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(54) **CARTRIDGE FOR A VAPORIZOR**

(71) Applicant: **VMR Products, LLC**, Miami, FL (US)

(72) Inventors: **Jan Andries Verleur**, Miami Beach, FL (US); **Yifeng Lu**, Miami, FL (US); **Hans Verleur**, El Dorado, CA (US)

(73) Assignee: **VMR PRODUCTS, LLC**, Miami, FL (US)

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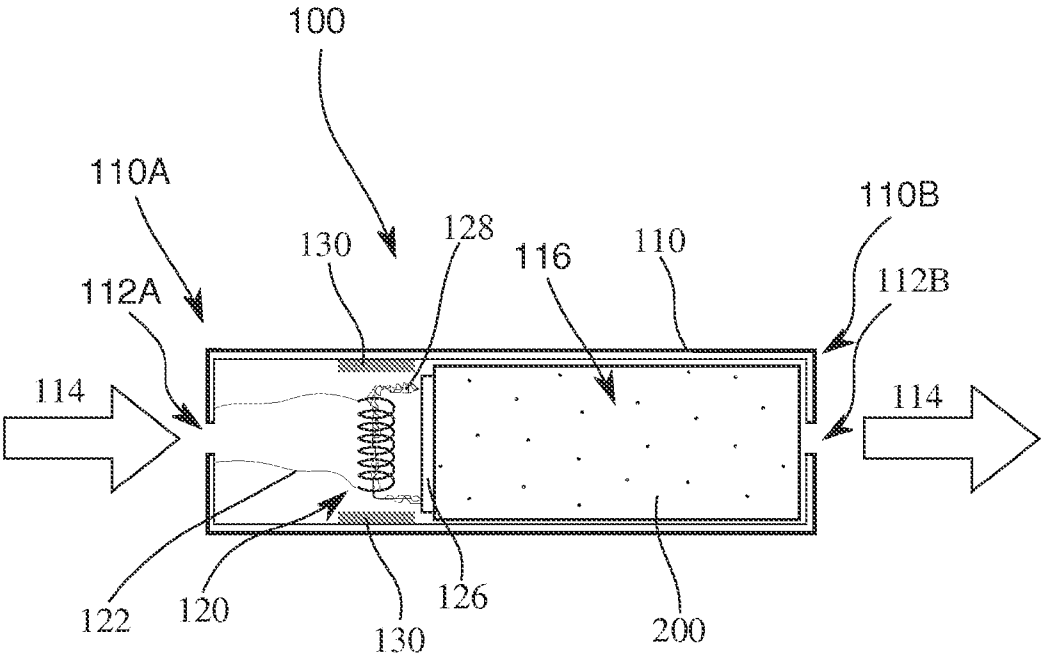
(57) **ABSTRACT**

An electronic cigarette or vaporizer may be composed of a battery portion and a cartomizer connectable to the battery portion. The cartomizer may include a heating element and a tank for holding a vaporizable fluid. The heating element may be substantially composed electrically conductive wiring wrapped around wicking. The vaporizable fluid may be transferable to the heating element through a semi-permeable membrane. A heat shield may be placed between the heating element and an outer shell of the cartomizer in order to prevent the outer shell, or other components of the cartomizer, from experiencing undesired temperature raises potentially resulting in failure.



