An electronic cigarette atomizer includes an air intake having an air intake opening stem mounted to slide relative to an air intake retainer. The air intake body extends from the air intake retainer. The air intake opening stem has an air intake opening. A valve plate is connected to the air intake opening stem. The valve plate is mounted to slide relative to the air intake retainer. A coupler is connected to the air intake. The coupler has a coupler body that is configured to attach to a power supply. A heating assembly is mounted to the coupler and has a heating element for producing a smoke or vapor. Optionally, the electronic cigarette atomizer further includes a valve opening located on the valve plate. The valve opening is in fluid communication with the air intake opening of the air intake opening stem.
ELECTRONIC CIGARETTE

FIELD OF THE INVENTION

[0001] The present invention is in the field of the electronic cigarette.

DISCUSSION OF RELATED ART

[0002] An electronic cigarette generally has a heater portion heating a cartridge held within the atomizer and a power supply portion. A typical example of an electronic cigarette is described in U.S. Pat. No. 8,528,569 by inventor Newton issued Sep. 10, 2013 entitled electronic cigarette with liquid reservoir, the disclosure of which is incorporated herein by reference.

[0003] In recent decades an increasing number of people became aware of the hazardous effects of cigarettes, some people ceased their habits immediately; however many others struggled to quit. Even though people realized their health deteriorated because of tar found within cigarettes among other reasons, nicotine’s addictive properties prevented them from stopping. Vapor inhalers, also known as electronic cigarettes were thus developed as an alternative solution.

[0004] Over the years vapor inhalers have been improved upon from its most basic function, which is to deliver gas through a hollow tube that can be inhaled by a user. A variety of vapor inhalers exist such as Lik Hon, U.S. Pat. No. 8,365,742, issued on Feb. 5, 2013, entitled Aerosol Electronic Cigarette, the disclosure of which is incorporated herein by reference. Hon teaches about an electronic cigarette with better atomizing efficiency and aerosol effects to mimic real cigarettes. The invention has a shell and a mouthpiece, an atomizer, air inlet, and aerosol passage. Similar to the previously described patent is Lik Hon, U.S. Pat. No. 8,393,331, issued Mar. 12, 2013, entitled Electronic Atomization Cigarette, which is disclosed herein by reference.

[0005] Other references include Yunchang Xi, Tucker (et al), and Nathan Terry (et al). Yunchang Xi, US publication number 2012/0204889 A1, published Aug. 16, 2012, entitled Combined Multifunctional Electronic Simulated Cigarette is disclosed herein by reference. Xi proposes an electronic cigarette comprising of an indicator, an aroma generator, smoke capsule and suction hole. This invention provides users with aromatic gases nicotine component and simulated smoke simultaneously; though, users may choose a combination of the aforementioned functions. Tucker et al, US publication number 2013/0192620 A1, published Aug. 1, 2013, entitled Electronic Cigarette is disclosed herein by reference. Tucker proposes an electronic cigarette, which comprises of a liquid supply, liquid material, a heater, a wick, an air inlet, and a fibrous element. These components work in conjunction to vaporize and ultimately deliver the vapor to the user. Terry et al, U.S. Pat. No. 8,550,068, issued Oct. 8, 2013, entitled Atomizer-Vaporizer for a Personal Vaporizing Inhaler is disclosed herein by reference. Terry teaches about a vapor inhaling unit consisting of a cavity that can receive a cartridge. The cartridge provides the substance for vaporization, but first must be atomized and then heated before it a user can inhale the vapors.

