carrier material, each layer oriented in a random manner with respect to other layers of said material. Again, spaces between adjacent layers may provide the spaces, conduits and/or channels.

10 The configuration of the sheet material of the heat-resistant carrier to include at least one of pores, spaces, channels and conduits, may provide multiple entry points (and insertion paths) to lessen the force required to insert the heater element 24 of the device 12 into the aerosol carrier cartridge 14. That is, they may ease an insertion of the heater element 24 into the aerosol carrier cartridge 14. Additionally, providing multiple layers 15 (through folding a single sheet, layering multiple sheets, or a combination of the two) and orienting the layers in a random manner to provide the pores, spaces, conduits and/or channels, permit air to flow through the substrate of the aerosol carrier unit 34 and also increase the surface area of the substrate that is available for contact with a flow of air therethrough.

20 The heat-resistant carrier may comprise a ceramic material, optionally a ceramic matrix composite, further optionally ceramic paper, and yet further optionally alumina-silicate fibres. The ceramic material may provide a level of resilience to prevent damage to the substrate during insertion of the heater element 24 into the aerosol carrier cartridge 14. This resilience may also assist with easing insertion of the heater element 24 into the substrate of the aerosol carrier cartridge 14, because the material may deflect away from the heater element 24 as it is being inserted, but return back towards its starting point to form a contact around the heater element 24, when so inserted. This may enhance the thermal contact of the substrate to the heater element 24 and may improve heat transfer from the heater element 24 to the substrate of the aerosol carrier cartridge 14.

30 The aerosol carrier unit 34 may further comprise a sheet of heat-resistant material surrounding the substrate. Optionally, this heat-resistant material may comprise the same

material as the heat resistant carrier of the substrate, but other heat-resistant materials may also be suitable.

The substrate material for the aerosol carrier unit 34 may be manufactured by combining a heat-resistant carrier precursor material and a tobacco-plant extract material such as the wax referred to earlier to form a mixture. From the mixture, a sheet material may be formed that comprises the heat-resistant carrier that holds the tobacco-plant extract material. As described above, the tobacco-plant extract material may be extracted from tobacco plant starter material using a supercritical fluid extraction process. Optionally, the substrate material for the aerosol carrier unit 34 may be manufactured by adding constituent materials for forming the heat-resistant material to constituent materials for forming the aerosol-forming precursor (i.e. comprising constituent materials for forming the heat-resistant material may be added to a nicotine-containing and/or flavoured fluid, gel, wax, or powder). Both sets of materials are mixed to form a mixture and then the mixture is formed into a sheet to form said sheet material. The constituent materials for forming the heating-resistant material may comprise alumina fibres and/or silica fibres and/or alumina powder and/or silica powder.

Manufacture of the aerosol carrier unit 34 itself may comprise folding, in a random manner, sheet material manufactured according to process described above, to form folds of said sheet material that are randomly oriented with respect to other folds. Alternatively, or additionally, a plurality of layers of said sheet may be layered (and optionally folded) to form the carrier unit 34.

The compression-resistant spacer 36 is located immediately downstream of the aerosol carrier unit 34 and abuts the aerosol carrier unit 34. In one of more embodiments of the present invention, the compression-resistant spacer 36 comprises a hollow tube. Optionally, the hollow tube may be formed from cellulose acetate. The compression-resistant spacer 36 is configured to locate the aerosol carrier unit 34 at the upstream end of the aerosol carrier cartridge 14 so that it can be penetrated by the heater element 24 of device 12. The compression-resistant spacer 36 may serve to inhibit downstream movement of the aerosol carrier unit 34 within the aerosol carrier cartridge 14 when the heater element 24 of device 12 is inserted into aerosol carrier unit 34. The compression-

resistant spacer 36 also serves to space the cooling element 38 from the aerosol carrier unit 34.

The cooling element 38 is located immediately downstream of the compression-resistant spacer 36 and abuts the compression-resistant spacer 36. In use, the air stream entrained with an aerosol and/or vapour released from the aerosol carrier unit 34 pass
5 through the cooling element 38 towards the second end 18 of the of the aerosol carrier cartridge 14. Hereinafter, compounds and/or flavours and/or any other substances released from the nicotine carrier unit 34, when heated by the heater element 24, shall be referred to as “substances”. The air stream and aerosol substances entrained therein may
10 cool within the cooling element 38 for inhalation by the user. In one or more embodiments of the present invention, cooling element 38 comprises a plurality of cooling formations 42 therein. Optionally, the formations 42 may comprise a plurality of longitudinal channels that extend along the length of the cooling element 38. Further optionally, these formations 42 may be formed by folding a sheet material to create a
15 plurality of folded layers, optionally with the layers at random orientations to one another. Optionally, the cooling element 38 may comprise a polymer material.

The filter element 40 is located immediately downstream of the cooling element 38 and abuts the cooling element 38. In one or more embodiments of the present invention, the filter element 40 comprises a conventional filter.

20 The aerosol carrier cartridge 14 may be assembled by coaxially aligning the aerosol carrier unit 34, compression-resistant spacer 36, cooling element 38 and filter and inserting the components in this configuration into the housing 32.

The aerosol carrier cartridge 14 configured to engage with the device 12 comprising a heater element 24 in order to deliver aerosol to a user. In use, the heater
25 element 24 of the device 12 heats the aerosol carrier unit 34 of the aerosol carrier cartridge 14 to a sufficient temperature to release (or liberate) captive substances held within the aerosol carrier unit 34 to form a vapour and/or aerosol, which is drawn downstream through the aerosol carrier cartridge 14 and inhaled by the user.

The compression-resistant spacer 36 of the aerosol carrier cartridge 14 is
30 configured to resist the penetration force experienced by the aerosol carrier cartridge 14 during insertion of the heater element 24 of the device 12 into the aerosol carrier unit 34.

The compression-resistant spacer 36 of the aerosol carrier cartridge 14 thereby may inhibit movement of the aerosol carrier unit 34 downstream within the aerosol carrier cartridge 14 during insertion of the heater element 24 of the device 12 into the aerosol carrier unit 34.

5 With the heater element 24 inserted into the aerosol carrier unit 34, operation of the device 12 will cause the heater element 24 to heat the aerosol carrier unit 34 of the aerosol carrier cartridge 14 to a temperature sufficient to release (or liberate) captive substances held within the aerosol carrier unit 34 to form a vapour and/or aerosol. At sufficiently high temperatures, substances are released from the aerosol carrier unit 34 of
10 the aerosol carrier cartridge 14. As a user draws on second end 18 of the aerosol carrier cartridge 14, the released substances from the aerosol carrier unit 34 are drawn downstream through the aerosol carrier cartridge 14 (entrained in a stream of air) and condense to form an aerosol that is drawn through the filter element 40 of the aerosol carrier cartridge 14 into the user's mouth.

15 As the air with the entrained vapour and/or aerosol containing the released substance passes downstream thorough the cooling element 38 the temperature of the air stream and entrained vapour and/or aerosol substances may be reduced due to transfer of thermal energy from the air stream and entrained vapour and/or aerosol substances to the cooling element 38. This is to ensure that the temperature of the air stream and entrained
20 vapour and/or aerosol substances is at a relatively low temperature when exiting the second end 18 of the aerosol carrier cartridge 14 so as to be comfortable for a user to inhale.

