AN AEROSOL GENERATING SYSTEM WITH PREVENTION OF CONDENSATE LEAKAGE

The present invention relates to an aerosol generating system. In particular, the present invention relates to an aerosol generating system in which the aerosol-forming substrate is liquid.

WO-A-2009/132793 discloses an electrically heated smoking system. A liquid is stored in a liquid storage portion, and a capillary wick has a first end which extends into the liquid storage portion for contact with the liquid therein, and a second end which extends out of the liquid storage portion. A heating element heats the second end of the capillary wick. The heating element is in the form of a spirally wound electric heating element in electrical connection with a power supply, and surrounding the second end of the capillary wick. In use, the heating element may be activated by the user to switch on the power supply. Suction on a mouthpiece by the user causes air to be drawn into the electrically heated smoking system over the capillary wick and heating element and subsequently into the mouth of the user.

The aerosol generating systems of the prior art, including the electrically operated smoking system referred to above, do have a number of advantages, but there is still opportunity for improvement in the design.

According to a first aspect of the invention, there is provided an aerosol generating system for heating a liquid aerosol-forming substrate, the system comprising: an aerosol-forming chamber; and leakage prevention means configured to prevent or reduce leakage of liquid aerosol condensate from the aerosol generating system.

The aerosol generating system is arranged to vaporize the liquid aerosol-forming substrate to form a vapour, which condenses in the aerosol-forming chamber to form the aerosol. Thus, the aerosol-forming chamber simply assists or facilitates the generation of the aerosol. The aerosol generating system may include the aerosol-forming substrate or may be adapted to receive the aerosol-forming substrate. As known to those skilled in the art, an aerosol is a suspension of solid particles or liquid droplets in a gas, such as air.

An advantage of the invention is that leakage of liquid aerosol condensate from the aerosol generating system is prevented or at least substantially reduced. The condensed liquid (liquid condensate) may form due to a change in temperature, for example a sudden temperature drop. Alternatively or additionally, the liquid condensate may accumulate in cavities, grooves, corners or other portions of the aerosol generating system where there is reduced airflow. The rate of condensation is affected by the vapour pressure of the aerosol-forming substrate, the temperature gradient between the vapour and the housing or wall of the aerosol generating system, and other factors, for example the airflow and turbulence. Minimising, or preferably preventing, leakage of the liquid aerosol condensate is important to avoid wastage of the liquid aerosol-forming substrate. In addition, if liquid leaks out of the

CLAIMS

1. An aerosol generating system for heating a liquid aerosol-forming substrate, the system comprising:

an aerosol-forming chamber; and

leakage prevention means configured to prevent or reduce leakage of liquid aerosol condensate from the aerosol generating system,

wherein, the leakage prevention means comprises at least one cavity in a wall of the aerosol-forming chamber, for collecting liquid condensate formed from the aerosol-forming substrate and the cavity has a cross-sectional dimension x, where x is preferably 0.5 mm or 1 mm or between 0.5 mm and 1 mm.

2. An aerosol generating system according to claim 1, wherein the leakage prevention means comprises at least one cavity in a wall of the aerosol-forming chamber, for collecting liquid condensate formed from the aerosol-forming substrate.

3. An aerosol generating system according to claim 2, wherein the at least one cavity contains capillary material.

4. An aerosol generating system according to any preceding claim, wherein the leakage prevention means comprises at least one hooked member for collecting droplets of liquid condensate formed from the aerosol-forming substrate.

5. An aerosol generating system according to claim 4, wherein the at least one hooked member comprises a recycle path for recycling the collected droplets of the liquid condensate formed from the aerosol-forming substrate.

6. An aerosol generating system according to claim 4 or claim 5, wherein the at least one hooked member includes capillary material.

7. An aerosol generating system according to any preceding claim, wherein the leakage prevention means comprises an impactor for disrupting airflow in the aerosol-forming chamber so as to collect droplets of liquid being formed from the aerosol-forming substrate.

8. An aerosol generating system according to claim 7, wherein the impactor includes capillary material.

~~9. An aerosol generating system according to any preceding claim, wherein the leakage~~

prevention means comprises a closure member for substantially sealing the aerosol-forming chamber when the aerosol generating system is not in use.

10. An aerosol generating system according to any preceding claim, further comprising a liquid storage portion for storing the liquid aerosol-forming substrate.

11. An aerosol generating system according to any preceding claim, further comprising a capillary wick for conveying the liquid aerosol-forming substrate by capillary action.

12. An aerosol generating system according to any preceding claim, wherein the aerosol generating system is electrically operated and further comprises an electric heater for heating the liquid aerosol-forming substrate.

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The present invention relates to an aerosol generating system. In particular, the present invention relates to an aerosol generating system in which the aerosol-forming substrate is liquid.