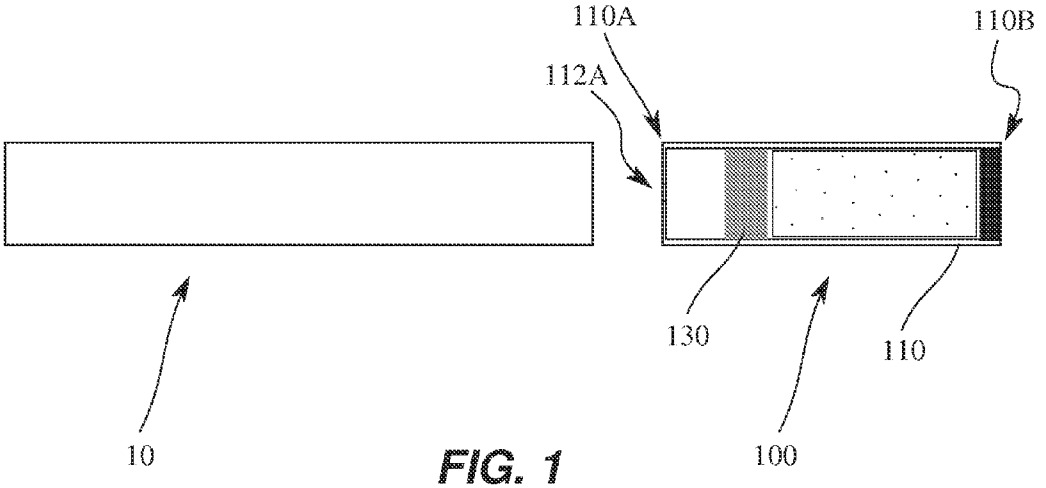

110A
110B
112A
130
110
10
100

FIG. 1

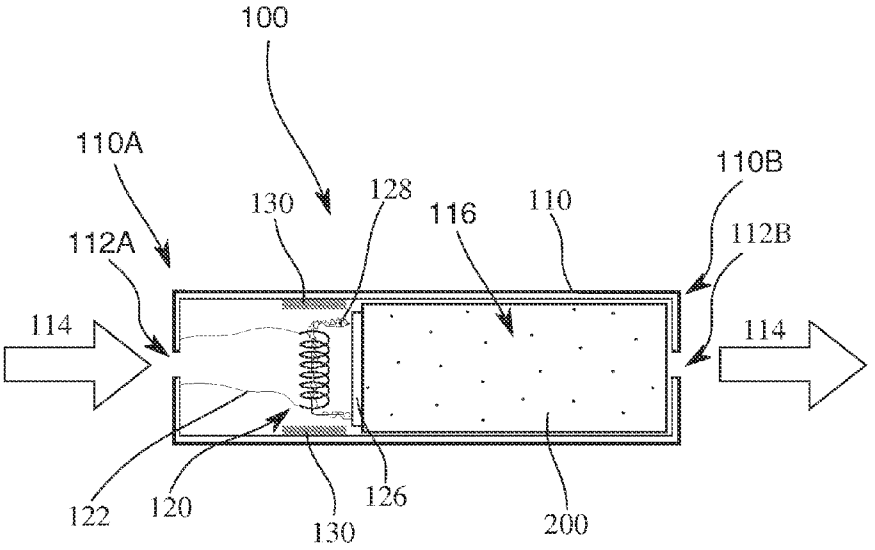

100
110A
110B
130
128
116
110
112A
112B
114
114
122
120
130
126
200

FIG. 2

CARTRIDGE FOR A VAPORIZOR

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Application No. 61/916,650, filed Dec. 16, 2014, the content of which is hereby incorporated herein by reference in its entirety.

FIELD OF THE DISCLOSURE

[0002] This disclosure relates to the field of vaporizers, also referred to as electronic cigarettes, and more particularly a cartomizer for a vaporizer, also referred to as a cartridge.

BACKGROUND

[0003] Electronic cigarettes have recently emerged as a new product for providing nicotine through a smokeless inhalation process. There are many embodiments of the electronic cigarette. Most implementations consist of a power supply (typically a battery) and an atomizing device. In reusable electronic cigarettes the two items are separated into a battery and a cartomizer, to allow the disposal and replacement of the nicotine containing fluid cartomizer while preserving the more costly battery and associated circuitry (microcontroller, switch, indicating LED, etc.) In disposable electronic cigarettes the two items are combined to integrate the functions into one unit that is disposed of after either the battery energy or the nicotine containing liquid is exhausted.

[0004] The liquid that is used to produce vapor in electronic cigarettes is a generally a solution of one or more of propylene glycol (PG) and/or vegetable glycerin (VG) and/or polyethylene glycol 400 (PEG400) mixed with concentrated flavors, and optionally, a variable percentage of a liquid nicotine concentrate. The solution is often sold in a bottle or in disposable cartridges or cartomizers. Many different flavors of such liquid are sold, including flavors that resemble the taste of regular tobacco, menthol, vanilla, coffee, cola and various fruits. Various nicotine concentrations are also available, and nicotine-free solutions are also common.

BRIEF SUMMARY OF THE DISCLOSURE

[0005] Embodiments of a cartomizer for use with an electronic cigarette may include an elongate outer shell having first and second ends; a first opening provided proximate to the first end of the outer shell, and a second opening provided proximate to the second end of the outer, and an airflow establishable between the first and second openings; a tank provided within the outer shell, the tank dimensioned to hold a vaporizable fluid; a heating element provided within the outer shell and adjacent to the tank, the heating element in the path of the airflow, the heating element operable to heat the vaporizable fluid to a vaporization temperature; and a heat shield provided proximate to the heating element. An electronic cigarette may include a battery portion which may include a battery housed within the battery, and embodiments of a cartomizer as described herein.

BRIEF DESCRIPTION OF THE FIGURES

[0006] FIG. **1** illustrates a side view of a battery portion for a vaporizer and a cartomizer in accordance with embodiments of the disclosure; longitudinal cross sectional view of an embodiment of a cartomizer for use with an electronic cigarette; and

[0007] FIG. **2** illustrates a side cross sectional view of an embodiment of a cartomizer for use with a vaporizer.

