(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
15 February 2024 (15.02.2024)

WIPO | PCT

(10) International Publication Number
WO 2024/033474 A1

(51) International Patent Classification:
A24F 40/465 (2020.01) *A24F 40/44* (2020.01)
A24F 40/42 (2020.01) *A24F 40/10* (2020.01)

(21) International Application Number:
PCT/EP2023/072174

(22) International Filing Date:
10 August 2023 (10.08.2023)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
22189945.3 11 August 2022 (11.08.2022) EP

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(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CV, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IQ, IR, IS, IT, JM, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, MG, MK, MN, MU, MW, MX, MY, MZ, NA,

(54) Title: SUSCEPTOR ASSEMBLY

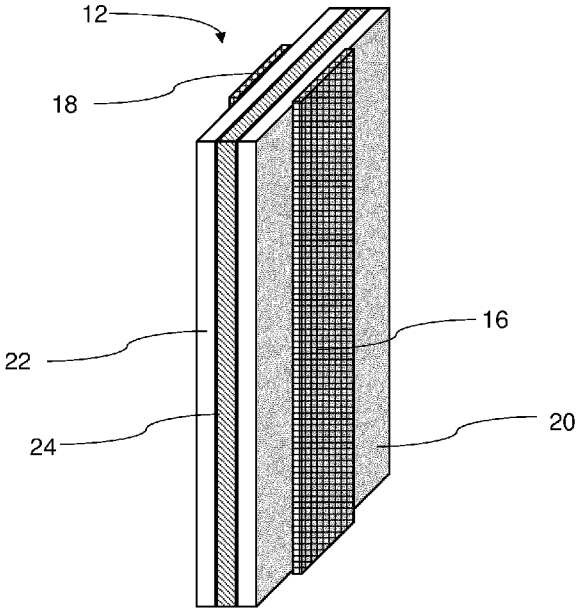


Figure 3

(57) Abstract: There is provided a susceptor assembly (12) for an aerosol-generating system. The susceptor assembly (12) comprises one or more wicking elements for transporting a liquid aerosol-forming substrate. The one or more wicking elements comprise a first wicking layer (20) and a second wicking layer (22). The susceptor assembly (12) further comprises a spacer element (24) positioned between and in contact with the first wicking layer (20) and the second wicking layer (22), and a susceptor element in contact with at least a portion of the one or more wicking elements. There is also provided a cartridge for an aerosol-generating system, an aerosol-generating system, and a method for manufacturing a susceptor assembly.

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NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS, ZA, ZM, ZW.

(84) **Designated States** *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, CV, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SC, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, ME, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report (Art. 21(3))*

SUSCEPTOR ASSEMBLY

The present disclosure relates to a susceptor assembly for an aerosol-generating system; a cartridge for an aerosol-generating system; an aerosol-generating system; and a method for manufacturing a susceptor assembly.

Aerosol-generating systems that employ inductive heating to heat an aerosol-forming substrate in order to generate an aerosol for user inhalation are generally known in the art. An aerosol-forming substrate is heated and vaporised to form a vapour. The vapour cools and condenses to form an aerosol, this aerosol is then inhaled by a user. Such electrically heated smoking systems are typically handheld and comprise a power supply, a reservoir for holding a supply of the aerosol-forming substrate and an inductive heating system.

Inductive heating systems typically comprise at least one inductor coil connected to the power supply. The inductive heating systems comprise a susceptor assembly comprising a susceptor element arranged in close proximity to the aerosol-forming substrate and within the alternating magnetic field. Some aerosol-generating systems comprise an aerosol-generating device and a cartridge that is configured to be used with the device. When the aerosol generating system comprises an aerosol-generating device and a cartridge, the susceptor element may form part of the cartridge.

The aerosol-forming substrate may be a liquid. In such cases, the aerosol-generating system may further comprise a wicking element configured to draw liquid aerosol-forming substrate from the storage portion to the susceptor element to be heated.

Typically, the susceptor assembly of inductive aerosol-generating systems may comprise a single wicking element comprising a single wicking layer.

It would be desirable to provide a susceptor assembly and an aerosol-generating system with more than one wicking layer, to improve delivery of liquid aerosol-forming substrate to the susceptor element and therefore enhance vaporisation of the liquid aerosol-forming substrate.

In accordance with a first embodiment of the present disclosure, there is provided a susceptor assembly for an aerosol-generating system. The susceptor assembly may comprise one or more wicking elements for transporting a liquid aerosol-forming substrate. The one or more wicking element may comprise a first wicking layer and a second wicking layer. The susceptor assembly may further comprise a spacer element positioned between and in contact with the first wicking layer and the second wicking layer. The susceptor assembly may further comprise a susceptor element in contact with at least a portion of the one or more wicking element.

Advantageously, providing a first wicking layer and a second wicking layer may improve ease of manufacturing a susceptor assembly for an aerosol-generating system, whilst transporting sufficient liquid aerosol-forming substrate for aerosolisation. However, it has been found that two wicking layers in contact with each other may lead to condensation becoming trapped between the two wicking layers. This may then cause a release of steam. The steam may

cause deformation of the susceptor assembly. Deformation of the susceptor assembly may in turn lead to reduced contact between the susceptor element and the one or more wicking elements, leading to reduced or inefficient aerosolisation of the liquid aerosol-forming substrate. The present invention provides a spacer element positioned between and in contact with the first wicking layer and the second wicking layer. Advantageously, the spacer element may improve liquid flow between the first wicking layer and the second wicking layer. Furthermore, the spacer element may provide a space for steam to build up, before it escapes the susceptor assembly, therefore minimising deformation of the susceptor assembly.

The one or more wicking elements may be configured to transport liquid aerosol-forming substrate to the susceptor element. The susceptor element may be configured to heat and vaporise the liquid aerosol-forming substrate.

The susceptor element may comprises a first susceptor layer and a second susceptor layer. The first susceptor layer may be in contact with at least a portion of the first wicking layer, and the second susceptor layer may be in contact with at least a portion of the second wicking layer. This may advantageously mean that, in operation, the one or more wicking elements is heated from two sides. This may increase the amount aerosol-forming substrate that is vaporised in a given time compared to a susceptor assembly comprising only one susceptor layer.

A first side of the spacer element may be in contact with a first side of the first wicking layer and the first susceptor layer may be in contact with a second side of the first wicking layer, wherein the first side of the first wicking layer opposes the second side of the first wicking layer. A second side of the spacer element may be in contact with a first side of the second wicking layer and the second susceptor layer may be in contact with a second side of the second wicking layer, wherein the first side of the second wicking layer opposes the second side of the second wicking layer. The first side of the spacer element may oppose the second side of the spacer element. In this arrangement, the first susceptor layer and second susceptor layer may be spaced from each other. The first wicking layer may be configured to transport liquid aerosol-forming substrate to the first susceptor layer. The second wicking layer may be configured to transport liquid aerosol-forming substrate to the second susceptor layer. This may allow delivery of liquid aerosol-forming to be balanced between the first susceptor layer and the second susceptor layer.

The first susceptor layer and second susceptor layer may be planar. In this context, a planar susceptor layer is a susceptor layer having a substantially greater length and width than thickness. The length and width directions are orthogonal to one another and define a first plane. A planar susceptor layer may have two opposing major surfaces extending in planes parallel to the first plane. One or both major surfaces is advantageously flat. During use of the first susceptor layer and second susceptor layer in an aerosol-generating system, this may allow air to flow across a surface of both the first susceptor layer and second susceptor layer, enhancing the entrainment of vapourised aerosol-forming substrate. The first susceptor layer and second susceptor layer

may be substantially parallel to one another. The first susceptor layer and the second susceptor layer may have a rectangular cross-section taken across the first plane.

The first susceptor layer and second susceptor layer may be separate components.

The first susceptor layer and the second susceptor layer may be integral with each other. Advantageously, this may simplify manufacturing of the susceptor assembly.

The susceptor element may comprise a connection section that connects the first susceptor layer to the second susceptor layer. The susceptor element may comprise three sections. The first section of the susceptor element may comprise the first susceptor layer. The second section of the susceptor element may comprise the second susceptor layer. The third section of the susceptor element may be the connection section joining the first susceptor layer to the second susceptor layer.

The connection section may be "U"-shaped or "V"-shaped. Advantageously, a susceptor element with a "U"-shaped or "V"-shaped connection section may hold the one or more wicking elements and spacer element together, in contact with each other, and the first and second wicking layers in contact with the first and second susceptor layers.

The susceptor element may be formed by bending or folding a single piece of susceptor material to form the first susceptor layer, the second susceptor layer and the connection section of the susceptor element. Advantageously, a susceptor element formed in this way may be simple to manufacture.

The first wicking layer and second wicking layer may be substantially planar. The first wicking layer and the second wicking layer of the susceptor assembly may be substantially parallel.

The first wicking layer and the second wicking layer may be integral with each other. The first wicking layer and the second wicking layer may be formed from a single piece of wicking material.

The first wicking layer and the second wicking layer may be separate components. Advantageously, the first wicking layer and the second wicking layer being separate components may prevent any bends or folds in the wicking layers that could compress the wicking layer and lead to suboptimal liquid transport.

The susceptor assembly may be substantially planar. The susceptor assembly may have a rectangular cross-section taken across the first plane.

The susceptor assembly may comprise a heating region and at least one mounting region. The heating region is a region of the susceptor assembly that is configured to be heated to a temperature required to vaporise the aerosol-forming substrate upon penetration by a suitable alternating magnetic field. The heating region of the susceptor assembly may comprise at least a portion of the first susceptor layer. The heating region of the susceptor assembly may comprise at least a portion of the second susceptor layer. Each of the first susceptor layer, second

susceptor layer, first wicking layer, second wicking layer and the spacer element may comprise a heating region.

Each of the first wicking layer, second wicking layer and the spacer element may comprise a mounting region. The at least one mounting region may be in contact with a susceptor holder. Preferably, at portion of the at least one mounting region may extend into a liquid reservoir. In preferred embodiments, the heating region may be arranged outside of the liquid reservoir. Advantageously, arranging the susceptor element substantially outside of the liquid reservoir, and particularly arranging the heating region of the susceptor assembly outside of the liquid reservoir, may ensure that the aerosol-forming substrate is heated sufficiently to release the volatile compounds only after the aerosol-forming substrate has been transported outside of the liquid reservoir. This may facilitate release of the volatile compounds from the aerosol-generating system.

In preferred embodiments, the cross-sectional area of the one or more wicking elements and the cross-sectional area of the spacer element, taken across the first plane, is greater that the cross sectional area of the susceptor element taken across the first plane. The length of the first susceptor layer and the length of the second susceptor layer may be about equal to the length of the first wicking layer, the second wicking layer and the spacer element.

The width of the first susceptor layer and the second susceptor layer may smaller than the width of the of the first wicking layer, the second wicking layer and the spacer element. The width of the first susceptor layer and the second susceptor layer may be about 20 percent smaller than the width of the of the first wicking layer, the second wicking layer and the spacer element. The width of the first susceptor layer and second susceptor layer may be about equal to the width of the heating region of the of the first wicking layer, the second wicking layer and the spacer element. The first susceptor layer and the second susceptor layer may not comprise a mounting region.

The first susceptor layer and the second susceptor layer may comprise a mounting region.

The susceptor assembly may form a shape of a cross. The first susceptor layer, the second susceptor layer, the first wicking layer, the second wicking layer, and the spacer layer, may have a cross-shaped cross-section along the first plane. The susceptor assembly may comprise a pair of mounting regions and a heating region. The heating region may be substantially rectangular and located centrally on the susceptor assembly. The pair of mounting regions may be substantially rectangular regions located at the periphery of the heating region. The mounting regions may be located at opposite sides of the heating region. The mounting regions may be arranged at the same central position along the length of the heating region. Each of the pair of mounting regions may have a smaller surface area than the heating region.

The spacer element may be fluid permeable. As used herein, a "fluid permeable" element means an element that allows liquid or gas to permeate through it.

The spacer element may be substantially planar, having a substantially greater length and width than thickness. The length and width directions are orthogonal to one another and define a first plane of the spacer element. The first side of the spacer element and the second side of the spacer element may oppose each other and extend in planes parallel to the first plane of the susceptor element. The spacer element may be configured to allow liquid aerosol-forming to move between the first side of the spacer element and the second side of the spacer element. The spacer element may be configured to transport liquid aerosol-forming substrate between the first side of the spacer element and the second side of the spacer element.

In the thickness direction the spacer element is preferably at least partially uncovered. For example, the spacer element in the thickness direction may have at least one area that is not covered by another component. Therefore, at least one area of the spacer element in the thickness direction may be open to an airflow passage in which, during use, the susceptor assembly is placed. During use of the susceptor assembly, steam may build up within the spacer element. Advantageously, before the steam reaches a pressure that could lead to deformation of the susceptor assembly, the steam may escape from the at least partially uncovered area of the spacer element in the thickness direction.

