



(51) International Patent Classification:

A24F 1/28 (2006.01) A61M 15/06 (2006.01)
A24F 47/00 (2006.01)

(21) International Application Number:

PCT/US2014/066949

(22) International Filing Date:

21 November 2014 (21.11.2014)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

61/906,928 21 November 2013 (21.11.2013) US
62/067,762 23 October 2014 (23.10.2014) US

(71) Applicant: **CORR-TECH ASSOCIATES, INC.**
[US/US]; 1751 W Grand Avenue, Chicago, Illinois 60622 (US).

(72) Inventors: **KING, Charles William**; 1751 W Grand Avenue, Chicago, Illinois 60622 (US). **CORRY, Charles Dominic**; 1751 W Grand Avenue, Chicago, Illinois 60622 (US). **MINGILINO, Christopher**; 1751 W Grand Avenue, Chicago, Illinois 60622 (US). **TUTT, Timothy**; 1751 W Grand Avenue, Chicago, Illinois 60622 (US).

(74) Agents: **GURDA, Szymon et al.**; Suite 400, 123 W Madison St, Chicago, Illinois 60602 (US).

(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, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, 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, 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))

— with amended claims (Art. 19(1))

Date of publication of the amended claims: 30 July 2015

(54) Title: IMPROVED VAPORIZATION AND DOSAGE CONTROL FOR ELECTRONIC VAPORIZING INHALER

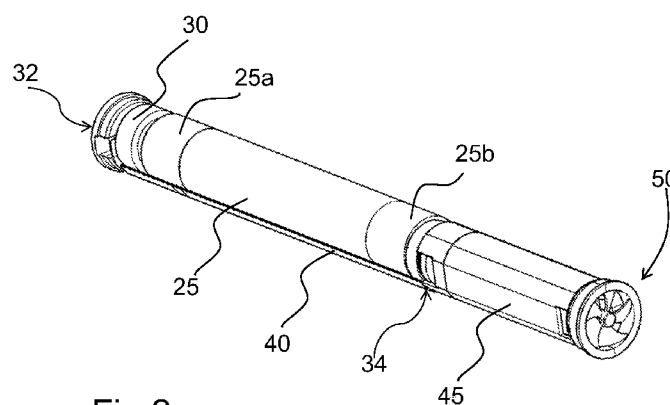


Fig. 2

(57) Abstract: The present invention provides an electronic vaporizing inhaler with an electrical storage device; a liquid reservoir for vaping liquid; a vaporizer with a substrate defined by a plurality of capillary apertures that provide fluid communication between the vaporizer and the liquid reservoir; a sponge; a wick; and a heating element; a microprocessor in electrical communication with the electrical storage device that directs current from the electrical storage device to the heating element in the vaporizer; a sensor configured to detect when a user draws on the electronic cigarette that activates the microprocessor when it detects that a user has drawn on the electronic cigarette; a housing having designed to contain the electrical storage device, vaporizer, microprocessor, sensor, and liquid reservoir and having a mouthpiece from which a user can inhale vapor from the vaporizer. The invention also provides a dosage control embodiment using a heat or diaphragm pump.



AMENDED CLAIMS**received by the International Bureau on 15 June 2015 (15.06.2015)**

1. An electronic vaporizing inhaler, said electronic vaporizing inhaler comprising:
 - an electrical storage device;
 - a liquid reservoir adapted to receive vaping liquid;
 - a vaporizer, comprising:
 - a solid partition defined by a plurality of capillary apertures extending transversely through the solid partition, wherein the capillary apertures provide fluid communication between the vaporizer and the liquid reservoir;
 - a sponge in physical contact with the partition and overlaying the capillary apertures;
 - a wick in physical contact with and overlaying the sponge; and
 - a heating element placed above the wick;
 - a microprocessor in electrical communication with the electrical storage device, wherein the microprocessor is configured to direct current from the electrical storage device to the heating element in the vaporizer;
 - a sensor configured to detect when a user draws on the electronic cigarette, wherein the sensor is in electrical communication with the microprocessor and wherein the sensor activates the microprocessor when it detects that a user has drawn on the electronic cigarette;
 - a housing having a first end and a second end, wherein the housing is designed to contain the electrical storage device, vaporizer, microprocessor, sensor, and liquid reservoir and wherein the second end of the housing is a mouthpiece from which a user can inhale vapor from the vaporizer.