Fig. 7 is an exploded perspective view illustration of a kit-of-parts for assembling an aerosol delivery system 10 according to one or more embodiments of the present
25 invention.

There has been described in the foregoing one or more embodiments of an aerosol delivery system that avoids or at least ameliorates the problems of the prior art.

In one or more optional arrangements, a carrier unit 34 containing nicotine and/or nicotine compounds may be substituted or supplemented with a carrier unit configured to
30 provide a flavoured vapour and/or aerosol upon heating of the carrier unit by the heater element 24 of the device 12. A precursor material for forming the flavoured vapour

and/or aerosol upon heating is held within pores, spaces, channels and/or conduits within the carrier unit. The precursor material may be extracted from a tobacco plant starting material using a supercritical fluid extraction process. Optionally, the precursor material is nicotine-free and comprises tobacco-flavours extracted from the tobacco plant starting material. Further optionally, the extracted nicotine-free precursor material (e.g. flavours only) could have nicotine added thereto prior to loading of the precursor material into the substrate of the carrier unit. Further optionally, flavours and physiologically active material may be extracted from plants other than tobacco plants.

In one or more optional arrangements, a carrier unit (containing nicotine, or nicotine-free) comprises two physically separate substrates. A first substrate is configured to hold a precursor material for forming a vapour and/or aerosol upon heating. A second substrate is configured to be penetrable by the heater element 24 of the device 12. In the one or more optional arrangements, the precursor material is not directly heated, which may be desirable in some instances (e.g. where direct heating may have a negative impact on flavours to be produced). Locating the precursor material in a different substrate to that which undergoes direct heating (i.e. the second substrate) means that the first substrate may experience lower temperatures than those experienced by the second substrate. In one or more embodiments the first substrate may be selected to have a thermal conductivity to provide a desired low-temperature at the second substrate or have a physical configuration which distributes the thermal energy from the heater element across the volume of the first substrate in order to dissipate the energy and produce a low heating effect at the second substrate. Therefore, different materials may be used for the first substrate than are used for the second substrate. Optionally, a thermally conductive barrier layer may be located between the first substrate and second substrate to separate the two substrates. Further optionally, the thermally conductive barrier layer may comprise a metal foil layer. However, heat transferred to the second substrate from the heater element 24 can still be transferred to the first substrate (to cause release of vapour and/or aerosol from the precursor material) via the thermally conductive barrier layer. The material of the first substrate comprises an absorbent material suitable for holding a quantity of precursor material. The material of the first substrate may comprise, for example, paper material, microporous foam material and/or microporous polymer

material and/or ceramic material. The precursor material may optionally be impregnated into the material of the first substrate and/or may be coated onto surfaces of the first substrate. For example, the precursor material may comprise a liquid absorbed into the material of the first substrate and/or the precursor material may comprise a powder
5 coated onto surfaces of the first substrate.

In one or more optional arrangements comprising a carrier unit having two separate substrates (see Fig. 8), the second substrate 46 may be formed into a cylinder and the first substrate 44 may be formed into an annular sleeve configured to fit around the second substrate 46. The optional thermally conductive barrier layer 48 may also be
10 configured as an annular sleeve configured to fit around the second substrate 46 and around which the annular sleeve of the first substrate 44 can be fitted. In these arrangements precursor material containing flavours and/or nicotine may be held in the outer, first substrate 44. The inner, second substrate 46 is configured to be penetrable by the heater element 24 of device 12. Optionally, the material forming the second substrate
15 46 may comprise the types of material discussed above in relation to Fig. 5 and/or may comprise other types of materials suitable for penetration by the heater element 24 of device 12. In all optional arrangements, the material of the second substrate 46 comprises a heat-resistant material. This may avoid degradation (e.g. by pyrolysis) of the second substrate 46 when heat is applied to the second substrate 46 via the heater element 24.
20 Optionally, the material forming the second substrate 46 may comprise a solid, relatively impenetrable material comprising a pre-formed bore, aperture or slot, for receiving the heater element 24 of device 12.

As used herein any reference to “one embodiment” or “an embodiment” means that a particular element, feature, structure, or characteristic described in connection with the
25 embodiment is included in at least one embodiment. Any appearances of the phrase “in one embodiment” or the phrase “in an embodiment” in the specification are not necessarily all referring to the same embodiment.

As used herein, the terms “comprises,” “comprising,” “includes,” “including,” “has,” “having” or any other variation thereof, are intended to cover a non-exclusive
30 inclusion. For example, a process, method, article, or apparatus that comprises a list of elements is not necessarily limited to only those elements but may include other elements

not expressly listed or inherent to such process, method, article, or apparatus. Further, unless expressly stated to the contrary, “or” refers to an inclusive or and not to an exclusive or. For example, a condition A or B is satisfied by any one of the following: A is true (or present) and B is false (or not present), A is false (or not present) and B is true (or present), and both A and B are true (or present).

5 In addition, use of the “a” or “an” are employed to describe elements and components of the invention. This is done merely for convenience and to give a general sense of the invention. This description should be read to include one or at least one and the singular also includes the plural unless it is obvious that it is meant otherwise.

10 The scope of the present disclosure includes any novel feature or combination of features disclosed therein either explicitly or implicitly or any generalisation thereof irrespective of whether or not it relates to the claimed invention or mitigate against any or all of the problems addressed by the present invention. The applicant hereby gives notice that new claims may be formulated to such features during prosecution of this application
15 or of any such further application derived therefrom. In particular, with reference to the appended claims, features from dependent claims may be combined with those of the independent claims and features from respective independent claims may be combined in any appropriate manner and not merely in specific combinations enumerated in the claims.

Claims

1. An aerosol delivery system comprising:
an aerosol-generating device comprising:
a device housing having an open-ended heating chamber configured to receive a carrier cartridge;
a heater element disposed within the heating chamber and configured to receive at least a first end of a carrier cartridge, said heating element operable to heat a carrier substrate of a carrier unit of said carrier cartridge to cause release of an aerosol-forming precursor therefrom to generate an aerosol when gas is passed through the carrier cartridge; and
a carrier cartridge comprising a carrier unit, said carrier unit comprising a carrier substrate configured to hold an aerosol-forming precursor comprising a nicotine-containing and/or flavoured fluid, gel, wax, or powder.
2. A system according to claim 1, wherein the heating element is configured to penetrate the carrier substrate.
3. A system according to claim 1 or claim 2, wherein the carrier substrate comprises sheet material formed from heat-resistant material.
4. A system according to claim 3, wherein the sheet material is folded in a substantially concertina arrangement.
5. A system according to claim 3 or claim 4, wherein said sheet material is folded in a random manner to form folds of said sheet material that are randomly oriented with respect to other folds of said sheet material.
6. A system according to any one of claims 3 to 5, wherein said substrate comprises a plurality of layers of sheet material, each layer oriented in a random manner with respect to other layers of said material.