The spacer element may be configured to allow liquid aerosol-forming substrate to move between the first wicking layer and the second wicking layer. In particular, liquid aerosol-forming substrate may move between the first wicking layer and the second wicking layer when the first wicking layer is in contact with the first side of the spacer element and the second wicking layer is in contact with the second side of the spacer element.

The first wicking layer may be in contact with a first side of the spacer element and the second wicking layer is in contact with a second side of the spacer element. The spacer element may separate the first wicking layer from the second wicking layer. Advantageously, the spacer element may prevent the first wicking layer from being in contact with the second wicking layer, and therefore provide a space for steam. The one or more wicking elements may comprise a capillary material. The first wicking layer may comprise a capillary material. The second wicking layer may comprise a capillary material. A capillary material is a material that is capable of transport of liquid from one end of the material to another by means of capillary action. The capillary material may have a fibrous or spongy structure. The capillary material preferably comprises a bundle of capillaries. For example, the capillary material may comprise a plurality of fibres or threads or other fine bore tubes. In some embodiments, the capillary material may comprise sponge-like or foam-like material. The structure of the capillary material may form a plurality of small bores or tubes, through which liquid aerosol-forming substrate can be transported by capillary action.

The one or more wicking elements may comprise or consist of an electrically insulating material. The one or more wicking elements may comprise a non-metallic material. Preferably,

the one or more wicking elements may not heat up in a magnetic field. The one or more wicking element may comprise a hydrophilic material or an oleophilic material. This may advantageously encourage the transport of the aerosol-forming substrate through the one or more wicking elements. The one or more wicking elements may comprise or consist of a porous ceramic material.

The one or more wicking elements may comprise a non-metallic material. Examples of suitable materials for the one or more wicking elements are sponge or foam materials, ceramic- or graphite-based materials in the form of fibres or sintered powders, foamed metal or plastics materials, fibrous materials, for example made of spun or extruded fibres, such as glass fibre, cellulose acetate, polyester, or bonded polyolefin, polyethylene, terylene or polypropylene fibres, nylon fibres or ceramic. Suitable materials for the one or more wicking elements may comprise cellulosic materials, such as cotton or rayon.

The one or more wicking elements may preferably comprise cotton, rayon or glass fibre. The first wicking layer may preferably comprise of consist of cotton. The second wicking layer may preferably comprise or consist of cotton.

The first wicking layer may have a thickness of between 0.1 and 0.5 millimetres. Preferably, the first wicking layer may have a thickness between 0.2 millimetres. The second wicking layer may have a thickness of between 0.1 and 0.5 millimetres. Preferably, the second wicking layer may have a thickness between 0.2 millimetres.

The spacer element may comprise a porous material. The spacer element may comprise more pores than the one or more wicking elements. The spacer element may comprise larger pores than the one or more wicking elements. The spacer element may be more porous that the one or more wicking elements.

The spacer element may comprise a capillary material. The spacer element may comprise more small bores or tubes, through which liquid aerosol-forming substrate can be transported by capillary action, than the one or more wicking elements. The spacer element may comprise larger bores or tubes, through which liquid aerosol-forming substrate can be transported by capillary action, than the one or more wicking elements. In this way, the rate of transport of the liquid aerosol-forming substrate through the spacer element may be higher than the rate of transport of the liquid aerosol-forming substrate through the first wicking layer or the second wicking layer.

The spacer element may not comprise a capillary material.

The spacer element may comprise a mesh. As used herein the term "mesh" encompasses grids and arrays of filaments having spaces therebetween. The term mesh also includes woven and non-woven fabrics.

The spacer element may comprise or consist of an electrically insulating material. The spacer element may comprise a non-metallic material. Preferably, the spacer element may not heat up in a magnetic field.

The spacer element may preferably comprise or consist of cotton. The spacer element may comprise a plastics material. The spacer element may comprise a polyetheretherketone (PEEK) film. The spacer element may comprise a fibre sheet.

The spacer element may have a higher fluid permeability than the fluid permeability of the one or more wicking elements.

The spacer element may comprise an aperture configured to allow liquid aerosol-forming substrate to move between the first wicking layer and the second wicking layer. The spacer element may comprise a plurality of apertures configured to allow liquid aerosol-forming substrate to move between the first wicking layer and the second wicking layer.

The aperture or apertures may also be a hole, cut-out, or channel.

The aperture or apertures may be defined through the spacer element, between the first side of the spacer element and the second side of the spacer element. In this way liquid aerosol-forming substrate may pass through the aperture or apertures between the first side of the spacer element and the second side of the spacer element.

The aperture or apertures may have a circular cross-section. The aperture or apertures may have a diameter of at least 0.1 millimetres.

The aperture or apertures may have rectangular cross-section. The aperture or apertures may have a triangular cross-section. The aperture or apertures may have any suitable cross-section.

The aperture or apertures may be defined at an end of the spacer element. The aperture or apertures may be finger-like apertures, meaning the apertures may be defined by three sides.

The aperture or each of the plurality of apertures may have a cross-sectional area of at least 0.005 millimetres squared. The aperture or each of the plurality of apertures may have a cross-sectional area of at least 0.01 millimetres squared.

The aperture or apertures may be configured to enhance transport of the liquid aerosol-forming substrate from the liquid reservoir to a centre of the spacer element.

The one or more wicking elements may comprise small bores, tubes or pores in which liquid aerosol-forming substrate may be held and alternatively or in addition may be transported through by capillary action. Each of one of the small bores, tubes, or pores may have a volume for holding or transporting liquid aerosol-forming substrate. The volume of the aperture or each aperture in the plurality of apertures in the spacer element may be greater than the volume of each one of the small bores, tubes, or pores in the one or more wicking elements. The total volume of the aperture or apertures in the spacer element may be greater than the total volume of the small bores, tubes and pores in the one or more wicking elements.

The spacer element may comprise one or more of curves, undulations, folds, and corrugations. The spacer element may have a first end and a second end. A width of the spacer element may extend from the first end to the second end. Where the spacer element does not

extend directly from the first end to the second, i.e. in a straight line, the spacer element may be considered to comprise one or more of curves, undulations, folds, and corrugations.

A curve may refer to a gradual change in direction of the spacer element, for example a gradual change in direction of the spacer element between the first end and the second end. Thus, a curve may form an arc, or a "C" shape. A curve in the spacer element may enhance transport of liquid aerosol-forming substrate between the first wicking layer and the second wicking layer.

A spacer element may comprise a curve configured to act as a spring element between the first and second wicking layers. The spring may be resiliently biased to hold the first wicking layer and second wicking layer at a predetermined distance apart. The distance apart may pre-set by the adjusting the radius of the curve. Advantageously, a spacer element comprising a curve configured to act as a spring element may press against the first and second wicking layers, ensuring good contact between the spacer element and the one or more wicking elements.

A fold may refer to a change in direction of the spacer element, for example a step change in direction of the spacer element between the first end and the second end. Thus, a fold may form two sides of a polygon, or a "V" shape.

An undulation may comprise multiple curves. For example, an undulation may refer to a gradual change in direction of the spacer element in a first direction, followed by a gradual change in direction of the spacer element in another, for example opposite, direction. Thus, an undulation may form a sinusoidal wave, or an "S" shape. Multiple undulations may be known as wave corrugations. The spacer element may comprise wave corrugations.

A corrugation may comprise multiple folds. For example, a corrugation may refer to a step change in direction of the spacer element, followed by another step change in direction of the spacer element. Thus, a corrugation may form three sides of a rectangle, or an "M" shape, or an "N" shape. Multiple corrugations comprising "V" shaped folds may be known as triangular corrugations. The spacer element may comprise triangular corrugations.

The corrugations may be formed by bending or folding a spacer material to form the spacer element. The corrugations may be formed by moulding a spacer material to form the spacer element.

The undulations, or corrugations of the spacer element may enhance the flow of liquid aerosol-forming substrate between the first layer of the one or more wicking elements and the second layer of the one or more wicking elements.

The spacer element may provide a void or plurality of voids between the first wicking layer and the second wicking layer. The void or voids may comprise an aperture or apertures. The void or voids may be defined between the spacer element and the first or second wicking layer by a curve, fold, undulation or corrugation in the spacer layer. The void or voids may provide a volume of space for liquid or gaseous aerosol-forming substrate to be held and alternatively or in addition

be transported through. Advantageously, the void or voids may prevent steam formed in between the first wicking layer and the second wicking layer from deforming the susceptor assembly.

A thickness of the spacer element may be between 0.1 and 0.5 millimetres. As used herein the thickness of the spacer element is defined as the distance between the first side of the spacer element and the second side of the spacer element. Preferably, the thickness of the spacer element may be between 0.2 and 0.4 millimetres.

A depth of the spacer element may be between 0.1 and 0.5 millimetres, preferably between 0.2 and 0.4 millimetres. As used herein the depth of the spacer element may be defined as the sum of a maximum distance, in a plane perpendicular to the first side, from a central axis of the plane to the first side of the spacer element and a maximum distance, in a plane perpendicular to the second side, from a central axis of the plane to the second side of the spacer element. For example, in a spacer element comprising a corrugation, the depth of the spacer element is the peak-to-peak amplitude of the corrugation.

A separation distance between the first wicking layer and the second wicking layer may be between 0.1 and 0.5 millimetres. Preferably, the separation distance between the first wicking layer and the second wicking layer may be between 0.2 and 0.4 millimetres. The depth of the spacer element may be the maximum separation distance between the first wicking layer and the second wicking layer.

The susceptor element may be fluid permeable. The first susceptor layer may be fluid permeable. The second susceptor layer may be fluid permeable. A fluid permeable susceptor element may advantageously allow vaporised aerosol-forming substrate to escape through the susceptor element. Therefore, the aerosol-forming substrate vapour generated in a region of the one or more wicking elements immediately adjacent to the susceptor element may escape through the susceptor element without needing to pass through the one or more wicking elements.

As used herein, a “susceptor element" means an element that is heatable by penetration with an alternating magnetic field. A susceptor element is typically heatable by at least one of Joule heating through induction of eddy currents in the susceptor element, and hysteresis losses. Possible materials for the susceptor elements include graphite, molybdenum, silicon carbide, stainless steels, niobium, aluminium and virtually any other conductive elements. Advantageously the first and second susceptor elements may be ferrite elements. The material and the geometry for the susceptor elements can be chosen to provide a desired electrical resistance and heat generation. Preferably, the first and second susceptor element comprises AISI 430 stainless steel.

Advantageously, in an aerosol-generating system that uses inductive heating, no electrical contacts need be formed between the susceptor assembly and a power supply. This may eliminate the need for solder or other bonding elements. A cartridge incorporating a susceptor

assembly which is configured to be inductively heated may allow production of a cartridge that is simple, inexpensive and robust.

The susceptor element or susceptor elements may be printed or otherwise deposited on the one or more wicking elements, as a film or plurality of tracks. The susceptor element may comprise or consist of an electrically conductive material deposited directly onto the one or more wicking elements. The electrically conductive material of the susceptor element may be deposited on to the one or more wicking elements as a plurality of tracks. In operation, vaporised aerosol-forming substrate may advantageously escape from the one or more wicking elements through gaps or spaces between the tracks. The plurality of tracks of each of the susceptor elements may advantageously be distributed over a surface of the one or more wicking elements to provide substantially uniform heating across that surface. For example, the width of each of the tracks and the spacing between the tracks may be substantially the same for each of the plurality of tracks. The plurality of tracks of each of the susceptor elements may comprise a first set of tracks parallel to one another. The plurality of tracks may further comprise a second set of tracks perpendicular to the first set of tracks and overlapping the first set of tracks. The first and second sets of tracks may together form a mesh-like structure.

The susceptor element may comprise or consist of a perforated foil. In operation, vaporised aerosol-forming substrate may advantageously escape from the one or more wicking elements through the perforations of the perforated foil. The perforations may be uniformly distributed across the susceptor element. The susceptor element may be perforated to allow for the egress of vapour from the susceptor assembly or to allow for the ingress of liquid aerosol-forming substrate.

The susceptor element may comprise electrically conductive filaments. The first susceptor layer may comprise or consist of electrically conductive filaments. The second susceptor layer may comprise or consist of electrically conductive filaments.

In preferred embodiment, the susceptor element may comprise a mesh. The first susceptor layer may comprise or consist of a mesh. The second susceptor layer may comprise or consist of a mesh. As used herein the term "mesh" encompasses grids and arrays of filaments having spaces therebetween. The term mesh also includes woven and non-woven fabrics.

The filaments may define interstices between the filaments and the interstices may have a width of between 10 micrometres and 100 micrometres. Preferably the filaments give rise to capillary action in the interstices, so that in use, the liquid aerosol-forming substrate is drawn into the interstices, increasing the contact area between the susceptor element and the liquid. In operation, vaporised aerosol-forming substrate may advantageously escape from the one or more wicking elements through interstices between the filaments of the susceptor element.