2. The electronic vaporizing inhaler of claim 1, wherein the housing is a single piece and the electronic vaporizing inhaler is disposable.
3. The electronic vaporizing inhaler of claim 1, wherein the housing is two separable pieces, wherein the electrical storage device, microprocessor, and sensor are contained in a first piece and the vaporizer, liquid reservoir, and mouthpiece are contained in a second piece, and wherein the electronic storage device is rechargeable.
4. The electronic vaporizing inhaler of claim 2, wherein the electrical storage device is a lithium-ion or lithium-polymer battery.
5. The electronic vaporizing inhaler of claim 1, wherein the heating element is selected from the group consisting of coils, thick films, thin films, and combinations thereof.
6. The electronic vaporizing inhaler of claim 1, wherein the heating element is of a type selected from the group consisting of coils, thin films, thick films, and combinations thereof.
7. The electronic vaporizing inhaler of claim 1, wherein the sensor is a mechanical pressure sensor.
8. The electronic vaporizing inhaler of claim 1, wherein the sensor is a digital pressure sensor.
9. The electronic vaporizing inhaler of claim 1, wherein the liquid reservoir has a flexible interior bladder.

10. An electronic vaporizing inhaler, said electronic vaporizing inhaler comprising:
- an electrical storage device;
 - a liquid reservoir adapted to receive vaping liquid;
 - a vaporizer, comprising:
 - a heating chamber, comprising:
 - a substrate having a plurality of apertures, wherein the plurality of apertures provide fluid communication between the vaporizer and the liquid reservoir;
 - a first heating element, wherein the first heating element heats the vaping liquid to a temperature sufficient to create and burst a vapor bubble;
 - a superior end having a plurality of nozzles, wherein the nozzle ejects the vaping liquid when the vapor bubble bursts;
 - a second heating element proximal to the nozzle;
 - a microprocessor in electrical communication with the electrical storage device, wherein the microprocessor is configured to direct current from the electrical storage device to the first and second heating elements in the vaporizer;
 - a sensor configured to detect when a user draws on the electronic cigarette, wherein the sensor is in electrical communication with the microprocessor and wherein the sensor activates the microprocessor when it detects that a user has drawn on the electronic cigarette;
 - a housing having a first end and a second end, wherein the housing is designed to contain the electrical storage device, vaporizer, microprocessor, sensor, and liquid reservoir and wherein the second end of the housing is a mouthpiece from which a user can inhale vapor from the vaporizer.

11. The electronic vaporizing inhaler of claim 10, wherein the first heating element is heated to a maximum temperature that is lower than the maximum temperature of the second heating element.
12. The electronic vaporizing inhaler of claim 11, wherein the first heating element is heated to a maximum temperature of 150°C and the second heating element is heated to a maximum temperature of 300°C.
13. The electronic vaporizing inhaler of claim 10, wherein the microprocessor sends pulses of currents to the first and second heating elements.
14. The electronic vaporizing inhaler of claim 10, wherein the sensor is a digital pressure sensor.
15. The electronic vaporizing inhaler of claim 10, wherein the microprocessor is configured to receive input from the user concerning the dosage of vaping liquid per draw.
16. An electronic vaporizing inhaler, said electronic vaporizing inhaler comprising:
 - an electrical storage device;
 - a liquid reservoir adapted to receive vaping liquid;
 - a vaporizer, comprising:
 - a primer chamber, comprising:
 - an inferior end having a plurality of apertures, wherein the plurality of apertures provide fluid communication between the vaporizer and the liquid reservoir;

a substrate embedded with a plurality of diaphragm pumps, each diaphragm pump comprising a diaphragm and a piezoelectric transducer, wherein the each diaphragm flexes inwardly and outwardly in response to its corresponding piezoelectric transducer; and

a superior end having a plurality of nozzles, wherein each nozzle ejects the vaping liquid when its corresponding diaphragm flexes inwardly;

a heating element proximal to the nozzle;

a microprocessor in electrical communication with the electrical storage device, wherein the microprocessor is configured to direct current from the electrical storage device to the heating element in the vaporizer and to the piezoelectric transducer;

a sensor configured to detect when a user draws on the electronic cigarette, wherein the sensor is in electrical communication with the microprocessor and wherein the sensor activates the microprocessor when it detects that a user has drawn on the electronic cigarette;

a housing having a first end and a second end, wherein the housing is designed to contain the electrical storage device, vaporizer, microprocessor, sensor, and liquid reservoir and wherein the second end of the housing is a mouthpiece from which a user can inhale vapor from the vaporizer.

17. The electronic vaporizing inhaler of claim 16, wherein the microprocessor sends pulses of currents to the heating element and to the piezoelectric transducer.

18. The electronic vaporizing inhaler of claim 16, wherein the sensor is a digital pressure sensor.

19. The electronic vaporizing inhaler of claim 16, wherein the microprocessor is configured to receive input from the user concerning the dosage of vaping liquid per draw.

20. The electronic vaporizing inhaler of claim 16, wherein the primer chamber has 5 or 6 diaphragm pumps.