7. A system according to any one of claims 3 to 6, wherein the carrier cartridge is tubular and comprises sheet material, and wherein a second end of the carrier cartridge is configured to form a mouthpiece for a user.
8. A system according to any of claims 3 to 7, wherein the heat-resistant material comprises a paper or paper matrix composite.
9. A system according to any of claims 3 to 8, wherein the heat-resistant material comprises a plastic or plastic matrix composite.
10. A system according to any of claims 3 to 9, wherein the heat-resistant material comprises a ceramic or ceramic matrix composite.
11. A system according to claim 10, wherein the ceramic composite comprises alumina-silicate fibres.
12. A system according to any one of the preceding claims, wherein the carrier substrate is impregnated with said aerosol-forming precursor.
13. A system according to any one of the preceding claims, wherein the carrier substrate is coated with said aerosol-forming precursor.
14. A system according to any one of the preceding claims, wherein the carrier substrate is configured to hold and release extracts from a tobacco plant.
15. A system according to any one of the preceding claims, wherein the carrier cartridge comprises a cooling element disposed adjacent to the carrier unit for cooling fluid released from said aerosol-forming precursor during heating.
16. A system according to claim 15, wherein said cooling element comprises a plurality of cooling formations.

17. A system according to any one of the preceding claims, wherein said carrier cartridge further comprises a housing for said carrier unit, or when this claim is dependent upon claim 15 or claim 16, for said carrier unit and said cooling element.

18. A system according to any one of the preceding claims, wherein an exterior surface of said carrier unit is formed from heat-resistant material configured to surround said carrier substrate.

19. A system according to any one of the preceding claims, wherein the carrier unit comprises a first substrate comprising said aerosol-generating precursor and a thermally conductive second substrate configured to conduct heat from the heater element to the first substrate to cause release of said aerosol-forming precursor therefrom.

20. A system according to claim 19, wherein the first substrate comprises an annular ring disposed around the second substrate.

21. A system according to claim 19 or claim 20, wherein the second substrate comprises an opening for receiving the heating element.

22. A system according to any of claims 19 to 21, wherein carrier unit further comprises an isolation layer that separates the first substrate and the second substrate to isolate the heating element from aerosol-generating precursor.

23. A carrier cartridge for a system for aerosol delivery, the carrier cartridge at an end thereof configured for insertion into a heating chamber of a device operative to initiate and maintain release of an aerosol from a carrier unit in said carrier cartridge, and another end of said carrier cartridge configured for insertion into a mouth of a user, the carrier cartridge comprising:

a carrier unit, said carrier unit comprising a carrier substrate configured to hold an aerosol-forming precursor comprising a nicotine-containing and/or flavoured fluid, gel, wax, or powder.

24. A cartridge according to claim 23, wherein said carrier substrate is configured to be penetrable by a heater element of said device.
25. A cartridge according to claim 23 or claim 24, wherein the carrier substrate comprises sheet material formed from heat-resistant material.
26. A cartridge according to claim 25, wherein the sheet material is folded in a substantially concertina arrangement.
27. A cartridge according to claim 25 or claim 26, wherein said sheet material is folded in a random manner to form folds of said sheet material that are randomly oriented with respect to other folds of said sheet material.
28. A cartridge according to any one of claims 25 to 27, wherein said substrate comprises a plurality of layers of sheet material, each layer oriented in a random manner with respect to other layers of said material.
29. A cartridge according to any one of claims 25 to 28, wherein the carrier cartridge is tubular and comprises sheet material, and wherein a second end of the carrier cartridge is configured to form a mouthpiece for a user.
30. A cartridge according to any of claims 25 to 29, wherein the heat-resistant material comprises a paper or paper matrix composite.
31. A cartridge according to any of claims 25 to 30, wherein the heat-resistant material comprises a plastic or plastic matrix composite.
32. A cartridge according to any of claims 25 to 31, wherein the heat-resistant material comprises a ceramic or ceramic matrix composite.

33. A cartridge according to claim 32, wherein the ceramic composite comprises alumina-silicate fibres.
34. A cartridge according to any one of claims 23 to 33, wherein the carrier substrate is impregnated with said aerosol-forming precursor.
35. A cartridge according to any one of claims 23 to 34, wherein the carrier substrate is coated with said aerosol-forming precursor.
36. A cartridge according to any one of claims 23 to 35, wherein the carrier substrate is configured to hold and release extracts from a tobacco plant.
37. A cartridge according to any one of claims 23 to 36, wherein the carrier cartridge comprises a cooling element disposed adjacent to the carrier unit for cooling fluid released from said aerosol-forming precursor during heating.
38. A cartridge according to claim 37, wherein said cooling element comprises a plurality of cooling formations.
39. A cartridge according to any one of claims 23 to 38, wherein said carrier cartridge further comprises a housing for said carrier unit, or when this claim is dependent upon claim 37 or claim 38, for said carrier unit and said cooling element.
40. A cartridge according to any one of claims 23 to 39, wherein an exterior surface of said carrier unit is formed from heat-resistant material configured to surround said carrier substrate.
41. A cartridge according to any one of claims 23 to 40, wherein the carrier unit comprises a first substrate comprising said aerosol-generating precursor and a thermally conductive second substrate configured to conduct heat from the heater element to the first substrate to cause release of said aerosol-forming precursor therefrom.

42. A cartridge according to claim 41, wherein the first substrate comprises an annular ring disposed around the second substrate.
43. A cartridge according to claim 41 or claim 42, wherein the second substrate comprises an opening for receiving the heating element.
44. A cartridge according to any of claims 41 to 43, wherein carrier unit further comprises an isolation layer that separates the first substrate and the second substrate to isolate the heating element from aerosol-generating precursor.
45. A carrier unit for a nicotine carrier cartridge, the nicotine carrier unit comprising a carrier substrate that comprises an aerosol-forming precursor comprising a nicotine-containing and/or flavoured fluid, gel, wax, or powder.
46. A carrier unit according to claim 45, wherein said carrier substrate is configured to be penetrable by a heater element of a device operative to initiate and maintain release of an aerosol from said carrier unit.
47. A carrier unit according to claim 45 or claim 46, wherein the carrier substrate comprises sheet material formed from heat-resistant material.
48. A carrier unit according to claim 47, wherein the sheet material is folded in a substantially concertina arrangement.
49. A carrier unit according to claim 47 or claim 48, wherein said sheet material is folded in a random manner to form folds of said sheet material that are randomly oriented with respect to other folds of said sheet material.
50. A carrier unit according to any one of claims 47 to 49, wherein said substrate comprises a plurality of layers of sheet material, each layer oriented in a random manner with respect to other layers of said material.

51. A carrier unit according to any of claims 47 to 50, wherein the heat-resistant material comprises a paper or paper matrix composite.
52. A carrier unit according to any of claims 47 to 51, wherein the heat-resistant material comprises a plastic or plastic matrix composite.
53. A carrier unit according to any of claims 47 to 51, wherein the heat-resistant material comprises a ceramic or ceramic matrix composite.
54. A carrier unit according to claim 53, wherein the ceramic composite comprises alumina-silicate fibres.
55. A carrier unit according to any one of claims 45 to 54, wherein the carrier substrate is impregnated with said aerosol-forming precursor.
56. A carrier unit according to any one of claims 45 to 55, wherein the carrier substrate is coated with said aerosol-forming precursor.
57. A carrier unit according to any one of claims 45 to 56, wherein the carrier substrate is configured to hold and release extracts from a tobacco plant.
58. A carrier unit according to any one of claims 45 to 57, wherein an exterior surface of said carrier unit is formed from heat-resistant material configured to surround said carrier substrate.
59. A carrier unit according to any one of claims 45 to 58, wherein the carrier unit comprises a first substrate comprising said aerosol-generating precursor and a thermally conductive second substrate configured to conduct heat from a heater element of a device operative to initiate and maintain release of an aerosol from said carrier unit to the first substrate to cause release of said aerosol-forming precursor therefrom.