Each susceptor layer may have a thickness of no more than two millimetres. Preferably, each susceptor layer may have a thickness of less than one millimetre. Particularly preferably the

first susceptor lay may have a thickness of between 0.1 and 0.2 millimetres. Particularly preferably the second susceptor lay may have a thickness of between 0.1 and 0.2 millimetres. The thickness of each of the susceptor layers is advantageously of a similar order to the skin depth of the material of the susceptor layer at the frequency of operation of the system. Advantageously the susceptor assembly has a thickness of no greater than ten times the skin depth of the material of the susceptor layers at the frequency of operation. This may ensure that each of susceptor layers has a suitably low mass and so the time taken for the susceptor layers to reach a temperature suitable for volatizing the aerosol-forming substrate is low. When the susceptor element is penetrated by alternating magnetic fields from opposing sides, each susceptor layer may advantageously have a thickness of at least twice the skin depth of the material of susceptor layer at the frequency of operation. This may minimize the interaction of the skin effects on opposing sides of the susceptor layer.

Advantageously the susceptor assembly may be configured to hold only a small volume of liquid aerosol-forming substrate, sufficient for a single user puff. This is advantageous because it allows that small volume of liquid to be vaporised rapidly, with minimal heat loss. Advantageously, the susceptor assembly, or a heating region of the susceptor assembly may hold between 2 millilitres and 10 millilitres of liquid aerosol-forming substrate.

The thickness of the susceptor assembly may be no more than two millimetres. Preferably, the susceptor assembly has a thickness of between 0.8 millimetres and 1.2 millimetres.

According to a second embodiment of the present disclosure there is provided a cartridge for use in an aerosol-generating system. The cartridge may comprise a susceptor assembly according to the first embodiment of the present disclosure and a liquid reservoir for holding a liquid aerosol-forming substrate. The one or more wicking elements may be in fluid communication with the liquid reservoir and configured to transport the liquid aerosol-forming substrate between the liquid reservoir and the susceptor element.

The cartridge may comprise an air inlet and an air outlet The cartridge may comprise an airflow passage extending between the air inlet and the air outlet.

At least a portion of the susceptor assembly may be positioned in the airflow passage. A portion of the susceptor element may be positioned in the airflow passage.

The susceptor element may be in fluid communication with the airflow passage. Aerosol-forming substrate vaporised by the susceptor assembly may escape into the airflow passage. The vapour may condense to form an aerosol within the airflow passage. The aerosol may be drawn out of the aerosol-generating system through the air outlet.

The cartridge may comprise a mouth end and a connection end, wherein the connection end is configured to connect the cartridge to an aerosol-generating device. The air outlet may be provided in the mouth end.

The cartridge may comprise a mouthpiece. The air outlet may be defined in the mouthpiece.

The airflow passage may pass through the liquid reservoir. For example, the liquid reservoir may have an annular cross-section defining an internal passage, and the airflow passage may extend through the internal passage of the liquid reservoir.

The cartridge may comprise a susceptor holder. The susceptor holder may be a tubular susceptor holder. The internal passage of the tubular susceptor holder may form a portion of the enclosed airflow passage. The enclosed airflow passage may extend from the air inlet, through the internal passage of the tubular susceptor holder, through the internal passage of the liquid reservoir to the air outlet.

The susceptor holder may support the susceptor assembly. The susceptor holder may contact at least one of the first wicking layer and the second wicking layer. The susceptor holder may secure the susceptor assembly in position in the cartridge.

According to the third embodiment of the present disclosure there is provided an aerosol-generating system. The aerosol generating system may comprise a susceptor assembly according to the first embodiment of the present disclosure. The aerosol generating system may further comprise a liquid reservoir for holding a liquid aerosol-forming substrate, wherein the one or more wicking elements is in fluid communication with the liquid reservoir and configured to transport the liquid aerosol-forming substrate. The aerosol generating system may further comprise an inductor coil, and a power supply connected to the inductor coil, the power supply configured to provide alternating current to the inductor coil to generate an alternating magnetic field. The susceptor element may be configured to be heated by the alternating magnetic field.

The aerosol-generating system may comprise a system air inlet, a system air outlet and a system airflow passage extending between the system air inlet and the system air outlet.

At least a portion of the susceptor assembly may be positioned in the system airflow passage. At least a portion of the susceptor element may be positioned in the system airflow passage.

The susceptor element may be in fluid communication with the system airflow passage. Aerosol-forming substrate vaporised by the susceptor assembly may escape into the airflow passage. The vapour may condense to form an aerosol within the system airflow passage. The aerosol may be drawn out of the aerosol-generating system through the system air outlet.

The aerosol-generating system may comprise a mouthpiece wherein the system air outlet is defined in the mouthpiece.

The inductor coil may circumscribe the susceptor assembly. The inductor coil may be a tubular, spiral coil. Preferably, the inductor coil is a helical coil. The inductor coil may be a helical coil that circumscribes, wherein at least a portion of the helical coil circumscribes the susceptor assembly. The helical coil may have a circular cross section when viewed parallel to the longitudinal axis of the aerosol-generating system.

The aerosol-generating system may be a handheld aerosol-generating system configured to allow a user to puff on the mouthpiece to draw an aerosol through the system air outlet. The aerosol-generating system may have a size comparable to a conventional cigar or cigarette. The aerosol-generating system may have a total length between about 30 millimetres and about 150 millimetres. The aerosol-generating system may have an external diameter between about 5 millimetres and about 30 millimetres. The aerosol-generating system may be an electrically operated smoking system.

The aerosol-generating system may comprise control circuitry. The control circuitry may comprise a microprocessor. The microprocessor may be a programmable microprocessor, a microcontroller, or an application specific integrated chip (ASIC) or other electronic circuitry capable of providing control. The control circuitry may be configured to supply power to the inductor coil continuously following activation of the system or may be configured to supply power intermittently, such as on a puff-by-puff basis. The power may be supplied to the inductive heating assembly in the form of pulses of electrical current, for example, by means of pulse width modulation (PWM). The control circuitry may comprise DC/AC inverter, which may comprise a Class-D or Class-E power amplifier. The control circuitry may comprise further electronic components. For example, in some embodiments, the control circuitry may comprise any of: sensors, switches, display elements.

The control circuitry may comprise a sensor for detecting when a user puffs on the aerosol-generating system. The sensor may be configured to detect when air is drawn through the system air flow passage. The sensor may allow the aerosol-generating system to supply power on a puff-by-puff basis.

The power supply may be a DC power supply. The power supply may be a battery. The battery may be a Lithium based battery, for example a Lithium-Cobalt, a Lithium-Iron-Phosphate, a Lithium Titanate or a Lithium-Polymer battery. The battery may be a Nickel-metal hydride battery or a Nickel cadmium battery. The power supply may be another form of charge storage device such as a capacitor. The power supply may be rechargeable and be configured for many cycles of charge and discharge. The power supply may have a capacity that allows for the storage of enough energy for one or more user experiences of the aerosol-generating system; for example, the power supply may have sufficient capacity to allow for the continuous generation of aerosol for a period of around six minutes, corresponding to the typical time taken to smoke a conventional cigarette, or for a period that is a multiple of six minutes. In another example, the power supply may have sufficient capacity to allow for a predetermined number of puffs or discrete activations of the susceptor assembly.

The aerosol-generating system may comprise a cartridge according to the second embodiment of the present disclosure and an aerosol-generating device. The system air outlet may comprise the cartridge air outlet.

The aerosol-generating device may comprise the inductor coil, and the power supply connected to the inductor coil. The aerosol-generating device may have a connection end configured to connect the aerosol-generating device to the cartridge. The connection end may comprise a cavity for receiving the cartridge.

The aerosol-generating device may have a distal end, opposite the connection end. The distal end may comprise an electrical connector configured to connect the aerosol-generating device to an electrical connector of an external power source, for charging the power supply of the aerosol-generating device.

It will be appreciated that any features described herein in relation to one embodiment the susceptor assembly may also be applicable to other embodiments of cartridges and aerosol-generating systems according to this disclosure. A feature described in relation to one embodiment of the disclosure may be equally applicable to another embodiment in accordance with this disclosure.

According to a fourth embodiment of the present disclosure, there is provided a method for manufacturing a susceptor assembly. The method may comprise providing a susceptor element; placing one or more wicking elements comprising a first wicking layer and a second wicking layer over the susceptor element. The method may further comprise placing a spacer element on the first wicking layer and folding the susceptor element, such that the spacer element is positioned between and in contact with the first wicking layer and the second wicking layer and the susceptor element forms a first susceptor layer and a second susceptor layer.

As used herein, the term “aerosol-forming substrate” refers to a substrate capable of releasing volatile compounds that can form an aerosol. The volatile compounds may be released by heating or combusting the aerosol-forming substrate.

The aerosol-forming substrate may comprise an aerosol former. As used herein, the term “aerosol-former” refers to any suitable compound or mixture of compounds that, in use, facilitates formation of an aerosol, for example a stable aerosol that is substantially resistant to thermal degradation at the temperature of operation of the system. Suitable aerosol-formers are well known in the art and include, but are not limited to: polyhydric alcohols, such as triethylene glycol, 1,3-butanediol and glycerine; esters of polyhydric alcohols, such as glycerol mono-, di- or triacetate; and aliphatic esters of mono-, di- or polycarboxylic acids, such as dimethyl dodecanedioate and dimethyl tetradecanedioate.

The aerosol-forming substrate may comprise nicotine. The aerosol-forming substrate may comprise water. The aerosol-forming substrate may comprise glycerol, also referred to as glycerine, which has a higher boiling point than nicotine. The aerosol-forming substrate may comprise propylene glycol. The aerosol-forming substrate may comprise plant-based material. The aerosol-forming substrate may comprise homogenised plant-based material. The aerosol-forming substrate may comprise tobacco. The aerosol-forming substrate may comprise a

tobacco-containing material. The tobacco-containing material may contain volatile tobacco flavour compounds. These compounds may be released from the aerosol-forming substrate upon heating. The aerosol-forming substrate may comprise homogenised tobacco material. The aerosol-forming substrate may comprise other additives and ingredients, such as flavourants.

As used herein, the term "liquid aerosol-forming substrate" is used to refer to an aerosol-forming substrate in condensed form. Thus, the "liquid aerosol-forming substrate" may be, or may comprise, one or more of a liquid, gel, or paste. If the liquid aerosol-forming substrate is, or comprises, a gel or paste, the gel or paste may liquidise upon heating. For example, the gel or paste may liquidise upon heating to a temperature of less than 50, 75, 100, 150, or 200 degrees Celsius.

The invention is defined in the claims. However, below there is provided a non-exhaustive list of non-limiting examples. Any one or more of the features of these examples may be combined with any one or more features of another example, embodiment, or aspect described herein.

Example Ex1: A susceptor assembly for an aerosol-generating system, the susceptor assembly comprising: one or more wicking elements for transporting a liquid aerosol-forming substrate, the one or more wicking elements comprising a first wicking layer and a second wicking layer; a spacer element positioned between and in contact with the first wicking layer and the second wicking layer; and a susceptor element in contact with at least a portion of the one or more wicking elements.

Example Ex2: The susceptor assembly according to example Ex1, wherein the susceptor element comprises a first susceptor layer and a second susceptor layer.

Example Ex3: The susceptor assembly according to example Ex2, wherein the first susceptor layer is in contact with at least a portion of the first wicking layer, and the second susceptor layer is in contact with at least a portion of the second wicking layer.

Example Ex4: The susceptor assembly according to example Ex2 or Ex3, wherein the first side of the spacer element is in contact with a first side of the first wicking layer and the first susceptor layer is in contact with a second side of the first wicking layer, wherein the first side of the first wicking layer opposes the second side of the first wicking layer.

Example Ex5: The susceptor assembly according to example Ex2, Ex3, or Ex4, wherein the second side of the spacer element is in contact with a first side of the second wicking layer and the second susceptor layer is in contact with a second side of the second wicking layer, wherein the first side of the second wicking layer opposes the second side of the second wicking layer.

Example Ex6: The susceptor assembly according to any one of examples Ex2 to Ex5, wherein the first susceptor layer and second susceptor layer are substantially parallel.

Example Ex7: The susceptor assembly according to example Ex2 to Ex6, wherein the first susceptor layer and second susceptor layer are separate components.

Example Ex8: The susceptor assembly according to any one of examples Ex2 to Ex6, wherein the susceptor element comprises a connection section joining the first susceptor layer to the second susceptor layer.

Example Ex9: The susceptor assembly according to example Ex8, wherein the connection section is U-shaped or V-shaped.

Example Ex10: The susceptor assembly according to any one of examples Ex1 to Ex9, wherein the first wicking layer and second wicking layer are substantially planar.

Example Ex11: The susceptor assembly according to any one of examples Ex1 to Ex10, wherein the first wicking layer and second wicking layer are substantially parallel.

Example Ex12: The susceptor assembly according to any one of examples Ex1 to Ex11, wherein the first wicking layer and second wicking layer are formed from a single piece of wicking material.

Example Ex13: The susceptor assembly according to any one of examples Ex1 to Ex11, wherein the first wicking layer and second wicking layer are separate components.

