# AN AEROSOL-GENERATING SYSTEM HAVING A HEATER ASSEMBLY AND A CARTRIDGE FOR AN AEROSOL-GENERATING SYSTEM HAVING A FLUID PERMEABLE HEATER ASSEMBLY

The present invention relates to aerosol-generating systems that comprise a heater assembly that is suitable for vapourising a liquid. In particular, the invention relates to handheld aerosol-generating systems, such as electrically operated smoking systems.

One type of aerosol-generating system is an electrically operated smoking system. Handheld electrically operated smoking systems consisting of a device portion comprising a battery and control electronics, and a cartridge portion comprising a supply of aerosol-forming substrate, and an electrically operated vapouriser, are known. A cartridge comprising both a supply of aerosol-forming substrate and a vapouriser is sometimes referred to as a "cartomiser". The vapouriser typically comprises a coil of heater wire wound around an elongate wick soaked in liquid aerosol-forming substrate. The cartridge portion typically comprises not only the supply of aerosol-forming substrate and an electrically operated vapouriser, but also a mouthpiece, which the user sucks on in use to draw aerosol into their mouth.

However, this arrangement has the drawback that the cartridges are relatively expensive to produce. This is because manufacturing the wick and coil assembly is difficult. Also, the electrical contacts between the coil of heater wire and the electrical contacts through which electrical current is delivered from the device portion must be delicately handled during manufacture. Furthermore, these cartridges include a mouthpiece portion in order to protect the delicate wick and coil assembly during transport. But the inclusion of a complete and robust mouthpiece in each cartridge means that each cartridge has a high material cost.

It would be desirable to provide a heater assembly suitable for an aerosol-generating system, such as a handheld electrically operated smoking system, that is inexpensive to produce and is robust. It would be further desirable to provide a heater assembly that is more efficient than prior heater assemblies in aerosol-generating systems.

In a first aspect there is provided an aerosol-generating system comprising:

a liquid storage portion comprising a housing holding a liquid aerosol-forming substrate, the housing having an opening; and

a fluid permeable heater assembly comprising a substantially flat electrically conductive filament arrangement, wherein the fluid permeable heater assembly is fixed to the housing and extends across the opening of the housing;

wherein the area of the electrically conductive filament arrangement is less than or equal to 25mm$^2$.

Herein disclosed is an aerosol-generating system comprising:

a liquid storage portion comprising a housing holding a liquid aerosol-forming substrate, the housing having an opening; and

a fluid permeable heater assembly comprising a plurality of electrically conductive filaments, wherein the fluid permeable heater assembly is fixed to the housing and extends across the opening of the housing.

The provision of a heater assembly that extends across an opening of a liquid storage portion allows for a robust construction that is relatively simple to manufacture.

The system may be an electrically operated smoking system.

The electrically conductive filaments may lie in a single plane. A planar heater assembly can be easily handled during manufacture and provides for a robust construction.

The electrically conductive filaments may define interstices between the filaments and the interstices may have a width of between 10 μm and 100 μm. Preferably the filaments give rise to capillary action in the interstices, so that in use, liquid to be vapourised is drawn into the interstices, increasing the contact area between the heater assembly and the liquid.

The electrically conductive filaments may form a mesh of size between 160 and 600 Mesh US (+/- 10%) (i.e. between 160 and 600 filaments per inch (+/- 10%)). The width of the interstices is preferably between 75 μm and 25 μm. The percentage of open area of the mesh, which is the ratio of the area of the interstices to the total area of the mesh is preferably between 25% and 56%. The mesh may be formed using different types of weave or lattice structures. Alternatively, the electrically conductive filaments consist of an array of filaments arranged parallel to one another.

The mesh, array or fabric of electrically conductive filaments may also be characterised by its ability to retain liquid, as is well understood in the art.

The electrically conductive filaments may have a diameter of between 10 μm and 100 μm, preferably between 8 μm and 50 μm, and more preferably between 8 μm and 39 μm. The filaments may have a round cross section or may have a flattened cross-section.