60. A carrier unit according to claim 59, wherein the first substrate comprises an annular ring disposed around the second substrate.
61. A carrier unit according to claim 59 or claim 60, wherein the second substrate comprises an opening for receiving the heater element.
62. A carrier unit according to any of claims 59 to 61, wherein the carrier unit further comprises an isolation layer that separates the first substrate and the second substrate to isolate the heater element from aerosol-generating precursor.
63. A method of manufacturing a sheet material for forming a carrier substrate of a carrier unit, comprising:
combining, to form a mixture, a sheet precursor material and an aerosol-forming precursor comprising a nicotine-containing and/or flavoured fluid, gel, wax, or powder;
forming from said mixture a sheet material.
64. A method according to claim 63, wherein said sheet material comprises a heat-resistant sheet material.
65. A method of manufacturing a carrier unit, comprising folding sheet material manufactured according to claim 63 or 64 in at least one of: a substantially concertina arrangement; and a random manner to form folds of said sheet material that are randomly oriented with respect to other folds of said sheet material.
66. A method according to claim 65, further comprising layering a plurality of layers of said sheet material, each layer oriented in a random manner with respect to other layers of said material.
67. A method according to claim 65 or 66, wherein said sheet material comprises at least one of: a paper or paper matrix composite.

68. A method according to claim 65 or 66, wherein said sheet material comprises at least one of: a paper or paper matrix composite; a plastic or plastic matrix composite; and a ceramic or ceramic matrix composite

69. A method according to claim 68, wherein said ceramic composite or ceramic matrix composite comprises alumina-silicate fibres.

70. A method according to any one of claims 65 to 69, further comprising impregnating said sheet material with an aerosol-forming precursor.

71. A method according to any one of claims 65 to 70, further comprising coating said sheet material with an aerosol-forming precursor.

72. A method according to claim 70 or 71, wherein the aerosol-forming precursor comprises extracts from a tobacco plant.

73. A method according to any one of claims 65 to 72, further comprising forming an exterior surface of said carrier unit from heat-resistant material configured to surround said sheet material.

74. A method according to any one of claims 65 to 73, further comprising forming a first substrate comprising an aerosol-generating precursor and forming a thermally conductive second substrate configured to conduct heat to the first substrate to cause release of said aerosol-forming precursor therefrom.

75. A method according to claim 74, wherein the first substrate comprises an annular ring disposed around the second substrate.

76. A method according to claim 74 or 75, further comprising forming an opening in said second substrate for receiving a heater element of a device operative to initiate and maintain release of an aerosol from said carrier unit.

77. A method according to any one of claims 74 to 76, further comprising forming an isolation layer between said first substrate and said second substrate.

78. A kit-of-parts for assembling a system for aerosol delivery, comprising:
an aerosol-generating device comprising:
a device housing having an open-ended heating chamber configured to receive a carrier cartridge;
a heater element disposed within the heating chamber and configured to receive at least a first end of a carrier cartridge, said heating element operable to heat a carrier substrate of a carrier unit of said carrier cartridge to cause release of an aerosol-forming precursor therefrom to generate an aerosol when gas is passed through the carrier cartridge; and
a carrier cartridge comprising a carrier unit, said carrier unit comprising a carrier substrate configured to hold an aerosol-forming precursor comprising a nicotine-containing and/or flavoured fluid, gel, wax, or powder.
79. A system for aerosol vapour delivery substantially as hereinbefore described and with reference to 1 to 8 of the drawings.
80. A carrier cartridge substantially as hereinbefore described and with reference to figures 1 to 7 of the drawings.
81. A carrier unit substantially as hereinbefore described and with reference to figures 5, 6 and 8 of the drawings.
82. A method of manufacturing a sheet material for forming a substrate of a carrier unit substantially as hereinbefore described and with reference to figures 5, 6 and 8 of the drawings.
83. A method of manufacturing a carrier unit substantially as hereinbefore described and with reference to figures 5, 6 and 8 of the drawings.
84. A kit-of-parts for assembling a system for aerosol delivery substantially as hereinbefore described and with reference to figure 7 of the drawings.