Example Ex14: The susceptor assembly according to any one of examples Ex1 to Ex13, wherein the susceptor assembly is substantially planar.

Example Ex15: The susceptor assembly according to any one of examples Ex1 to Ex14, wherein the spacer element is fluid permeable.

Example Ex16: The susceptor assembly according to any one of examples Ex1 to Ex15, wherein the spacer element substantially planar.

Example Ex17: The susceptor assembly according to any one of examples Ex1 to Ex16, wherein the first wicking layer is in contact with a first side of the spacer element and the second wicking layer is in contact with a second side of the spacer element.

Example Ex18: The susceptor assembly according to any one of examples Ex1 to Ex17, wherein the spacer element separates the first wicking layer from the second wicking layer.

Example Ex19: The susceptor assembly according to any of examples Ex1 to Ex18, wherein the one or more wicking elements comprises a capillary material.

Example Ex20: The susceptor assembly according to any of examples Ex1 to Ex19, wherein the one or more wicking elements comprises cotton.

Example Ex21: The susceptor assembly according to any of examples Ex1 to Ex20, wherein the spacer element comprises a porous material.

Example Ex22: The susceptor assembly according to any of examples Ex1 to Ex21, wherein the spacer element comprises a mesh.

Example Ex23: The susceptor assembly according to any of examples Ex1 to Ex22, wherein the spacer element comprises cotton.

Example Ex24: The susceptor assembly according to any of examples Ex1 to Ex23, wherein the spacer element comprises a plastics material.

Example Ex25: The susceptor assembly according to any of examples Ex1 to Ex24, wherein the spacer element comprises a PEEK film.

Example Ex26: The susceptor assembly according to any of examples Ex1 to Ex25, wherein the spacer element comprises a fibre sheet.

Example Ex27: The susceptor assembly according to any of examples Ex1 to Ex26, wherein the spacer element comprises an aperture configured to allow liquid aerosol-forming substrate to move between the first wicking layer and the second wicking layer.

Example Ex28: The susceptor assembly according to example Ex27, wherein the spacer element comprises a plurality of apertures configured to allow liquid aerosol-forming substrate to move between the first wicking layer and the second wicking layer.

Example Ex29: The susceptor assembly according to example Ex27 or Ex28, wherein the aperture or apertures have a circular cross-section.

Example Ex30: The susceptor assembly according to example Ex29, wherein the aperture or apertures have a diameter of about 0.1 millimetre.

Example Ex31: The susceptor assembly according to example Ex27 or Ex28, wherein the aperture or apertures have a rectangular cross-section.

Example Ex32: The susceptor assembly according to any one of examples Ex1 to Ex31, wherein the spacer element comprises a curve or a fold.

Example Ex33: The susceptor assembly according to any one of examples Ex1 to Ex32, wherein the spacer element comprises a corrugation, or corrugations.

Example Ex34: The susceptor assembly according to example Ex33, wherein the spacer element comprises a wave-shaped corrugation or a triangular corrugation.

Example Ex35: The susceptor assembly according to any of examples Ex1 to Ex34, wherein a thickness of the spacer element is between 0.1 and 0.5 millimetres, preferably between 0.2 and 0.4 millimetres.

Example Ex36: The susceptor assembly according to any of examples Ex1 to Ex35, wherein a depth of the spacer element is between 0.1 and 0.5 millimetres, preferably between 0.2 and 0.4 millimetres.

Example Ex37: The susceptor assembly according to any of examples Ex1 to Ex36, wherein a distance between the first wicking layer and the second wicking layer is between 0.1 and 0.5 millimetres.

Example Ex38: The susceptor assembly according to example Ex37, wherein the distance between the first wicking layer and the second wicking layer is between 0.2 and 0.4 millimetres.

Example Ex39: The susceptor assembly according to any of examples Ex1 to Ex38, wherein the susceptor element is fluid permeable.

Example Ex40: The susceptor assembly according to any of examples Ex1 to Ex39, wherein the susceptor element comprises electrically conductive filaments.

Example Ex41: The susceptor assembly according to example Ex40, wherein the susceptor element comprises a mesh.

Example Ex42: A cartridge for an aerosol-generating system, the cartridge comprising:

a susceptor assembly according to any of examples Ex1 to Ex41; and

a liquid reservoir for holding a liquid aerosol-forming substrate, wherein the one or more wicking elements is in fluid communication with the liquid reservoir and is configured to transport the liquid aerosol-forming substrate from the liquid reservoir to the susceptor element.

Example Ex43: The cartridge according to example Ex42, further comprising an air inlet, an air outlet and an airflow passage extending between the air inlet and air outlet.

Example Ex44: The cartridge according to example Ex43, wherein the susceptor assembly is positioned in the airflow passage.

Example Ex45: The cartridge according to example Ex44, wherein the susceptor element is in contact with air in the airflow passage.

Example Ex46: The cartridge according to any of examples Ex42 to Ex45 comprising a mouth end and a connection end, wherein the connection end is configured to connect the cartridge to an aerosol-generating device.

Example Ex47: The cartridge according to example Ex46, wherein the air outlet is provided in the mouth end.

Example Ex48: The cartridge according to any one of examples Ex43 to Ex47, further comprising a mouthpiece, wherein the air outlet is defined in the mouthpiece.

Example Ex49: An aerosol-generating system comprising:

a susceptor assembly according to any of examples Ex1 to Ex41;

a liquid reservoir for holding a liquid aerosol-forming substrate, wherein the one or more wicking elements is in fluid communication with the liquid reservoir and configured to transport the liquid aerosol-forming substrate;

an inductor coil; and

a power supply connected to the inductor coil and configured to provide alternating current to the inductor coil to generate an alternating magnetic field, wherein the susceptor element is configured to be heated by the alternating magnetic field.

Example Ex50: The aerosol-generating system according to Ex49, further comprising a system air inlet, a system air outlet and a system airflow passage extending between the system air inlet and the system air outlet.

Example Ex51: The aerosol-generating system according to Ex50, wherein the susceptor assembly is positioned in the system airflow passage.

Example Ex52: The aerosol-generating system according to Ex50 or Ex51, further comprising a mouthpiece wherein the air outlet is defined in the mouthpiece.

Example Ex53: The aerosol-generating system according to any of Ex49 to Ex52, wherein the inductor coil circumscribes the susceptor assembly.

Example Ex54: The aerosol-generating system according to any of Ex49 to Ex53, wherein the inductor coil is a helical coil.

Example Ex55: A method for manufacturing a susceptor assembly, the method comprising: providing a susceptor element; placing one or more wicking elements comprising a first wicking layer and a second wicking layer over the susceptor element; placing a spacer element on the first wicking layer; and folding the susceptor element, such that the spacer element is positioned between and in contact with the first wicking layer and the second wicking layer and the susceptor element forms a first susceptor layer and a second susceptor layer.

Examples will now be further described with reference to the figures in which:

Figure 1A shows a schematic illustration of a cross section of an aerosol-generating system according to a first embodiment of the present disclosure;

Figure 1B shows a schematic illustration of a cross section of the aerosol-generating system of Figure 1A, wherein the system is in use configuration; and

Figure 2A shows a schematic illustration of a cross section of the cartridge of Figure 1A and 1B;

Figure 2B shows a schematic illustration of a cross section of the cartridge of Figure 2A rotated by 90 degrees about a central longitudinal axis of the cartridge;

Figure 3 shows a schematic illustration a perspective view of the susceptor assembly shown in Figures 1A-2B;

Figure 4 shows a schematic side view of a susceptor assembly according to a second embodiment of the present disclosure;

Figure 5 shows a schematic cross-section of a susceptor assembly according to a third embodiment of the present disclosure;

Figure 6 shows a schematic cross-section of a susceptor assembly according to a fourth embodiment of the present disclosure;

Figure 7 shows a schematic cross-section of a susceptor assembly according to a fifth embodiment of the present disclosure;

Figure 8 shows a schematic cross-section of a susceptor assembly according to a sixth embodiment of the present disclosure;

Figure 9 shows a schematic cross-section of a spacer element according to a seventh embodiment of the present disclosure;

Figure 10A shows a perspective view of a susceptor assembly according to an eighth embodiment of the present disclosure;

Figure 10B shows a plan view of a spacer element of the susceptor assembly of Figure 10A;

Figures 11-14 show plan views of exemplary spacer elements according to the present disclosure;

Figure 15A shows a perspective view of a spacer element according to a thirteenth embodiment of the present disclosure;

Figure 15B shows a plan view of the spacer element of Figure 15A;

Figure 16A shows a perspective view of a spacer element according to a fourteenth embodiment of the present disclosure; and

Figure 16B shows a plan view of the spacer element of Figure 16A.

Figure 1A shows a schematic illustration of an aerosol-generating system according to an example of the present disclosure. The system comprises a cartridge 10 and a device 60, which can be coupled together to form the aerosol-generating system. The aerosol-generating system is portable and has a size comparable to a conventional cigar or cigarette.

Figure 1B shows a schematic illustration of an aerosol-generating system of Figure 1A with the cartridge 10 and device 60 coupled together to form the aerosol-generating system.

The cartridge 10 comprises a susceptor assembly 12 mounted in a susceptor holder 14. The cartridge 10 is shown in Figures 2A and 2B separately from the aerosol-generating system. Figures 3 shows the susceptor assembly in more detail.

The susceptor assembly 12 is planar, and thin, having a thickness dimension that is substantially smaller than a length dimension and a width dimension. The susceptor assembly 12 is shaped in the form of a rectangle.

The susceptor assembly comprises a susceptor element comprising a first susceptor layer 16 and a second susceptor layer 18. The susceptor assembly also comprises a wicking element for transporting a liquid aerosol-forming substrate, the wicking element comprises a first wicking layer 20 and a second wicking layer 22. The susceptor assembly further comprises a spacer element, not shown in Figure 1A. Each of the first susceptor layer 16, the second susceptor layer 18, and the first wicking layer 20 and the second wicking layer 22 generally forms the shape of a rectangle, and each susceptor layer has the same length and width dimensions, and the width of the susceptor elements 16, 18 is smaller than the width of the first wicking layer 20 and the second wicking layer 22. Each of the first wicking layer 20 and the second wicking layer 22 therefore comprise outer, exposed portions of wicking element, each protruding into one of two channels 45. The first and second susceptor layer 16, 18 are substantially identical, and comprise a sintered mesh formed from ferritic stainless steel filaments and austenitic stainless steel filaments. The first wicking layer 20 and the second wicking layer 22 comprise a porous body of cotton filaments. The wicking element 20 is configured to deliver liquid from the outer, exposed surfaces of the first wicking layer 20 and the second wicking layer 22 to the first and second susceptor elements 16, 18.

The first and second susceptor elements 16, 18 are configured to be heatable by penetration with an alternating magnetic field, for vaporising an aerosol-forming substrate. The wicking element 20 contacts the susceptor holder 14, such that the susceptor holder 14 supports the susceptor assembly 12 in position in the cartridge 10.

The susceptor assembly 12 is partially arranged inside the internal passage 26 of the tubular susceptor holder 14, and extends in a plane parallel to a central longitudinal axis of the susceptor holder 14. The first and second susceptor elements 16, 18 are arranged entirely within the internal passage 26 of the susceptor holder 14. The first wicking layer 20 and the second wicking layer 22 of the wicking element, extend through openings in the side wall of the susceptor holder 14 into one of two channels 45.

The cartridge 10 has a mouth end, and a connection end, opposite the mouth end. An outer housing 36 defines a mouth end opening 38 at the mouth end of the cartridge 10. The cartridge 10 may further comprise a mouthpiece, at the mouth end. The connection end is configured for connection of the cartridge 10 to an aerosol-generating device, as described in detail below. The susceptor assembly 12 and the susceptor holder 14 are located towards the connection end of the cartridge 10.

The outer housing 36 formed from a mouldable plastics material, such as polypropylene. The outer housing 36 defines an internal space in which the susceptor assembly 12 and the susceptor holder 14 are contained.

The external width of the outer housing 36 is greater at the mouth end of the cartridge 10 than at the connection end, which are joined by a shoulder 37. This enables the connection end of the cartridge 10 to be received in a cavity of an aerosol-generating device, with the shoulder 37 locating the cartridge in the correct position in the device. This also enables the mouth end of the cartridge 10 to remain outside of the aerosol-generating device, with the mouth end conforming to the external shape of the aerosol-generating device.

The cartridge 10 further comprises a liquid reservoir 44. The liquid reservoir 44 is defined in the cartridge 10 for holding a liquid aerosol-forming substrate 42.

The liquid reservoir 44 extends from the mouth end of the outer housing 36 to the connection end of the outer housing 36, and comprises an annular space defined by the outer housing 36.

The annular space has an internal passage 48 that extends between the mouth end opening 38, and the open end of the internal passage 26 of the susceptor holder 14.