[0006] Additionally many other inventors have individually contributed to the improvements of vapor inhalers; the inventors are Steven Schennum, Mark Scatterday, and Guocheng Pan. Steven Schennum, U.S. Pat. No. 8,495,998, issued on Jul. 30, 2013, is entitled Inhaler, the disclosure of which is incorporated herein by reference. Schennum shows a handheld inhaler comprising of a canister, a first body that delivers aerosol to the user, a trigger for releasing pressurized fluid from the canister. The trigger consists of a compression spring and cam that engages a pressure sensitive lever with a plate that releases the cocked trigger. Guocheng Pan, U.S. Pat. No. 8,205,622, issued Jun. 26, 2012, is entitled Electronic Cigarette, the disclosure which is incorporated herein by reference. Mark Scatterday, U.S. Pat. No. 8,539,959, issued on Sep. 24, 2013, is entitled Electronic Cigarette Configured to Simulate the Natural Burn of a Cigarette, the disclosure of which is incorporated herein by reference. Scatetday presents an electronic cigarette with a translucent conduit and light chamber, allowing light from the light source to be diffused in such a way that the light emitted during inhalation simulates the natural burn of a traditional tobacco cigarette. Pan describes an invention that has two tubes (connected by electrical connectors), a power source, electric airflow sensor, and most importantly a Single Chip Miycyo which controls the atomization process. When airflow triggers the chip, the chip sends instructions to the electronic cigarette to supply power through the electrical connectors to the inhaler and atomizer.

SUMMARY OF THE INVENTION

[0007] An electronic cigarette heater and atomizer includes an air intake having an air intake opening stem mounted to slide relative to an air intake retainer. The air intake body extends from the air intake retainer. The air intake opening stem has an air intake opening. A valve plate is connected to the air intake opening stem. The valve plate is mounted to slide relative to the air intake retainer. A coupler is connected to the air intake. The coupler has a coupler body that is configured to attach to a power supply. A heating assembly is mounted to the coupler and has a heating element for producing a smoke or vapor. Optionally, the electronic cigarette atomizer further includes a valve opening located on the valve plate. The valve opening is in fluid communication with the air intake opening of the air intake opening stem.

[0008] An air intake sleeve may have a sleeve wall defining a sleeve aperture. The sleeve wall has a sleeve edge that engages an air intake O-ring seal. The air intake O-ring seal is mounted to the air intake body. The valve opening can be located on the valve plate. The valve opening is in fluid communication with the air intake opening of the air intake opening stem. The air intake further comprises a sleeve retainer. The sleeve retainer retains an air intake sleeve, and the air intake sleeve has a sleeve wall defining a sleeve aperture. The sleeve wall has a sleeve edge that engages an air intake O-ring seal, and the air intake O-ring seal is mounted to the air intake body.

[0009] The valve opening is located on the valve plate, and the valve opening is in fluid communication with the air intake opening of the air intake opening stem. The sleeve retainer has a sleeve retainer aperture formed on the sleeve retainer body, and the sleeve retainer further includes a sleeve retainer grip having a sleeve retainer vent formed on the sleeve retainer grip. The sleeve retainer also has a sleeve retainer O-ring seal mounted to the sleeve retainer body, and the sleeve retainer O-ring seal engages a second sleeve edge of the sleeve wall. The air intake has a sleeve retainer internal thread formed on a sleeve retainer, and the sleeve retainer internal thread engages with the coupler. The heating assembly has a heating assembly external thread that engages the coupler, and the heating assembly also has a heating assembly
grip on an external periphery of the heating assembly. The heating assembly has a heating assembly vent opening. The coupler has a coupler shoulder that extends from a coupler rim, and the coupler has a first coupler vent and a second coupler vent. The air intake also has a sleeve retainer having an external sleeve retainer thread, and the external sleeve retainer thread engages the air intake body. The coupler has a coupler connector thread that connects to a power supply.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an assembled view of the electronic cigarette.
FIG. 2 is a right side exploded view of the electronic cigarette.
FIG. 3 is a left side exploded view of the electronic cigarette.
FIG. 4 is an assembled view of the electronic cigarette including the power supply.

The following callout list of elements can be a useful guide in referencing the element numbers of the drawings.