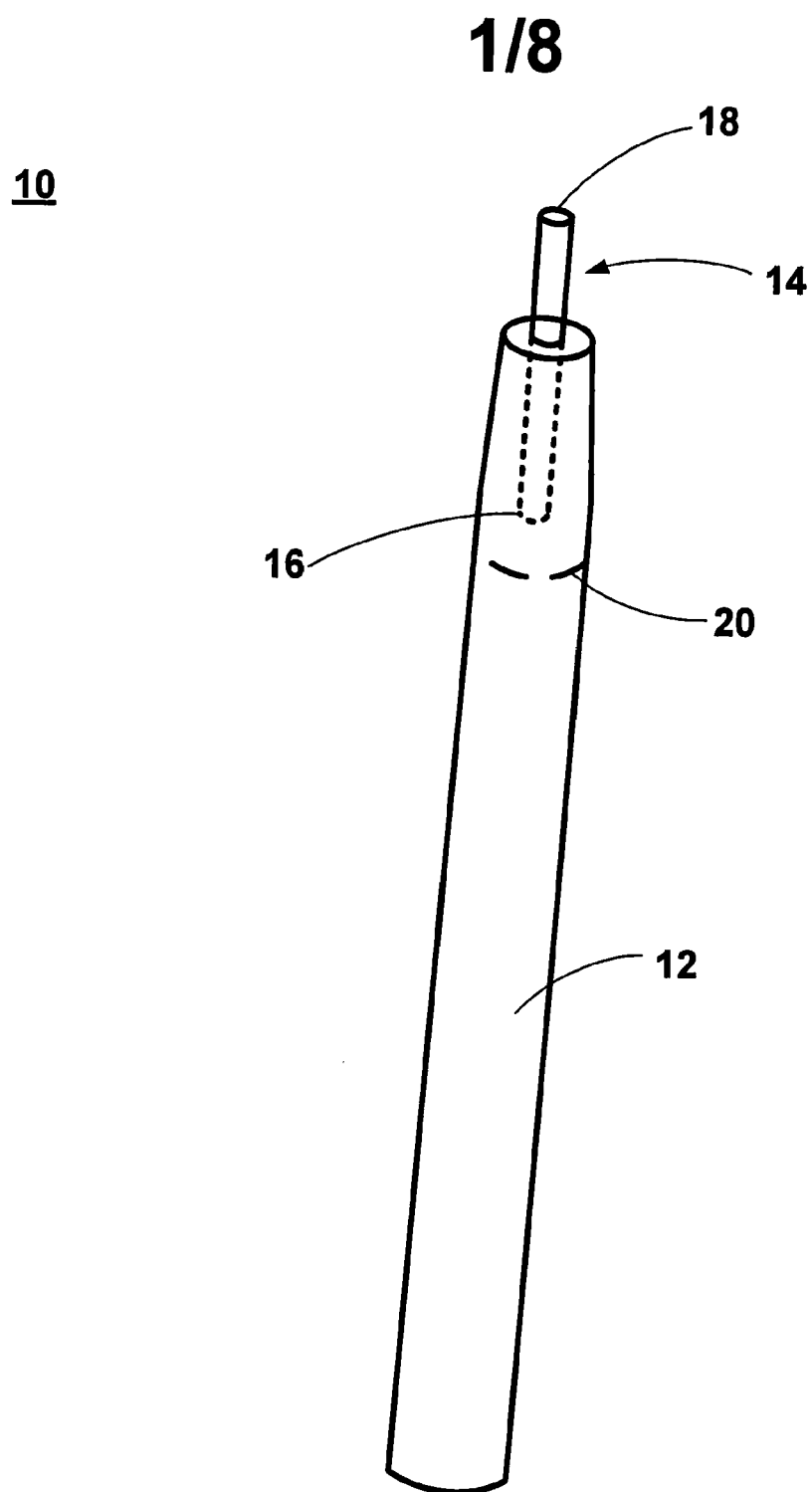
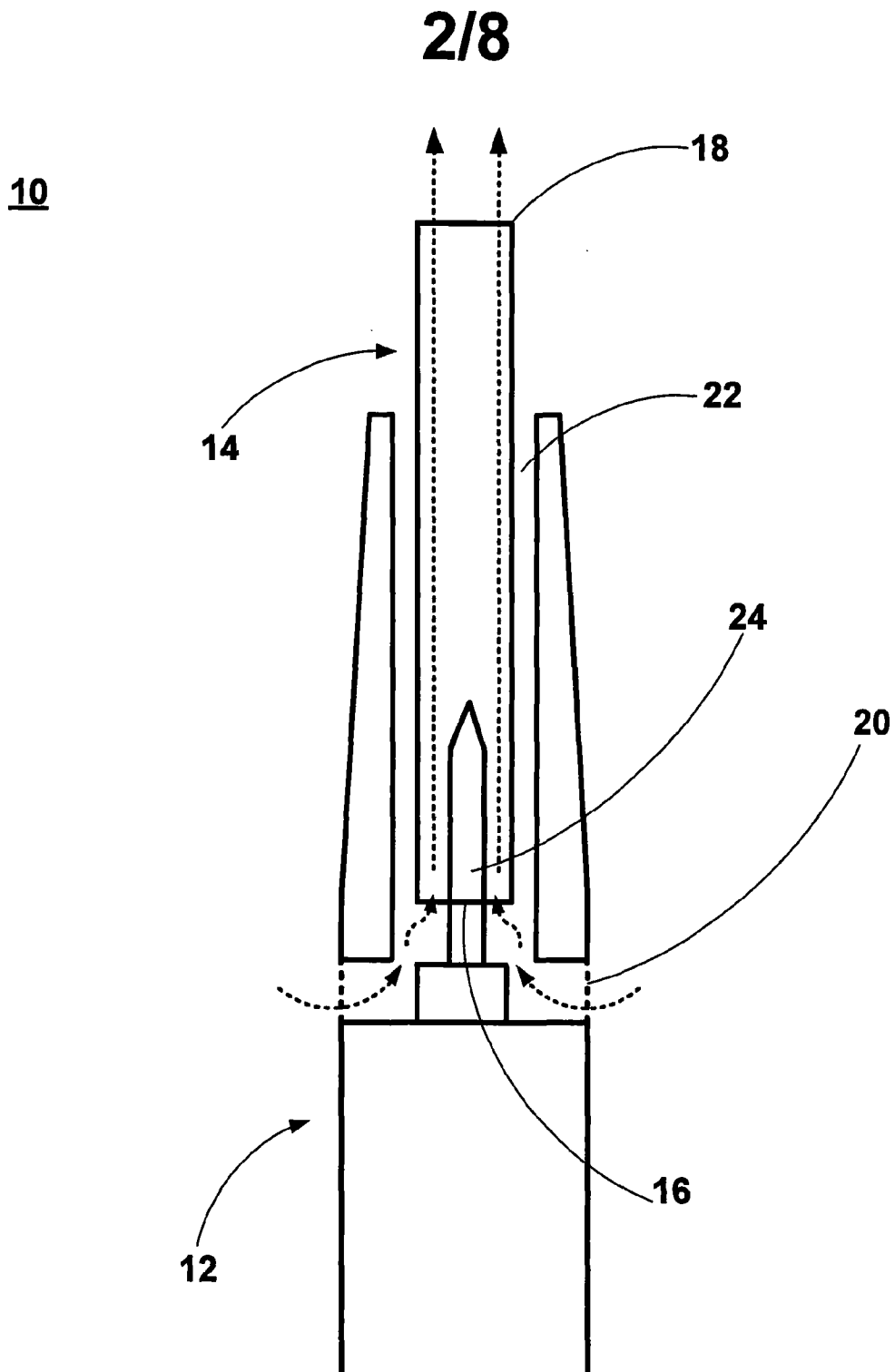