The liquid reservoir 44 further comprises two channels 45, the two channels 45 being defined between an inner surface of the outer housing 36 and an outer surface of the susceptor holder 14. The two channels 45 extend from the annular space defined by the outer housing 36 at the mouth end of the cartridge 10, to the connection end of the cartridge 10, such that the wicking element extends through the openings in the side wall of the susceptor holder 14 into the two channels 45. The two channels 45 extend from the annular space defined by the outer

housing 36 at the mouth end of the cartridge 10 on opposite sides of the internal passage 26 of the susceptor holder 14.

The susceptor holder 14 comprises a base 30 that partially closes one end of the internal passage 26. The base 30 comprises a plurality of air inlets 32 that enable air to be drawn into the internal passage 26 through the partially closed end.

An air passage is formed through the cartridge 10 by the internal passage 26 of the susceptor holder 14, and the internal passage 48 of the liquid reservoir 44. The air passage extends from the air inlets 32 in the base 30 of the susceptor holder 14, through the internal passage 26 of the susceptor holder 14, and through the internal passage 48 of the liquid reservoir 44 to the mouth end air outlet 38. The air passage enables air to be drawn through the cartridge 10 from the connection end to the mouth end.

The device 60 comprises a generally cylindrical housing 62 having a connection end and a distal end opposite the connection end. A cavity 64 for receiving the connection end of the cartridge is located at the connection end of the device 60. An air inlet 65 is provided through the outer housing 62 at the base of the cavity 64 to enable ambient air to be drawn into the cavity 64 at the base. The air inlet 65 of the device is the system air inlet.

The device 60 further comprises an inductive heating arrangement arranged within the device outer housing 62. The inductive heating arrangement includes an inductor coil 90, control circuitry 70 and a power supply 72. The power supply 72 comprises a rechargeable nickel cadmium battery, that is rechargeable via an electrical connector (not shown) at the distal end of the device. The control circuitry 70 is connected to the power supply 72, and to the inductor coil 90, such that the control circuitry 70 controls the supply of power to the inductor coil 90. The control circuitry 70 is configured to supply an alternating current to the inductor coil 90.

The inductor coil 90 is positioned around the susceptor assembly 12 when the cartridge 10 is received in the cavity 64, as shown in Figure 1B. The inductor coil 90 has a size and a shape matching the size and shape of heating regions of the susceptor element. The inductor coil 90 is made with a copper wire having a round circular section, and is arranged on a coil former element (not shown). The inductor coil 90 is a helical coil, and has a circular cross section when viewed parallel to the longitudinal axis of the aerosol-generating device.

The inductor coil 90 is configured such that when the alternating current is supplied to the inductor coil, the inductor coil generates an alternating magnetic field in the region of the susceptor assembly 12 when the cartridge 10 is received in the cavity 64.

The inductive heating arrangement further includes a flux concentrator element 91. The flux concentrator element 91 has a greater radius than the inductor coil 90, and so partially surrounds the inductor coil 90. The flux concentrator element 91 is configured to reduce the stray power losses from the generated magnetic field.

Figure 1B shows the aerosol-generating system of Figure 1A, wherein the cartridge 10 is coupled to the device 60, for operation. In operation, when a user puffs on the mouth end opening 38 of the cartridge 10, ambient air is drawn into the base of the cavity 64 through system air inlet 65, and into the cartridge 10 through the air inlets 32 in the base 30 of the cartridge 10. The ambient air flows through the cartridge 10 from the base 30 to the mouth end air outlet 38, through the air passage, and over the susceptor assembly 12 and in particular over and across the first susceptor layer 16 and the second susceptor layer 18.

The control circuitry 70 controls the supply of electrical power from the power supply 72 to the inductor coil 90 when the system is activated.

The control circuitry 72 includes an airflow sensor 63. The airflow sensor 63 is in fluid communication with the passage of ambient air which is drawn through the system by the user. The control circuitry 72 supplies electrical power to the inductor coil 90 when user puffs on the cartridge 10 are detected by the airflow sensor 63.

When the system is activated, an alternating current is established in the inductor coil 90, which generates alternating magnetic fields in the cavity 64 that penetrate the susceptor assembly 12, causing the susceptor element, including the first susceptor layer and the second susceptor layer, to heat. Liquid aerosol-forming substrate in the channels 45 is drawn into the susceptor assembly 12 through the wicking element to the susceptor element. In particular, liquid is drawn through the first wicking layer 20 and the second wicking layer 22 to the first susceptor layer 16 and the second susceptor layer 18, respectively. Liquid may also be transferred between the first wicking layer 20 and the second wicking layer 22, through the spacer element. The liquid aerosol-forming substrate 42 at the susceptor element is heated, and volatile compounds from the heated aerosol-forming substrate are released into the air passage of the cartridge 10, which cool to form an aerosol. The aerosol is entrained in the air being drawn through the air passage of the cartridge 10, and is drawn out of the cartridge 10 at the mouth end air outlet 38 for inhalation by the user.

Figure 2A shows a schematic illustration of the cartridge 10 separately from the aerosol-generating device.

Figure 2B shows a schematic illustration of the cartridge of Figure 2A rotated by 90 degrees about a central longitudinal axis of the cartridge. Figure 2B illustrates the layered structure of the susceptor assembly 12. The susceptor assembly 12 is planar, and thin, having a thickness dimension that is substantially smaller than a length dimension and a width dimension. The susceptor assembly comprises the susceptor element, comprising the first susceptor layer 16 and the second susceptor layer 18, and the wicking element for transporting a liquid aerosol-forming substrate. The wicking element comprises the first wicking layer 20 and the second wicking layer 22, with the spacer element 24 positioned between and in contact with the first wicking layer and the second wicking layer.

The spacer element 24 is fluid permeable and is configured to allow the liquid aerosol-forming substrate to move between the first wicking layer 20 and the second wicking layer 22. The spacer element 24 generally forms the shape of a rectangle, and has the same length and width dimensions as the first wicking layer and the second wicking layer. The spacer element 24 comprises a porous body of cotton.

Figure 3 shows a schematic illustration a perspective view of the susceptor assembly shown in Figures 1A-2B. The width of the susceptor layers 16, 18 is smaller than the width of the first wicking layer 20 and the second wicking layer 22. Therefore, when mounted in a cartridge, the first susceptor layer 16 and the second susceptor layer 18 may be suspended so that they are not in contact with the susceptor holder. In this embodiment, the first susceptor layer 16 and the second susceptor layer 18 are separate components, which are substantially identical. The first wicking layer 20 and the second wicking layer 22 are separate components, which are substantially parallel.

Figure 4 shows a schematic side view of a susceptor assembly according to a second embodiment of the present disclosure. The susceptor assembly of Figure 4 is configured to operate in a similar manner to the susceptor assembly according to the first embodiment. The structure of the susceptor assembly of the first embodiment and the susceptor of the second embodiment are largely the same, apart from the differences in the wicking element and the susceptor element, as described below.

The susceptor element of Figure 4 comprise a first susceptor layer 116 and a second susceptor layer 118, which are substantially parallel. The susceptor element further comprises a connection section 117 joining the first susceptor layer 116 to the second susceptor layer 118. The connection section 117 shown in Figure 4 is a U-shaped curve. The susceptor element is formed by bending or folding a single piece of material to form the susceptor element comprising the first susceptor layer 116, the second susceptor layer 118, and the connection section 117. The connection section 117 comprises a sintered mesh formed from ferritic stainless steel filaments and austenitic stainless steel filaments.

In this example, the wicking element comprises a first wicking layer 120, a second wicking layer 122 and a wicking connection section 121 joining the first wicking layer 120 to the second wicking layer 122. The wicking connection section 121 shown in Figure 4 is a U-shaped curve. The wicking element is formed by bending or folding a single piece of material to form the wicking element comprising the first wicking layer 120, the second wicking layer 122, and the wicking connection section 121. The wicking connection section 121 comprises a porous body of cotton filaments. In other examples, not shown in the Figures, alternative arrangements of the wicking element and susceptor element may be possible. For example, susceptor assembly may comprise a susceptor element comprising a connection section joining a first susceptor layer to a

second susceptor layer, wherein the wicking element comprises a first wicking layer and a second wicking layer that are separate components.

Figure 5 shows a schematic cross-section of a susceptor assembly according to a third embodiment of the present disclosure. The wicking element and susceptor element may be the same as the wicking element and susceptor element of Figures 3 or 4. The spacer element 224, shown in Figure 5, is substantially planar and comprises a first side of the spacer element in contact with the first wicking layer 20, 120 and a second side of the spacer element 224 in contact with the second wicking layer 22, 122, where the first side of the spacer element 224 opposes the second side of the spacer element 224. The spacer element 224 of Figure 5 comprises a plurality of apertures 226 defined through the spacer element. The apertures extend between the first side of the spacer element 224 to the second side of the spacer element 224.

In use, the apertures 226 allow or enhance the movement of liquid-aerosol forming substrate between the first wicking layer 20, 120 and the second wicking layer 22, 122. In this example, the spacer element 224 may comprise a fluid permeable material comprising a woven mesh of cotton filaments, wherein the liquid aerosol-forming substrate can move through the spacer element via spaces between the filaments of the spacer element and through the apertures 224. Alternatively, the spacer material may comprise a plastics material such a PEEK film, wherein the liquid aerosol-forming is able to move through the spacer element 224 only via the apertures 226.

Figure 6 shows a schematic cross-section of a susceptor assembly according to a fourth embodiment of the present disclosure. The spacer element 234 shown in Figure 6 comprises triangular corrugations 234. The triangular corrugations 234 are formed from folds in the spacer element 234, wherein the folds are “V” shaped step changes in direction.

Figure 7 shows a schematic cross-section of a susceptor assembly according to a fifth embodiment of the present disclosure. The spacer element 244, shown in Figure 7, comprises wave-shaped corrugations. The wave-shaped corrugations are formed by multiple curves in the spacer element. The curves are arc-like or “C” shaped gradual changes in direction of the spacer element 244.

Figure 8 shows a schematic cross-section of a susceptor assembly according to a sixth embodiment of the present disclosure. The spacer element 254 shown in Figure 8 comprises a curve configured to act as a spring element between the first 20, 120 and second 22, 122 wicking layers. The spring is resiliently biased to hold the first wicking layer 20, 120 and second wicking layer 22, 122 at a predetermined distance apart.

Figure 9 shows a schematic plan view of a spacer element 264 according to a seventh embodiment of the present disclosure. The spacer element 264 comprises finger-like apertures 266 through the spacer element. The apertures 266 have a rectangular cross-section and are defined through the spacer element 264 between the first side and second side of the spacer

element to enhance transport of liquid aerosol-forming substrate between the first wicking layer and the second wicking layer.

Figure 10a shows a perspective view of a susceptor assembly according to an eighth embodiment of the present disclosure, wherein the susceptor assembly is shaped in the form of a cross. Each of the first susceptor layer 216, second susceptor layer 218, first wicking layer 220, second wicking layer 222, and spacer element 334 are shaped in the form of a cross.

Figure 10b shows a top view of the spacer element of the susceptor assembly of Figure 10a. The spacer element 334 comprises a pair of mounting regions 330 and a heating region 332. The heating region 332 is substantially rectangular and is located centrally on the spacer element. The pair of mounting regions 330 are also substantially rectangular regions located at the periphery of the heating region 332, at opposite sides of the heating region 332. In this embodiment, the mounting regions 330 are arranged at the same central position along the length of the heating region 332. Each of the pair of mounting regions 330 has a smaller surface area than the heating region 332.

The cross-section of the spacer element 334 in this embodiment is identical to the cross-section of the each of the first susceptor layer 216, second susceptor layer 218, first wicking layer 220, and second wicking layer 222. The first susceptor layer 216, second susceptor layer 218, first wicking layer 220, and second wicking layer 222 each have respective mounting and heating regions corresponding to the mounting and heating regions of the spacer element 334.

The heating regions of the first susceptor layer 216 and second susceptor layer 218 are configured to be heatable by penetration with an alternating magnetic field, for vapourising an aerosol-forming substrate. The pair of mounting regions of the first susceptor layer 216 and second susceptor layer 218 are configured to contact a susceptor holder, such that the susceptor holder can support the susceptor assembly in position in a cartridge. The pair of mounting regions are configured to minimise heat transfer from the susceptor assembly to the susceptor holder.

Figures 11-16B show spacer elements in the shape of a cross, with various numbers and shapes of aperture defined through the spacer element.

Figures 11-14 show plan views of exemplary spacer elements according to the present disclosure.