DETAILED DESCRIPTION

[0008] The following detailed description and the appended drawings describe and illustrate exemplary embodiments of the invention solely for the purpose of enabling one of ordinary skill in the relevant art to make and use the invention. As such, the detailed description and illustration of these embodiments are purely exemplary in nature and are in no way intended to limit the scope of the invention, or its protection, in any manner. It should also be understood that the drawings are not to scale and in certain instances details have been omitted, which are not necessary for an understanding of the present invention, such as conventional details of fabrication and assembly.

[0009] Embodiments of a cartomizer for use with an electronic cigarette may include an elongate outer shell having first and second ends; a first opening provided proximate to the first end of the outer shell, and a second opening provided proximate to the second end of the outer, and an airflow establishable between the first and second openings; a tank provided within the outer shell, the tank dimensioned to hold a vaporizable fluid; a heating element provided within the outer shell and adjacent to the tank, the heating element in the path of the airflow, the heating element operable to heat the vaporizable fluid to a vaporization temperature; and a heat shield provided proximate to the heating element.

[0010] In further embodiments of a cartomizer, the heat shield is provided between the heating element and the outer shell. The heat shield may be formed as a ring. The heat shield may be substantially composed of a metal. The heating element may be composed of wicking and a conductive coil may be wrapped around the wicking. Embodiments of the cartomizer may further include a semi-permeable membrane provided between the tank and the heating element, and wherein the liquid is transferred from the tank to the heating element through the semi-permeable membrane.

[0011] An electronic cigarette may include a battery portion which may include a battery housed within the battery, and embodiments of a cartomizer as described herein.

[0012] With reference now to the Figures, an embodiment of a cartomizer **100** for use with a vaporizer or an electronic cigarette is provided in accordance with the disclosure. The electronic cigarette may composed of a battery portion **10**, which may house circuitry and a battery, as well as embodiments of cartomizer **100** as provided within the disclosure. Cartomizer **100** may include an outer wall **110**, the dimensions of which defining an outer diameter or an outer circumference of cartomizer **100**. Outer wall **110** is illustrated as cylindrical, however the disclosure further contemplates additional shapes or dimensions of outer wall **110**. In some embodiments, outer wall **110** may be correspondingly dimensioned with the outer dimensions of the battery portion **10** to be joined or used with cartomizer **100**. Outer wall **110** may be formed from plastic, glass or other any other suitable material known or to be discovered.

[0013] Cartomizer **100** may be used connected to a battery portion of an electronic cigarette. Embodiments of a battery portion are disclosed, for instance, in U.S. Application Ser. No. 61/903,344, the entire contents of which are expressly

incorporated herein by reference. In some embodiments, cartomizer **100** may be inserted into an end cavity or recess of the battery portion **10** of an electronic cigarette. Cartomizer **100** may be substantially elongate and have a defined first end **110**A and a second end **1109**. At least two holes or openings **112**A/**112**B may be provided so as to permit an air flow **114** through cartomizer **100**. One or more first openings **112**A may be provided proximate to first end **110**A, while one or more second openings **112**B may be provided proximate to second end **110**B. An airflow **114** may be thereby established through cartomizer **100** to permit a user of the electronic cigarette to inhale the produced vapor through one of the openings **112**A/**112**B. In one embodiment, a battery portion **10** of an electronic cigarette is connected at or proximate to first end **110**A of cartomizer **100**, while a mouthpiece may be provided at or proximate to second end **110**B.

[0014] A vaporizable liquid **200** may be stored within a liquid tank **116** in at least a portion of cartomizer **100**. Liquid **200** may be any known or to be developed liquid which may be used in electronic cigarettes. In order to vaporize liquid **200**, a heating element **120** is provided for elevating the temperature of liquid **200** to its vaporization temperature. Heating element **120** may be an electrically conductive coil, such as a wiring substantially comprised of metal, from which a current may be supplied to through wires or circuitry **122**. A current may be passed through circuitry **122** by and through a battery housed in a battery portion of an electronic cigarette when the battery portion is connected to cartomizer **100**. A membrane **126** may be provided in order to transfer liquid **200** from the tank **116** to a wicking **128**. Membrane **126** may be semi-permeable in order to control or limit the transport of liquid **200** as it is soaked into membrane **126** and transferred to wicking **128**. The semi-permeable nature of membrane **126** may thereby prevent leakage from tank **116** to other portions of cartomizer **100**. Wicking **128** may be made from fiberglass and operable to transport liquid **200** to heating element **120**. In one embodiment, wicking may be a non-coated glass fiber which may prevent a burning taste which often comes from a coating thereby avoiding the introduction of any potentially harmful substance into the vapor. Heating element **120** may then heat liquid **200** soaked into wick **128** to a vaporized temperature, and the vapor may be inhaled by a user through air stream **114**.