FIG. 1

**FIG. 2**

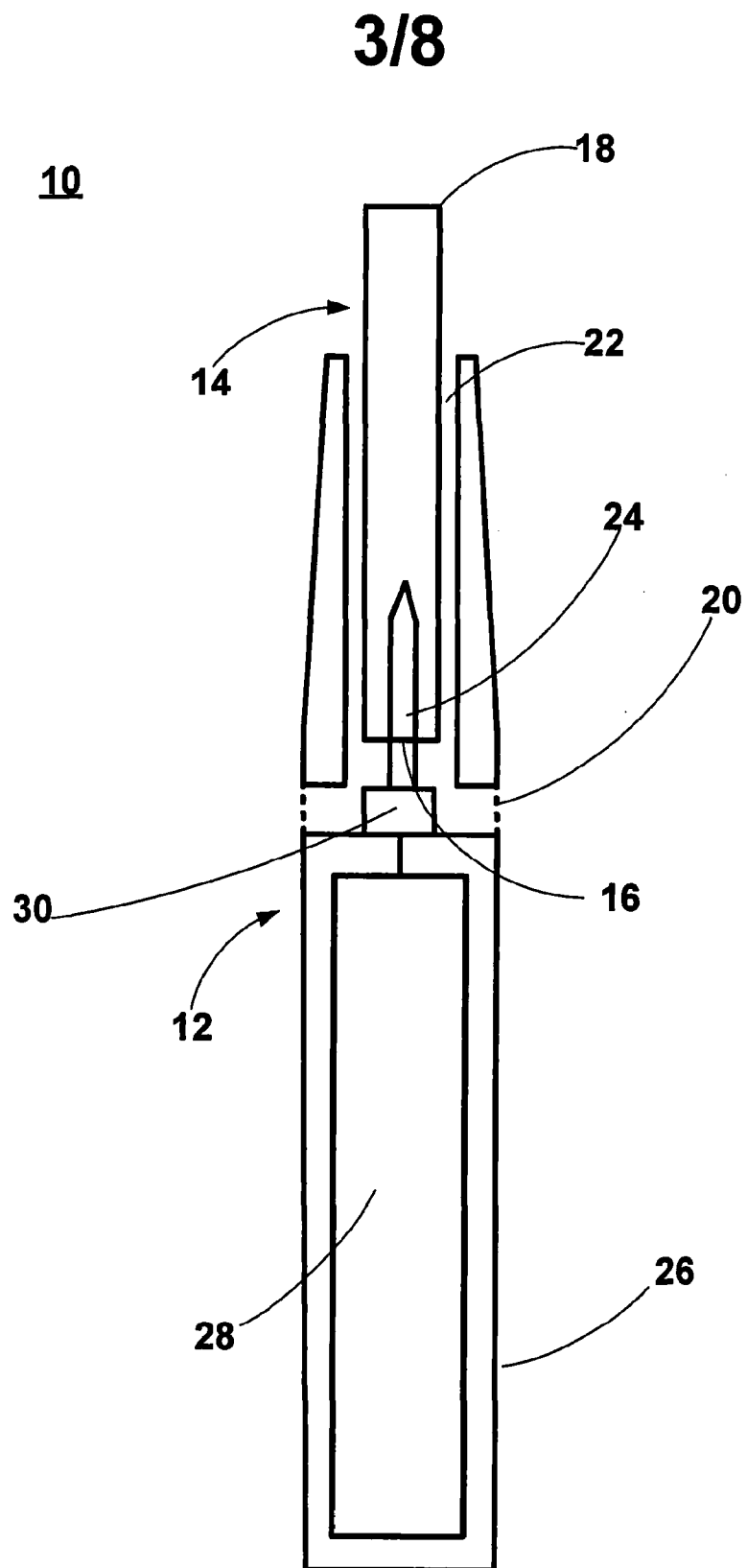


FIG. 3

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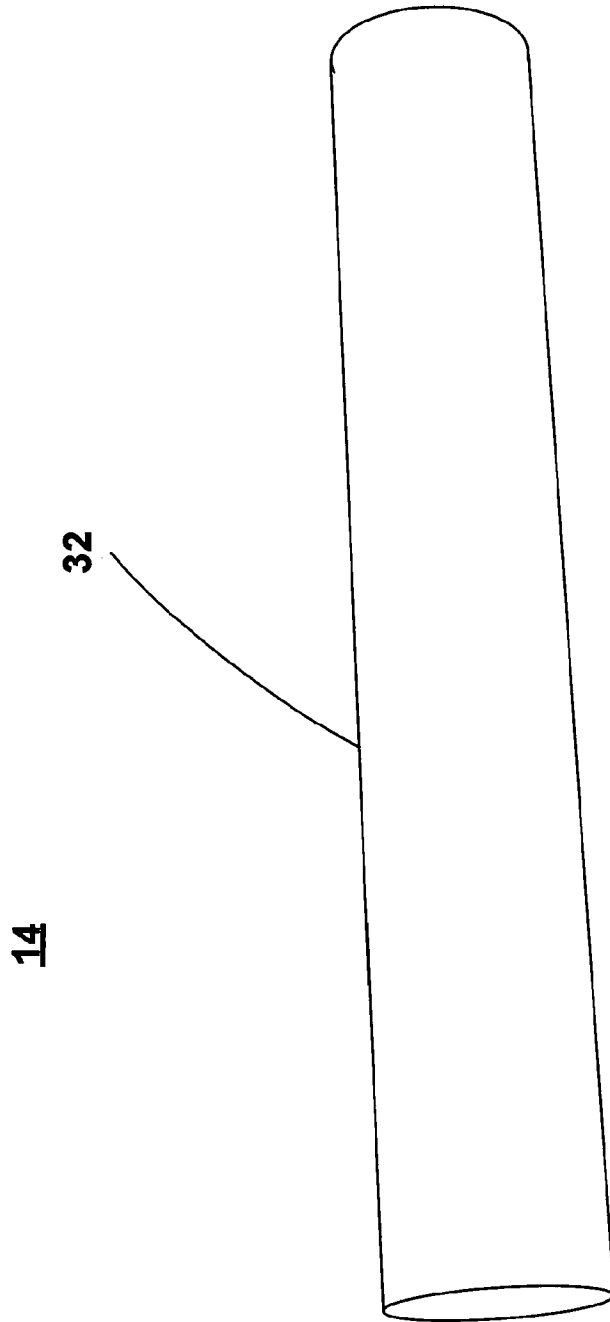


FIG. 4

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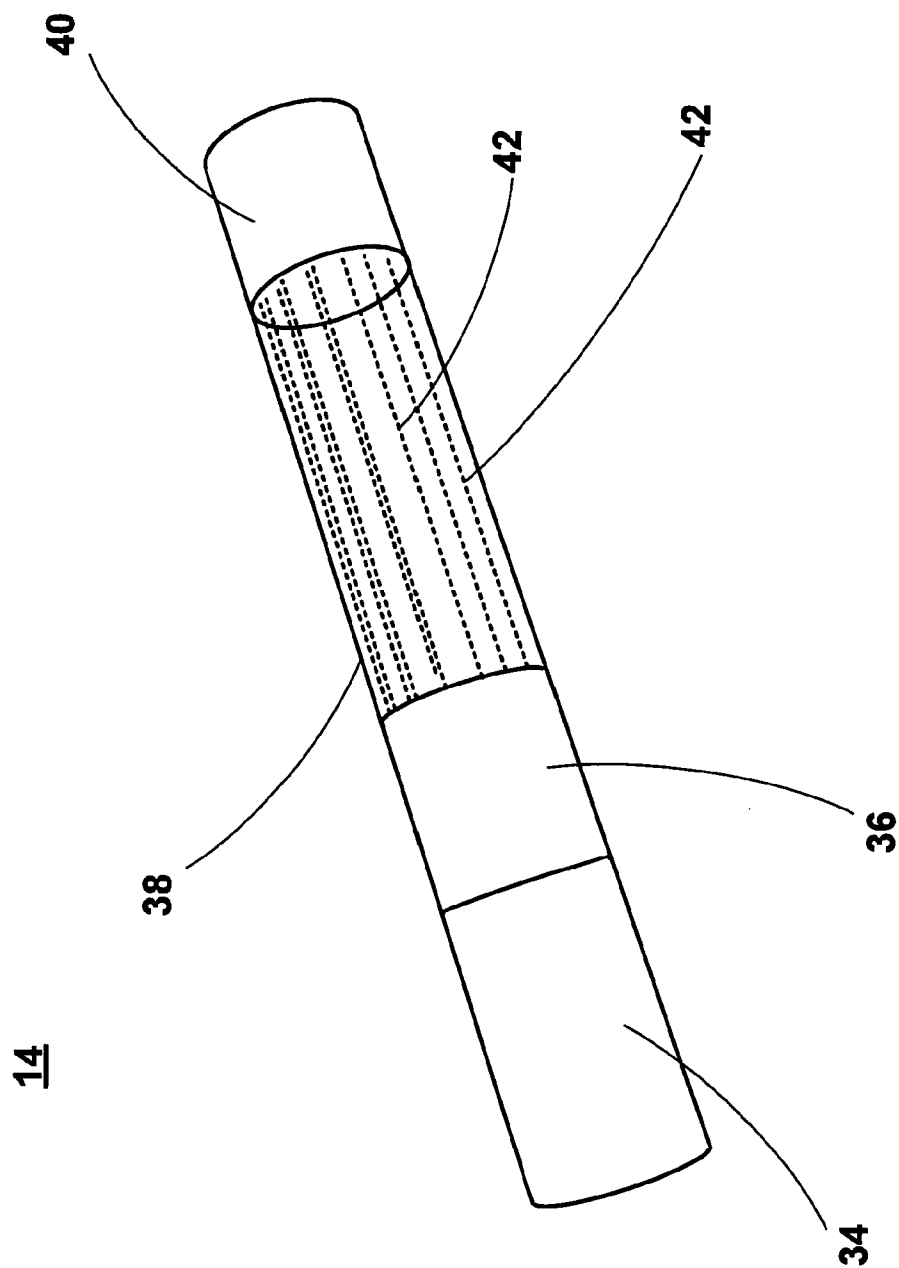