From the first aspect, ~~The~~ the area of the mesh, array or fabric of electrically conductive filaments ~~may be small, preferably~~is less than or equal to 25 $mm^2$, allowing it to be incorporated in to a handheld system. The mesh, array or fabric of electrically conductive filaments may, for example, be rectangular and have dimensions of 5 mm by 2 mm. Preferably, the mesh or array of electrically conductive filaments covers an area of between 10% and 50% of the area of the heater assembly. More preferably, the mesh or array of electrically conductive filaments covers an area of between 15% and 25% of the area of the heater assembly. Sizing of the mesh, array or fabric of electrically conductive filaments 10% and 50% of the area, or less or equal than 25 mm2, reduces the amount of total power required to heat the mesh, array or fabric of electrically conductive filaments while still ensuring sufficient contact of the mesh, array or fabric of electrically conductive filaments to the liquid provided one or more capillary materials to be volatilized.

The heater filaments may be formed by etching a sheet material, such as a foil. This may be particularly advantageous when the heater assembly comprises an array of parallel filaments. If the heater assembly comprises a mesh or fabric of filaments, the filaments may be individually formed and knitted together. Alternatively, the heater filaments may be stamped from electrically conductive foil, as for example stainless steel.

system may have a size comparable to a conventional cigar or cigarette. The smoking system may have a total length between approximately 30 mm and approximately 150 mm. The smoking system may have an external diameter between approximately 5 mm and approximately 30mm.

The aerosol-forming substrate is a substrate capable of releasing volatile compounds that can form an aerosol. The volatile compounds may be released by heating the aerosol-forming substrate.

The aerosol-forming substrate may comprise plant-based material. The aerosol-forming substrate may comprise tobacco. The aerosol-forming substrate may comprise a tobacco-containing material containing volatile tobacco flavour compounds, which are released from the aerosol-forming substrate upon heating. The aerosol-forming substrate may alternatively comprise a non-tobacco-containing material. The aerosol-forming substrate may comprise homogenised plant-based material. The aerosol-forming substrate may comprise homogenised tobacco material. The aerosol-forming substrate may comprise at least one aerosol-former. The aerosol-forming substrate may comprise other additives and ingredients, such as flavourants.

In a second aspect, there is provided a cartridge for use in an electrically operated aerosol-generating system, comprising:

a liquid storage portion comprising a rigid housing holding a liquid aerosol-forming substrate, the housing having an opening; and

a fluid permeable heater assembly comprising a plurality of electrically conductive filaments, wherein the fluid permeable heater assembly is fixed to the housing and extends across the opening of the housing.

Herein disclosed is a cartridge for use in an electrically operated aerosol-generating system, comprising:

a liquid storage portion comprising a housing holding a liquid aerosol-forming substrate, the housing having an opening; and

a fluid permeable heater assembly comprising a plurality of electrically conductive filaments, wherein the fluid permeable heater assembly extends across the opening of the housing of the liquid storage portion.

A cartridge with this construction may be made robust, reliable and at low cost. The heater assembly may be substantially flat, without the need for any winding of a heater wire around a capillary wick.

The electrically conductive filaments may lie in a single plane. A planar heater assembly can be easily handled during manufacture and provides for a robust construction.

The electrically conductive filaments may define interstices between the filaments and the interstices may have a width of between 10 μm and 100 μm. Preferably the

filaments give rise to capillary action in the interstices, so that in use, liquid to be vapourised is drawn into the interstices, increasing the contact area between the heater assembly and the liquid.

The electrically conductive filaments may form a mesh of size between 160 and 600 Mesh US (+/- 10%) (i.e. between 160 and 600 filaments per inch (+/- 10%)). The width of the interstices is preferably between 75 μm and 25 μm. The percentage of open area of the mesh, which is the ration of the area of the interstices to the total area of the mesh is