[0015] Certain portions of cartomizer **100** and outer wall **110** near heating element **120** may be exposed to a higher temperature by nature of their proximity to heating element **120**. In some embodiments, heating element **120** may well exceed the transition temperature of the outer wall **110**, thereby risking that the outer wall may melt or deform due to the high temperatures generated by heating element **120**. In embodiments where outer wall **110** is composed of a transparent or semi-transparent plastic, the transition temperature may result in the plastic changing from a clear amorphous solid into an opaque solid through a crystallization process. A heat shield **130** may be provided on portions of cartomizer **100** proximate to heating element **120** in order to protect components of cartomizer **100** from the elevated temperatures of heating element **120**. Heat shield **130** may take the form of a ring provided between heating element **120** and outer wall **110**. Heat shield **130** may also, or alternatively, be provided proximate to a portion where the vaporized liquid **200** enters airflow path **114**, for instance between the tank **116** and wall **110**. In addition to a ring, heat shield **130** may take the form of a variety of shapes or dimensions, either interspersed or contiguous. Heat Shield **130** may be manufactured of insulating material and in one embodiment heat shield **130** may be substantially composed of metal. Accordingly, heat shield **130** operates to protect areas of cartomizer **100** exposed to elevated temperatures, and permits components in the protected areas of cartomizer **100**, such as outer wall **110**, to be manufactured from materials which might otherwise melt or deform due to their exposure to high temperatures. Embodiments of the heat shield may be provided alternatively, or additionally, proximate to liquid tank **116**, which in some embodiments is made of plastic and, regardless of the material tank **116** is made from, may benefit from insulation from high temperatures generated by heating element **120**. For instance, when a plastic outer shell **110**, or other plastic component, is heated to a glass transition temperature, the plastic changes from a substantially clear amorphous solid and begins to crystallize into an opaque solid.

[0016] The descriptions set forth above are meant to be illustrative and not limiting, and persons of skill in the art will recognize that various common and known deviations from the above described structures are considered to be within the scope of the disclosed concepts described herein.

[0017] The embodiments illustratively disclosed herein suitably may be practiced in the absence of any element which is not specifically disclosed herein. The invention illustratively disclosed herein suitably may also be practiced in the absence of any element which is not specifically disclosed herein and that does not materially affect the basic and novel characteristics of the claimed invention.

What is claimed:

1. A cartomizer for use with an electronic cigarette, the cartomizer comprising:

an elongate outer shell having first and second ends;

a first opening provided proximate to the first end of the outer shell, and a second opening provided proximate to the second end of the outer, and an airflow establishable between the first and second openings;

a tank provided within the outer shell, the tank dimensioned to hold a vaporizable fluid;

a heating element provided within the outer shell and adjacent to the tank, the heating element in the path of the airflow, the heating element operable to heat the vaporizable fluid to a vaporization temperature; and

a heat shield provided proximate to the heating element.

2. The cartomizer of claim **1**, wherein the heat shield is provided between the heating element and the outer shell.

3. The cartomizer of claim **2**, wherein the heat shield is formed as a ring.

4. The cartomizer of claim **1**, wherein the heat shield is substantially composed of a metal.

5. The cartomizer of claim **1**, wherein the heating element is composed of wicking and a conductive coil wrapped around the wicking.

6. The cartomizer of claim **5** further comprising a semi-permeable membrane provided between the tank and the heating element, and wherein the liquid is transferred from the tank to the heating element through the semi-permeable membrane.

7. An electronic cigarette comprising:

a battery portion including a battery housed within the battery portion; and

a cartomizer including

an elongate outer shell having first and second ends,

a first opening provided proximate to the first end of the outer shell, and a second opening provided proximate to the second end of the outer, and an airflow establishable between the first and second openings,

a tank provided within the outer shell, the tank dimensioned to hold a vaporizable fluid,

a heating element provided within the outer shell and adjacent to the tank, the heating element in the path of the airflow, the heating element operable to heat the vaporizable fluid to a vaporization temperature, and

a heat shield provided proximate to the heating element.

8. The electronic cigarette of claim **7**, wherein the heat shield is provided between the heating element and the outer shell.

9. The electronic cigarette of claim **8**, wherein the heat shield is formed as a ring.

10. The electronic cigarette of claim **7**, wherein the heat shield is substantially composed of a metal.

11. The electronic cigarette of claim **7**, wherein the heating element is composed of wicking and a conductive coil wrapped around the wicking.

12. The electronic cigarette of claim **11** further comprising a semi-permeable membrane provided between the tank and the heating element, and wherein the liquid is transferred from the tank to the heating element through the semi-permeable membrane.

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