FIG. 5

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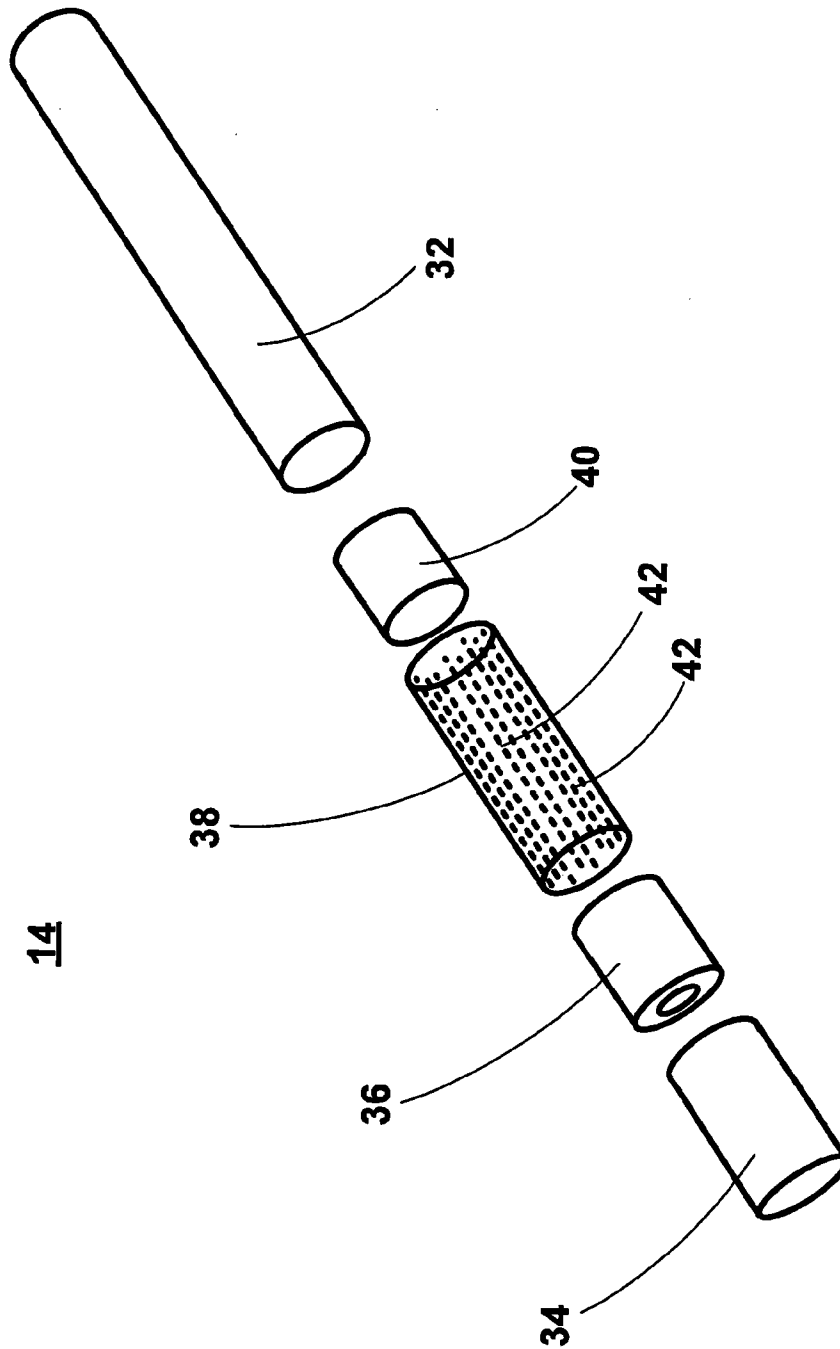


FIG. 6

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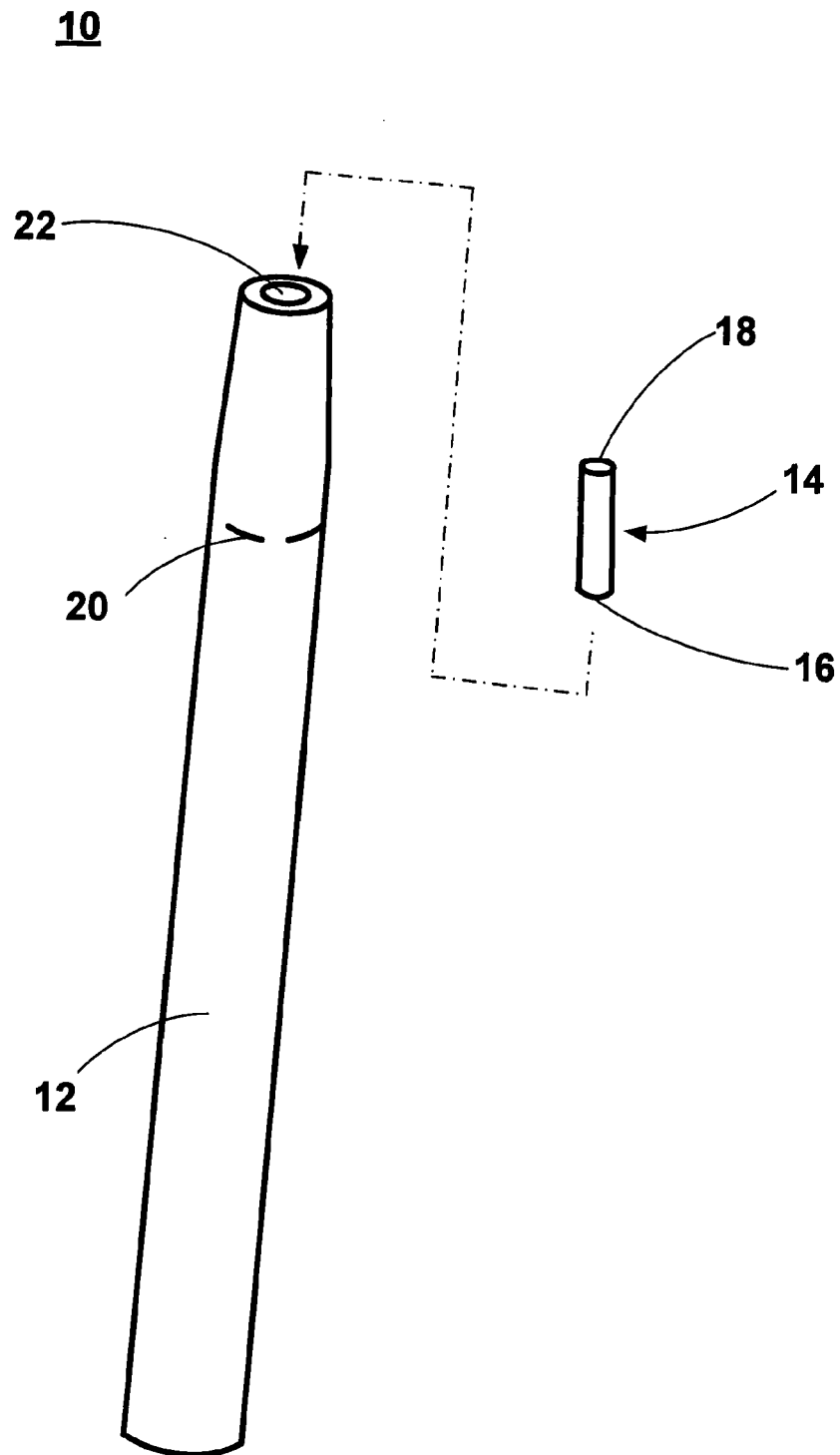