Figure 11 shows a cross-shaped spacer element 344, according to a ninth embodiment of the present disclosure. The cross-shaped spacer element 344 comprises finger-like apertures 346 defined through the spacer element 344. The apertures 346 are defined through the spacer element 344 between the first side and second side of the spacer element to enhance the movement of liquid aerosol-forming substrate between the first wicking layer and the second wicking layer. The cross-shaped spacer element 344 comprises six finger-like apertures that have a rectangular cross-section. The finger-like apertures 346 are largely comprised in the mounting regions 340 of the spacer element 344. At least a portion of the finger-like apertures 346 extend

into the heating region 342 of the spacer element 344. The finger-like apertures 346 are orthogonal to the plane of the longitudinal direction go the susceptor assembly. The finger-like apertures 346 extend from opposing ends of the spacer element 344 towards the centre of the spacer element 344. The opposing ends situated in the mounting regions 340 and are configured to be the ends of the spacer element that extend into a liquid reservoir. In this way, the finger-like apertures enhance the transport of liquid aerosol-forming substrate from the liquid reservoir to the centre, heating region 342, of the spacer element 344, and therefore the centre of the susceptor assembly, which should be the hottest part of the susceptor assembly during operation.

Figure 12 shows a plan view of a cross-shaped spacer element 354, according to a tenth embodiment of the present disclosure. The cross-shaped spacer element 354 comprises two finger-like apertures 356 defined through the spacer element 354, and four “L”-shaped apertures 358 defined through the spacer element 354. The apertures 354, 356 are defined through the spacer element 354 between a first side and a second side of the spacer element 354. The finger-like apertures 356 are largely comprised in the mounting regions 350 of the spacer element 354. At least a portion of the finger-like apertures 356 extend into the heating region 352 of the spacer element 354. The finger-like apertures 356 are orthogonal to the plane of the longitudinal direction go the susceptor assembly. The finger-like apertures 356 extend from opposing ends of the spacer element 354 towards the centre of the spacer element 354. The opposing ends are situated in the mounting regions 350 of the spacer element 354 and are configured to be the ends of the spacer element 354 that extend into a liquid reservoir. A first section of the “L”-shaped apertures 358 extend from opposing ends of the spacer element 354 towards the centre of the spacer element 354. The opposing ends are situated in the mounting regions 350 of the spacer element 354 and are configured to be the ends of the spacer element 354 that extend into a liquid reservoir. At least a portion of the first section of the finger-like apertures 358 extend into the heating region 352 of the spacer element 354. The first section of the “L”-shaped apertures are parallel to the finger-like apertures 356. A second section of the “L”-shaped apertures 358 is perpendicular to the finger-like apertures 356. The second section of the “L”-shaped apertures 358 extend in a plane parallel to the longitudinal direction of the susceptor assembly. The second section of the “L”-shaped apertures are comprised in the heating region 352. In this configuration, the “L”-shaped apertures are configured in use to draw liquid from a liquid reservoir and through spacer element, to provide a more even distribution of liquid-aerosol forming substrate across the susceptor assembly.

Figure 13 shows a plan view of a cross-shaped spacer element 364, according to a eleventh embodiment of the present disclosure. The cross-shaped spacer element 364 comprises two finger-like apertures 366 defined through the spacer element 364, and four “L”-shaped apertures 368 defined through the spacer element 364. The finger-like apertures 366 and “L”-shaped

apertures 368 are substantially the same as the apertures of the tenth embodiment, expect where set out below.

The difference between apertures of the eleventh embodiment and the apertures of the tenth embodiment is that finger-like apertures 366 and the "L"-shaped apertures 368 of the eleventh embodiment further comprise an aperture with a circular-cross section 367.

Figure 14 shows a plan view of a cross-shaped spacer element 384, according to a twelfth embodiment of the present disclosure. In this embodiment the cross-sectional area of the apertures 376 is relatively large compared to the total cross-section of the spacer element 374.

Figure 15A shows a perspective view of a spacer element according to a thirteenth embodiment of the present disclosure. In this embodiment, the spacer element 384 comprises six apertures 386. The apertures 386 are configured both to allow the liquid aerosol-forming substrate to move from a first side of the spacer element to the second side of the spacer element and to allow the liquid aerosol-forming substrate to move from a first end or a second end of the spacer element 384 to a central portion of the spacer element 384.

Figure 15B shows a plan view of the spacer element 384 of Figure 15A. The apertures 386 are defined through the spacer element at both the mounting regions 380 and the heating region 382. The apertures 386 are similar to the "L"-shaped apertures shown in Figure 12, however, the apertures 386 comprise a curve between a first section of the "L"-shaped aperture and the second section of the "L"-shaped aperture.

Figure 16A shows a perspective view of a spacer element 394 according to a fourteenth embodiment of the present disclosure. The spacer element 394 comprises three apertures 396 defined therethrough. The apertures 396 have a gradually changing cross-section. The cross-section of the apertures 396 gradually decreases from an outer portion of the spacer element 394 to a central portion of the spacer element 394.

Figure 16B shows a plan view of the spacer element of Figure 16A.

For the purpose of the present description and of the appended claims, except where otherwise indicated, all numbers expressing amounts, quantities, percentages, and so forth, are to be understood as being modified in all instances by the term "about". Also, all ranges include the maximum and minimum points disclosed and include any intermediate ranges therein, which may or may not be specifically enumerated herein. In this context, therefore, a number A is understood as A ± 10 percent of A. Within this context, a number A may be considered to include numerical values that are within general standard error for the measurement of the property that the number A modifies. The number A, in some instances as used in the appended claims, may deviate by the percentages enumerated above provided that the amount by which A deviates does not materially affect the basic and novel characteristic(s) of the claimed invention. Also, all ranges include the maximum and minimum points disclosed and include any intermediate ranges therein, which may or may not be specifically enumerated herein.

CLAIMS

1. A susceptor assembly for an aerosol-generating system, the susceptor assembly comprising:
one or more wicking elements for transporting a liquid aerosol-forming substrate, the one or more wicking elements comprising a first wicking layer and a second wicking layer;
a spacer element positioned between and in contact with the first wicking layer and the second wicking layer, wherein the spacer element is configured to allow the liquid aerosol-forming substrate to move between the first wicking layer and the second wicking layer; and
a susceptor element in contact with at least a portion of the one or more wicking elements.

2. The susceptor assembly according to claim 1, wherein the spacer element separates the first wicking layer from the second wicking layer.

3. The susceptor assembly according to claim 1 or 2, wherein the first wicking layer is in contact with a first side of the spacer element and the second wicking layer is in contact with a second side of the spacer element.

4. The susceptor assembly according to claim 3, wherein the spacer element comprises an aperture or a plurality of apertures defined through the spacer element, between the first side of the spacer element and the second side of the spacer element, wherein the aperture or apertures are configured to allow liquid aerosol-forming substrate to move between the first wicking layer and the second wicking layer.

5. The susceptor assembly according to any one of claims 1 to 4, wherein the spacer element comprises a curve or a fold.

6. The susceptor assembly according to claim 5, wherein the spacer element comprises a corrugation.

7. The susceptor assembly according to any of claims 1 to 6, wherein the spacer element is fluid permeable.

8. The susceptor assembly according to any of claims 1 to 7, wherein the spacer element comprises cotton.

9. The susceptor assembly according to any of claim 1 to 8, wherein a thickness of the spacer element is between 0.1 and 0.5 millimetres, preferably between 0.2 and 0.4 millimetres.

10. The susceptor assembly according to any of claims 1 to 9, wherein the susceptor element comprises a first susceptor layer and a second susceptor layer.

11. The susceptor assembly according to claim 10, wherein the susceptor element comprises a connection section joining the first susceptor layer to the second susceptor layer.

12. A cartridge for an aerosol-generating system, the cartridge comprising:
a susceptor assembly according to any of claim 1 to 11; and
a liquid reservoir for holding a liquid aerosol-forming substrate, wherein the one or more wicking elements is in fluid communication with the liquid reservoir and is configured to transport the liquid aerosol-forming substrate from the liquid reservoir to the susceptor element.

13. The cartridge according to claim 12, further comprising an air inlet, an air outlet and an airflow passage extending between the air inlet and air outlet, wherein the susceptor assembly is positioned in the airflow passage.

14. An aerosol-generating system comprising:
a susceptor assembly according to any of claim 1 to 13;
a liquid reservoir for holding a liquid aerosol-forming substrate, wherein the one or more wicking elements is in fluid communication with the liquid reservoir and configured to transport the liquid aerosol-forming substrate;
an inductor coil; and
a power supply connected to the inductor coil and configured to provide alternating current to the inductor coil to generate an alternating magnetic field, wherein the susceptor element is configured to be heated by the alternating magnetic field.

15. The aerosol-generating system according to claim 14, further comprising a system air inlet, a system air outlet and a system airflow passage extending between the system air inlet and the system air outlet, wherein the susceptor assembly is positioned in the system airflow passage.