WO-A-2009/132793 discloses an electrically heated smoking system. A liquid is stored in a liquid storage portion, and a capillary wick has a first end which extends into the liquid storage portion for contact with the liquid therein, and a second end which extends out of the liquid storage portion. A heating element heats the second end of the capillary wick. The heating element is in the form of a spirally wound electric heating element in electrical connection with a power supply, and surrounding the second end of the capillary wick. In use, the heating element may be activated by the user to switch on the power supply. Suction on a mouthpiece by the user causes air to be drawn into the electrically heated smoking system over the capillary wick and heating element and subsequently into the mouth of the user.

US 2001/0200008 discloses an electronic cigarette comprising a mouthpiece, a cartridge for containing a liquid, and a power source that comprises a battery for providing heat to the liquid. The cartridge includes an absorbent sponge, a liquid supply bottle and an atomization means such as an ultrasonic atomiser. In use, the atomization means receives heated liquid and generates a vapour to be inhaled by a user.

The aerosol generating systems of the prior art, including the electrically operated smoking system referred to above, do have a number of advantages, but there is still opportunity for improvement in the design.

According to a first aspect of the invention, there is provided an aerosol generating system for heating a liquid aerosol-forming substrate, the system comprising: an aerosol-forming chamber; and leakage prevention means configured to prevent or reduce leakage of liquid aerosol condensate from the aerosol generating system. The leakage prevention means comprises at least one cavity in a wall of the aerosol-forming chamber, for collecting liquid condensate formed from the aerosol-forming substrate and the or each cavity has a cross-sectional dimension x, between 0.5 mm and 1 mm.

The aerosol generating system is arranged to vaporize the liquid aerosol-forming substrate to form a vapour, which condenses in the aerosol-forming chamber to form the aerosol. Thus, the aerosol-forming chamber simply assists or facilitates the generation of the aerosol. The aerosol generating system may include the aerosol-forming substrate or may be adapted to receive the aerosol-forming substrate. As known to those skilled in the art, an aerosol is a suspension of solid particles or liquid droplets in a gas, such as air.

An advantage of the invention is that leakage of liquid aerosol condensate from the aerosol generating system is prevented or at least substantially reduced. The condensed liquid (liquid condensate) may form due to a change in temperature, for example a sudden

temperature drop. Alternatively or additionally, the liquid condensate may accumulate in cavities, grooves, corners or other portions of the aerosol generating system where there is reduced airflow. The rate of condensation is affected by the vapour pressure of the aerosol-forming substrate, the temperature gradient between the vapour and the housing or wall of the aerosol generating system, and other factors, for example the airflow and turbulence. Minimising, or preferably preventing, leakage of the liquid aerosol condensate is important to avoid wastage of the liquid aerosol-forming substrate. In addition, if liquid leaks out of the

CLAIMS

1. An aerosol generating system for heating a liquid aerosol-forming substrate, the system comprising:

an aerosol-forming chamber; and

leakage prevention means configured to prevent or reduce leakage of liquid aerosol condensate from the aerosol generating system,

characterised in that, the leakage prevention means comprises at least one cavity in a wall of the aerosol-forming chamber, for collecting liquid condensate formed from the aerosol-forming substrate and the or each cavity has a cross-sectional dimension x between 0.5 mm and 1 mm.

2. An aerosol generating system according to claim 1, wherein the leakage prevention means comprises at least one further cavity in a wall of the aerosol-forming chamber, for collecting liquid condensate formed from the aerosol-forming substrate.

3. An aerosol generating system according to claim 1 or 2, wherein the at least one cavity contains capillary material.

4. An aerosol generating system according to any preceding claim, wherein the leakage prevention means comprises at least one hooked member for collecting droplets of liquid condensate formed from the aerosol-forming substrate.

5. An aerosol generating system according to claim 4, wherein the at least one hooked member comprises a recycle path for recycling the collected droplets of the liquid condensate formed from the aerosol-forming substrate.

6. An aerosol generating system according to claim 4 or claim 5, wherein the at least one hooked member includes capillary material.

7. An aerosol generating system according to any preceding claim, wherein the leakage prevention means comprises an impactor for disrupting airflow in the aerosol-forming chamber so as to collect droplets of liquid being formed from the aerosol-forming substrate.

8. An aerosol generating system according to claim 7, wherein the impactor includes capillary material.

9. An aerosol generating system according to any preceding claim, wherein the leakage

prevention means comprises a closure member for substantially sealing the aerosol-forming chamber when the aerosol generating system is not in use.

10. An aerosol generating system according to any preceding claim, further comprising a liquid storage portion for storing the liquid aerosol-forming substrate.

11. An aerosol generating system according to any preceding claim, further comprising a capillary wick for conveying the liquid aerosol-forming substrate by capillary action.

12. An aerosol generating system according to any preceding claim, wherein the aerosol generating system is electrically operated and further comprises an electric heater for heating the liquid aerosol-forming substrate.