FIG. 7

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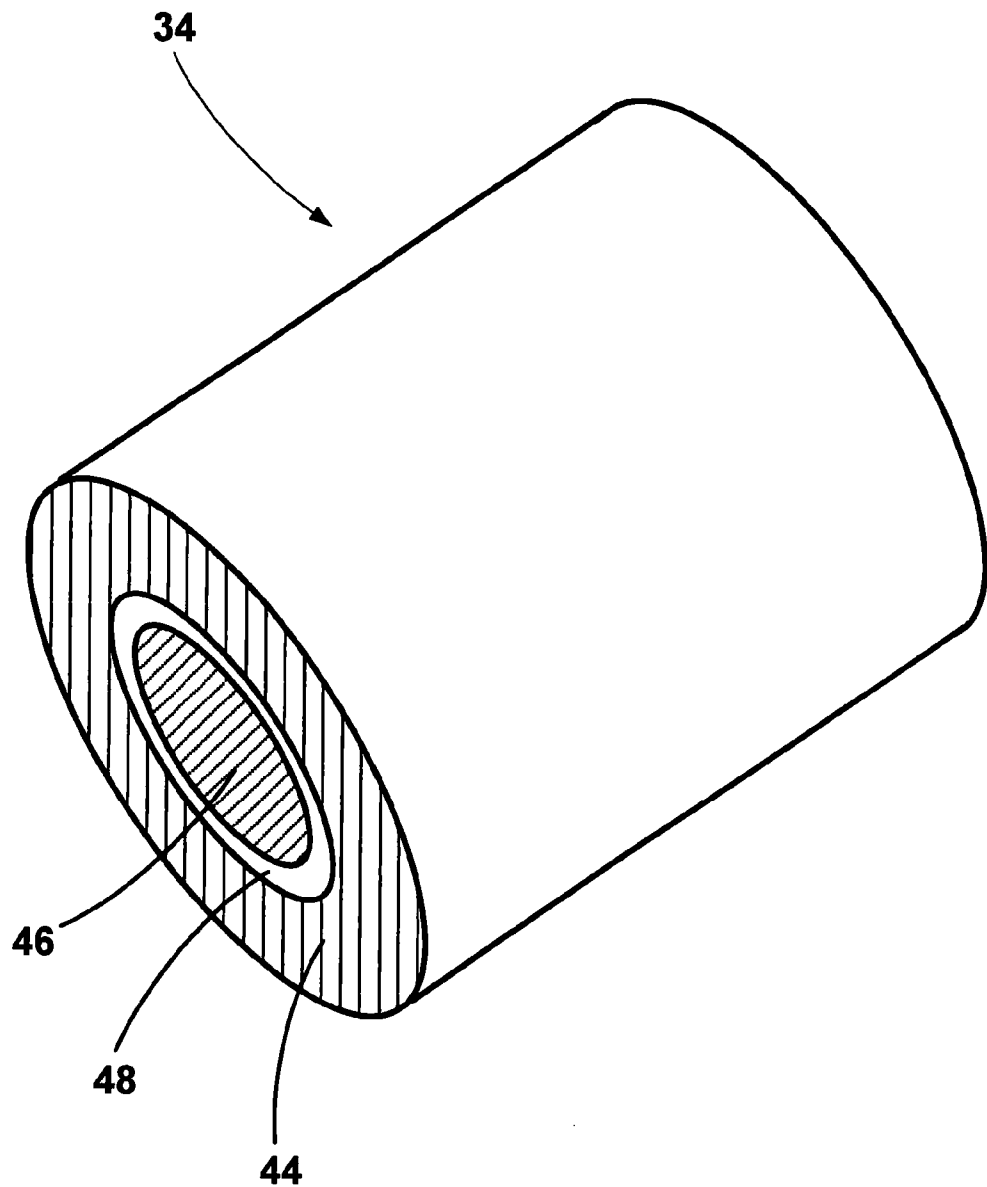


FIG. 8

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2017/050398

A. CLASSIFICATION OF SUBJECT MATTER INV. A61M11/00 A61M11/04 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) A61M		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EPO-Internal, WPI Data		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 204 217 904 U (YUNNAN ZHONGYAN NEW MATERIAL TECHNOLOGY CO LTD) 25 March 2015 (2015-03-25) figures 1,2 -----	1-26,39, 40, 45-58,78
X	WO 2015/082652 A1 (PHILIP MORRIS PRODUCTS SA [CH]) 11 June 2015 (2015-06-11) page 9, line 28 - line 35; figure 5 -----	1-62,78
X	WO 2015/075650 A1 (PHILIP MORRIS PRODUCTS SA [CH]; HUFNAGEL JAN CARLOS [SG]; GLABASNIA AN) 28 May 2015 (2015-05-28) page 15, line 3 - line 30; figure 2 -----	1-26,39, 40, 45-58,78
X	CA 2 925 647 A1 (JAPAN TOBACCO INC [JP]) 2 April 2015 (2015-04-02) paragraph [0033] - paragraph [0040]; figure 2 -----	1-22,45, 78
-/-		
☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.		
* Special categories of cited documents : "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search 13 July 2017	Date of mailing of the international search report 24/07/2017	
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer Louarn, Arzhur	

INTERNATIONAL SEARCH REPORT

International application No.
PCT/GB2017/050398

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☒ Claims Nos.: 79-84
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
see FURTHER INFORMATION sheet PCT/ISA/210
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☒ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CA 2 924 390 A1 (PHILIP MORRIS PRODUCTS SA [CH]) 11 June 2015 (2015-06-11) figures 1-5 -----	63-77
A	US 2011/041861 A1 (SEBASTIAN ANDRIES DON [US] ET AL) 24 February 2011 (2011-02-24) figures 1,2 -----	23-44
A	WO 2009/132793 A1 (PHILIP MORRIS PROD [CH]) 5 November 2009 (2009-11-05) figures 1-3 -----	23-44
A	WO 2006/090290 A1 (PHILIP MORRIS PROD [CH]) 31 August 2006 (2006-08-31) pages 12-14; figures 1-7 -----	45-62
A	US 5 746 227 A (ROSE JED E [US] ET AL) 5 May 1998 (1998-05-05) figures 1,2,4,5 -----	46-62

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/GB2017/050398

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FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-22, 78, 79, 84

An aerosol delivery system

2. claims: 23-44, 80

A carrier cartridge

3. claims: 45-62, 81, 83

A carrier unit for a nicotine carrier cartridge

4. claims: 63-77, 82

A method of manufacturing a sheet material

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box II.2

Claims Nos.: 79-84

Claims 79-83 and 84 contain a reference to the description and/or the drawings. According to Rule 6.2(a) PCT, claims should not contain such references except where absolutely necessary, which is not the case here.

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guidelines C-IV, 7.2), should the problems which led to the Article 17(2) declaration be overcome.