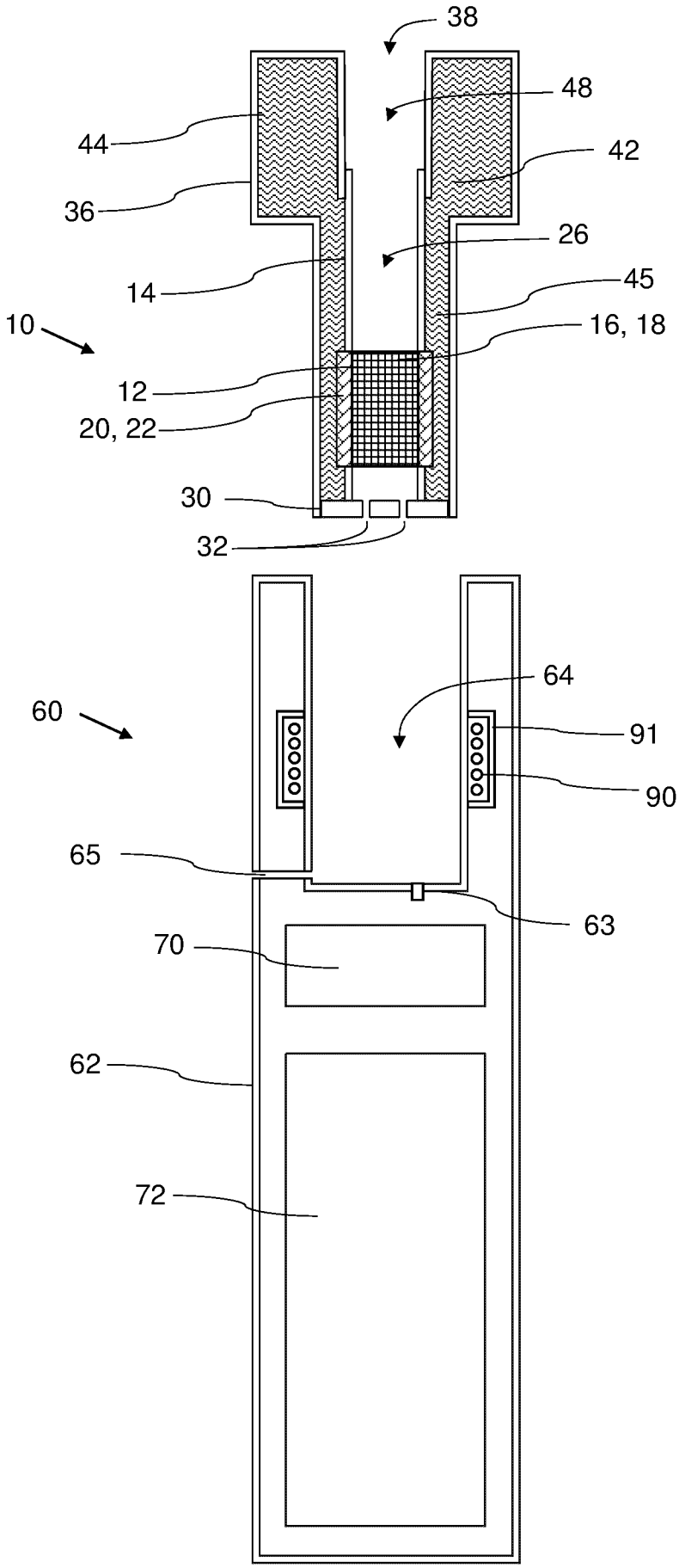

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Figure 1A

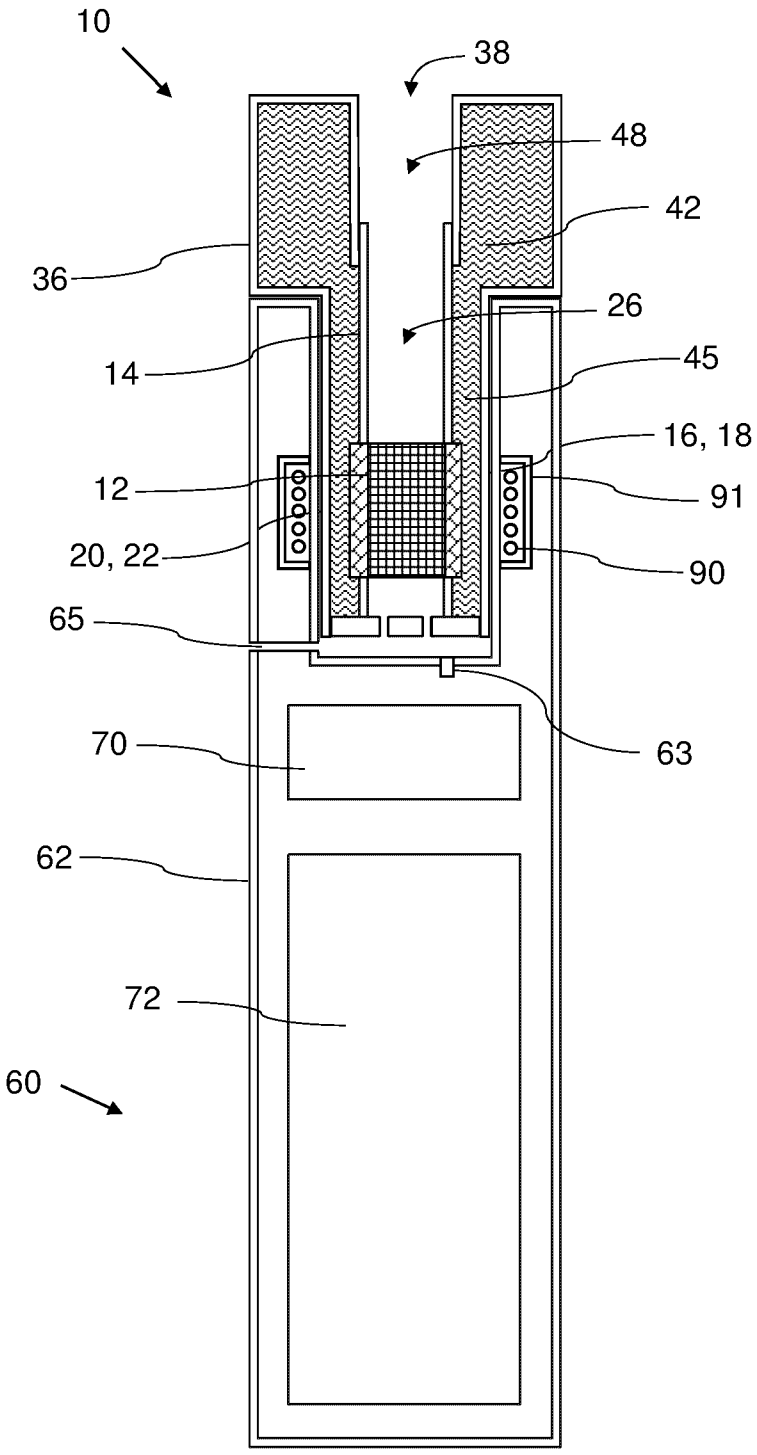


Figure 1B

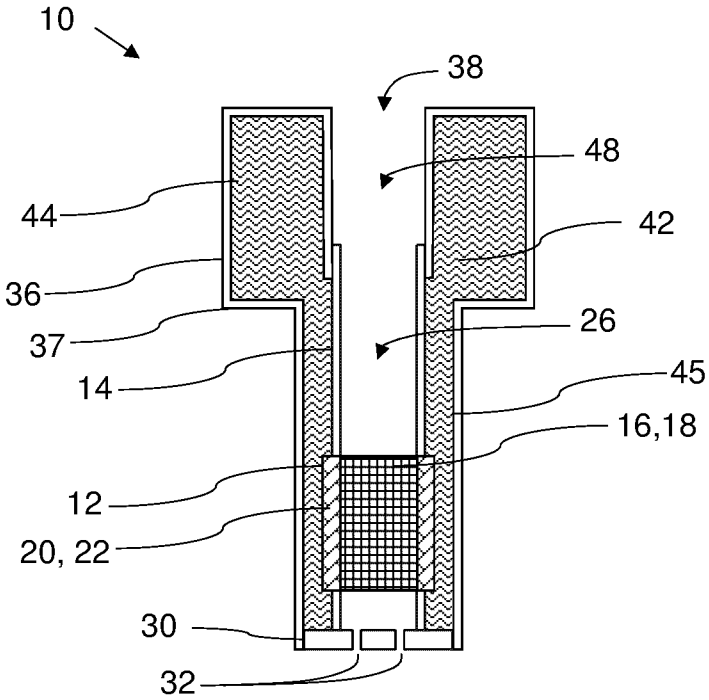


Figure 2A

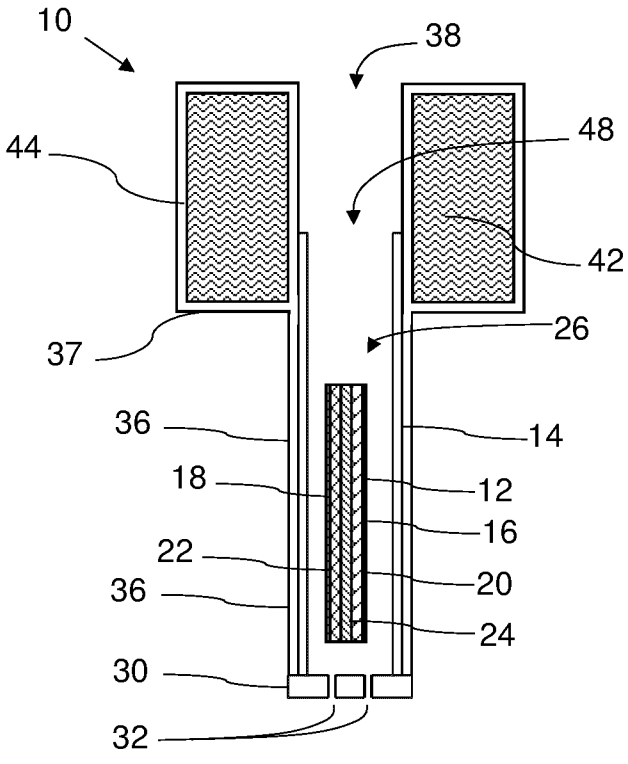


Figure 2B

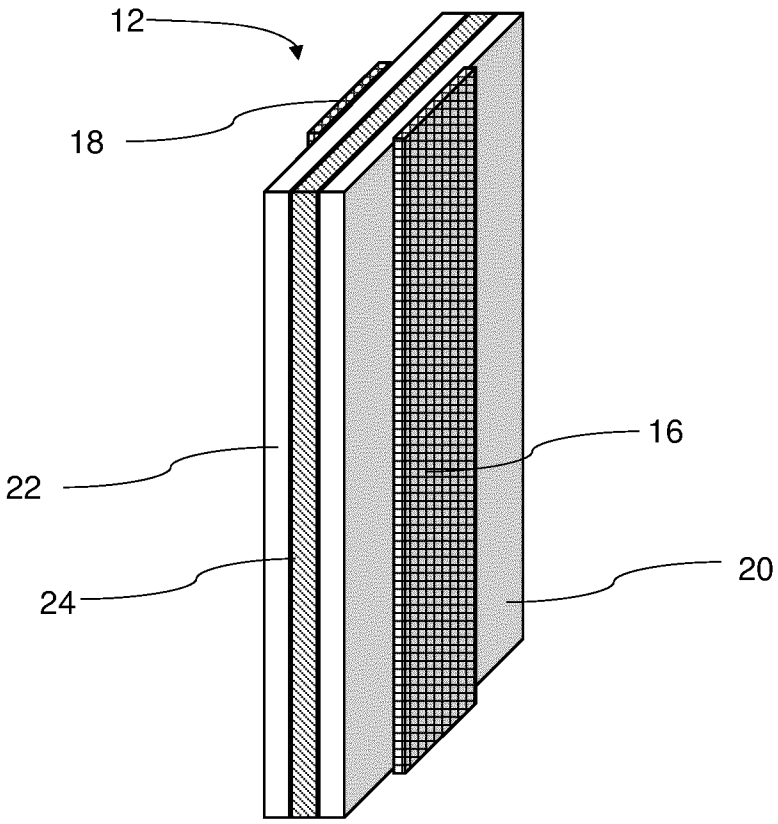


Figure 3

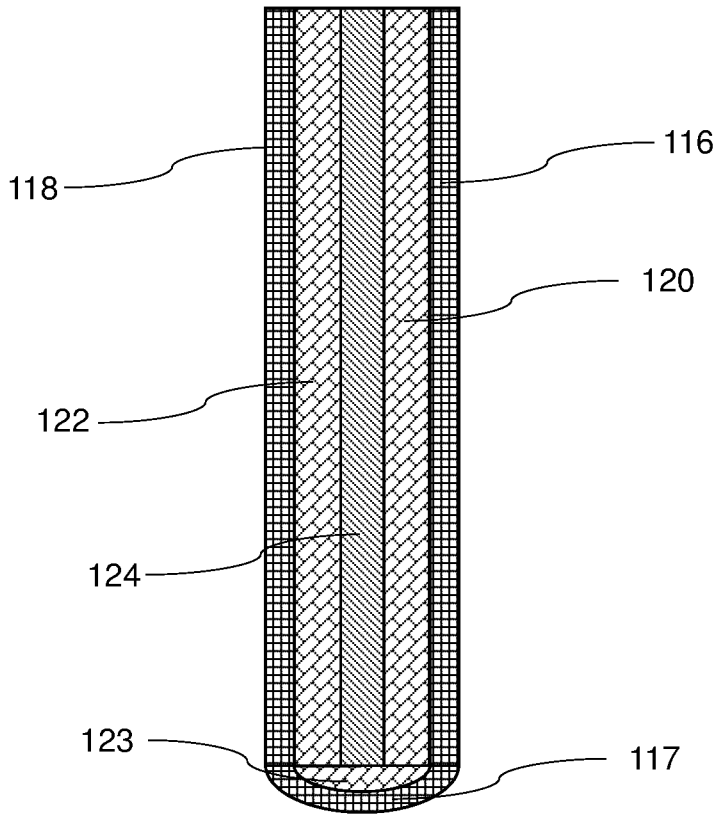


Figure 4

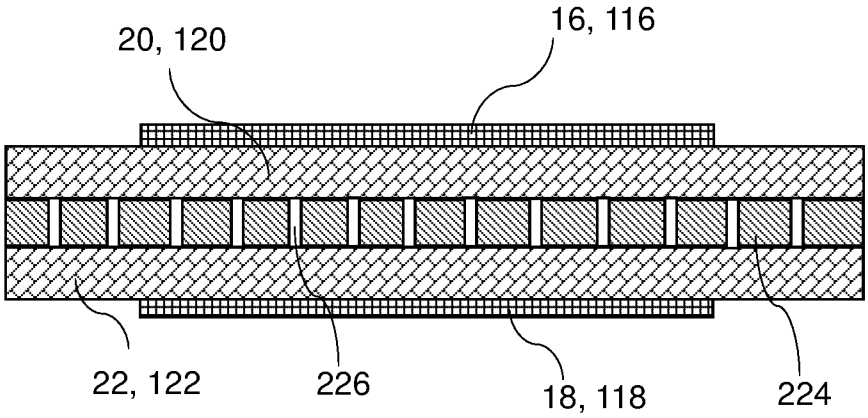


Figure 5

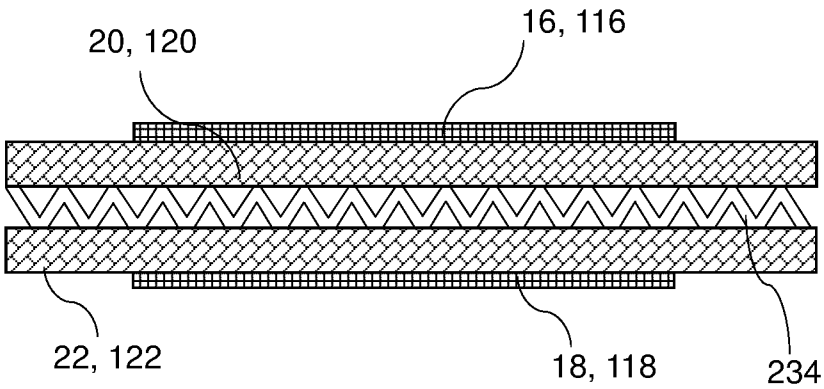


Figure 6

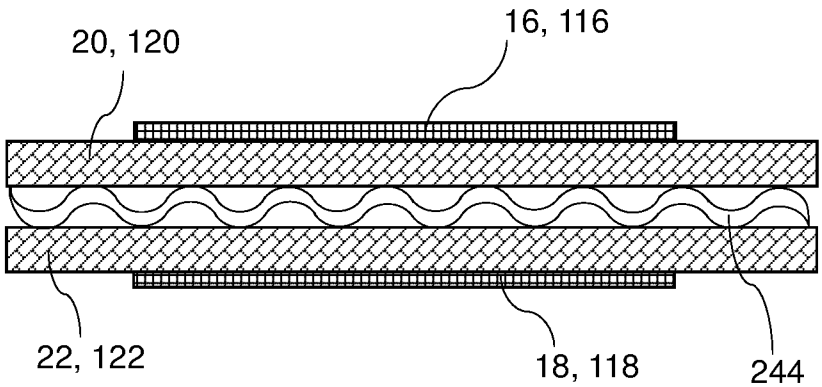


Figure 7

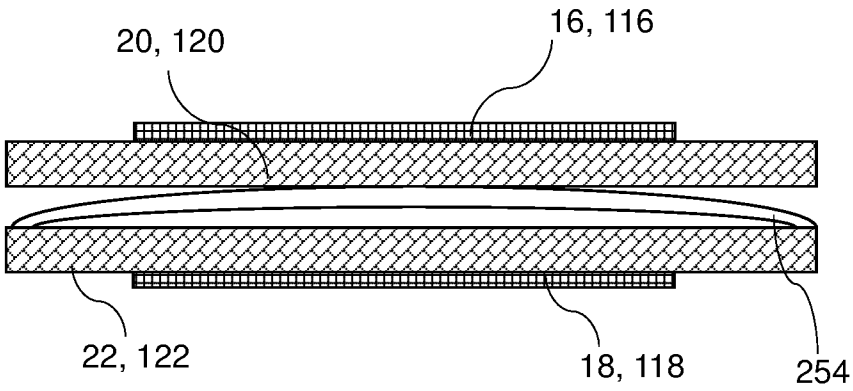


Figure 8

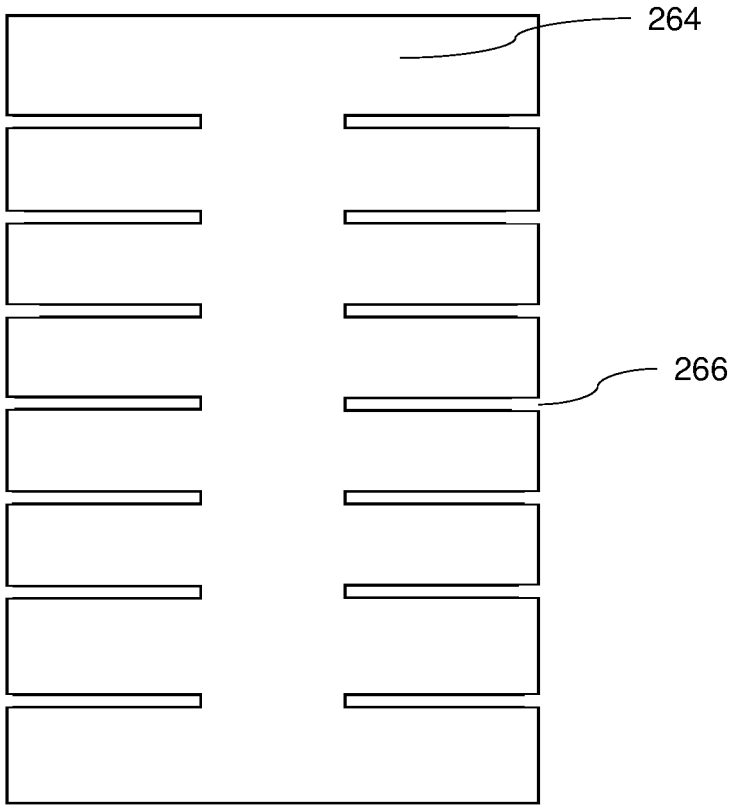


Figure 9

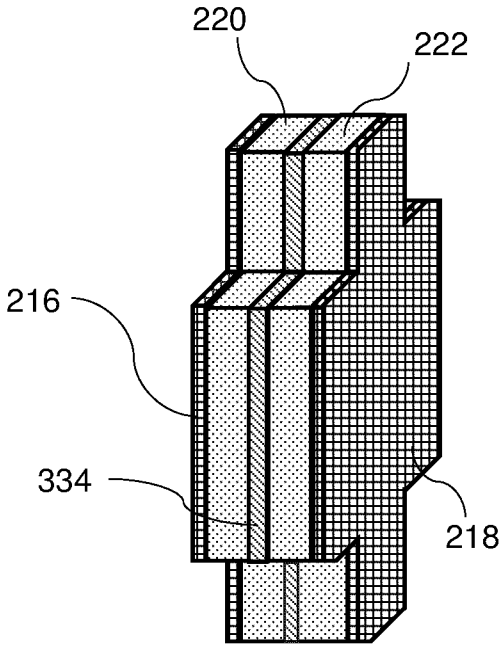


Figure 10a

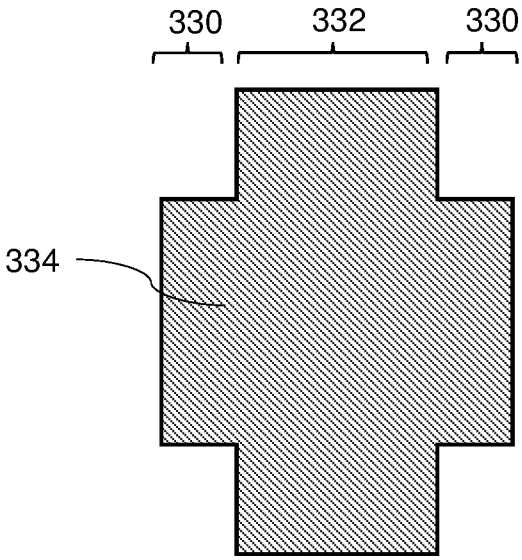


Figure 10b

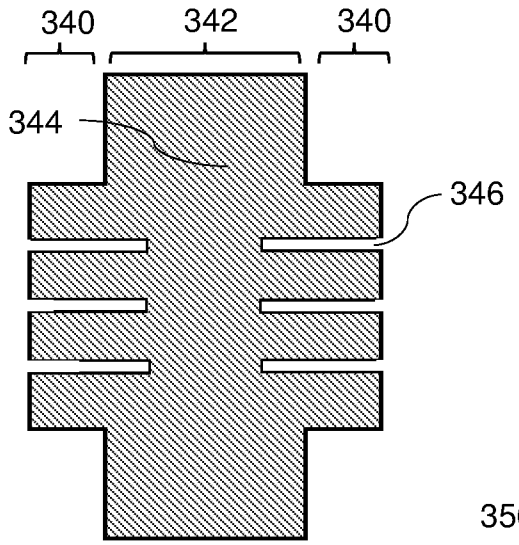


Figure 11

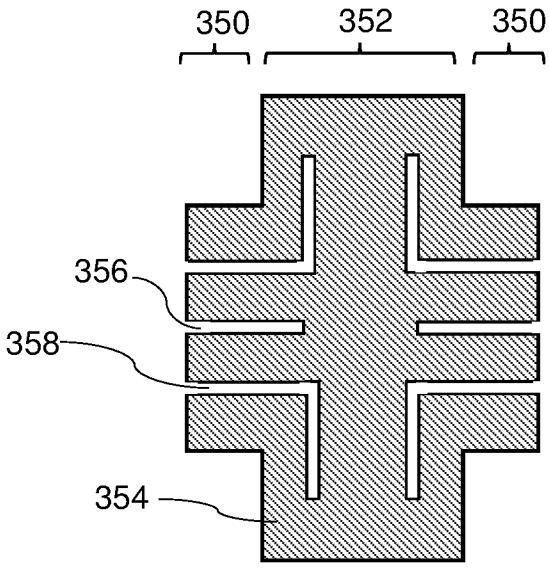


Figure 12

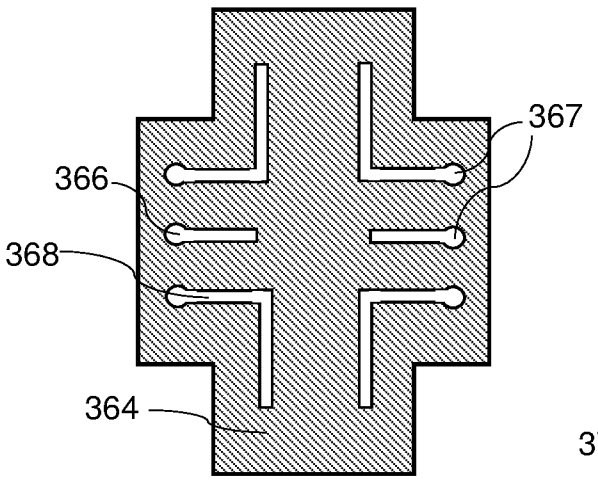


Figure 13

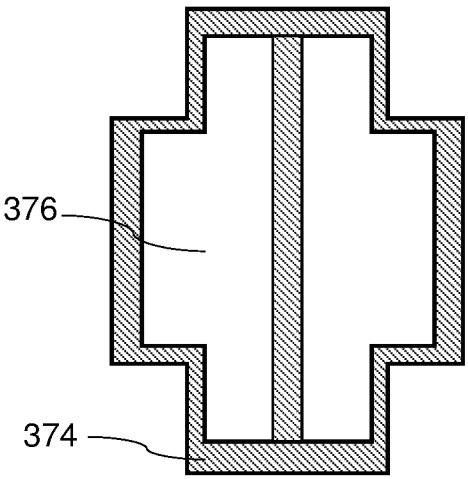


Figure 14

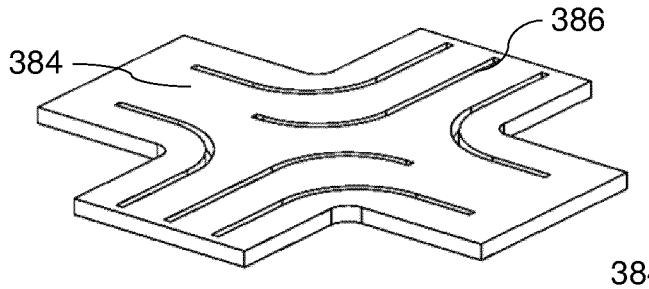


Figure 15a

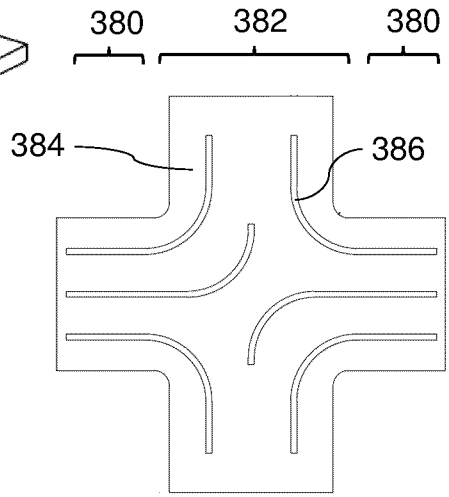


Figure 15b

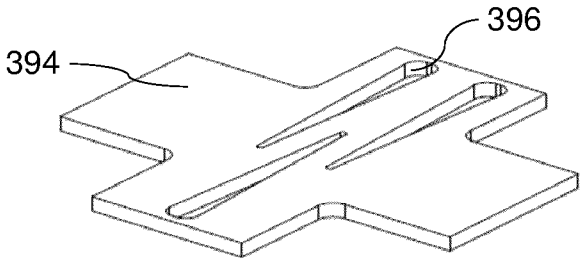


Figure 16a

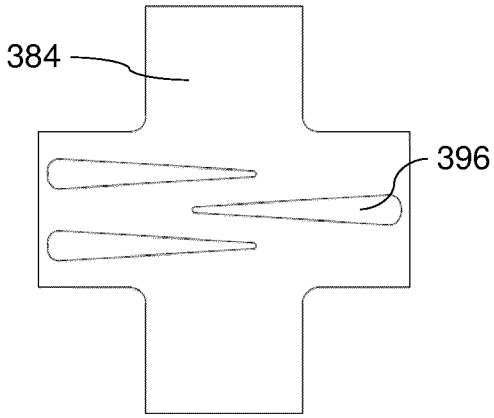


Figure 16b

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2023/072174

A. CLASSIFICATION OF SUBJECT MATTER
INV. A24F40/465 A24F40/42 A24F40/44
ADD. A24F40/10

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

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 A	US 2022/015431 A1 (MIRONOV OLEG [CH] ET AL) 20 January 2022 (2022-01-20) abstract; figures 1, 2 paragraph [0026] paragraph [0033] - paragraph [0034] paragraph [0051] - paragraph [0052]	1-3,5,6, 9-15 4,7,8
A	US 2019/356047 A1 (GUDURU RAKESH [US]) 21 November 2019 (2019-11-21) abstract; claim 1; figures 1-3, 4, paragraph [0024] paragraph [0026] - paragraph [0027] paragraph [0036]	1-15

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[x] Further documents are listed in the continuation of Box C.

[x] See patent family annex.

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"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	Date of mailing of the international search report
13 November 2023	21/11/2023

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	Alaguero, Daniel

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

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2023/072174

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2020/008008 A1 (PHILIP MORRIS PRODUCTS SA [CH]) 9 January 2020 (2020-01-09) abstract; figures 1-6 page 22, line 5 - line 17 page 28, line 1 - line 12 page 29, line 3 - line 29 page 30, line 20 - page 31, line 2	1-15
A	EP 3 826 489 A1 (PHILIP MORRIS PRODUCTS SA [CH]) 2 June 2021 (2021-06-02) abstract; figures 1-10 paragraph [0135] - paragraph [0138] paragraph [0140] - paragraph [0146]	1-15

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2023/072174

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