Air Intake
Air Intake Opening Stem
Air Intake Threaded Connection
Valve Opening
Air Intake Retainer
Air Intake Body
Air Intake O-Ring Seal
Valve Plate
Air Intake Opening
Air Intake Sleeve
Sleeve Wall
Sleeve Edge
Sleeve Aperture
Sleeve Retainer
Sleeve Retainer Aperture
Sleeve Retainer Body
Sleeve Retainer Grip
Sleeve Retainer Vent
Sleeve Retainer O-Ring Seal
Sleeve Retainer Internal Thread
Heating Assembly
Heating Assembly External Thread
Heating Assembly Heating Element
Heating Assembly Grip
Heating Assembly Vent Opening
Coupler
First Coupler Vent
Internal Heating Assembly Thread
External Sleeve Retainer Thread
Coupler Rim
Second Coupler Vent
Coupler Shoulder
Coupler Connector Thread
Power Supply
Led Tip
Battery
CPU
Power Supply Connector
Push Button

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

An electronic cigarette is typically made of an electronic cigarette heater and atomizer and a power supply. The present invention heater and atomizer can be used for heating a nicotine liquid, however the present invention heater and atomizer also be used for combusting tobacco by heating the tobacco directly to create smoke. The electronic cigarette atomizer is generally connected to a power supply that has a rechargeable battery and an electronic power controller operated by a microchip. The power supply has a threaded connection that connects to the electronic cigarette atomizer. The power supply and electronic cigarette atomizer are both generally cylindrical in shape. The tip of the power supply may have an LED light that simulates the look of a lit cigarette or cigar. The power supply delivers power when a user presses a button, or the power supply can be automatically activated when a user takes a drag on the electronic cigarette. The power is generally a low voltage power that is delivered to the heating assembly. The heating assembly is held by the coupler. The coupler connects to the power supply and to the sleeve retainer. The sleeve retainer and the air intake cooperate to retain an air intake sleeve. The heating assembly is a hot coil or other metal piece that heats up from electrical resistance heating.

The user takes air through an air intake opening that is located on the air intake opening stem. The air intake opening stem is a hollow straw shaped mouthpiece that can be flared for oral comfort. The air intake opening is preferably round and passing through length of the air intake opening stem. The air intake opening communicates through the air intake from the tip of the air intake opening stem down to the air intake threaded connection. The air intake threaded connection connects to the sleeve retainer. The air intake threaded connection surrounds a valve plate. The valve plate is rigidly connected to the air intake opening stem. The air intake opening extends through the valve opening. The valve opening can have multiple small openings such as the four pictured in FIG. 3. The air intake is generally mounted on an air intake retainer and having an air intake body.

The air intake also has an air intake O-ring seal that is mounted near the air intake retainer. The air intake retainer has a grip surface and an opening for receiving the air intake opening stem. The air intake opening stem is mounted on a spring within the air intake retainer. The bias can be made as a helical coil spring, leaf spring or magnetic attraction. The spring biases the air intake opening stem into a closed position. In closed position, the air intake opening has an air passage that passes through it and connects to the valve opening. When a user presses down on the air intake opening stem, the air intake opening stem translates relative to the air intake retainer. The air intake opening stem is connected to the valve plate which moves toward the heating assembly heat element. Movement of the valve plate ejects the cartridge or tobacco from the atomization chamber. The valve plate appears as a disk that is mounted to the air intake opening stem. The diameter of the disk matches the internal diameter of the sleeve retainer so that the internal walls of the sleeve retainer can be scraped clean with each depression of the air intake opening stem. The atomization chamber is formed on an inside cavity of the sleeve retainer. The user can press the air
intake opening stem 21 multiple times so that the user can clear or clean the atomization chamber without tools. The air intake body 25 is a generally elongated tube. The air intake O-ring seal 26 can be mounted to a groove formed on the air intake body 25. The air intake body 25 has the air intake threaded connection 22 formed on the external surface of the air intake body 25. The air intake body 25 extends from the air intake retainer 24 and is preferably coaxial to the air intake retainer 24. The helical spring can be mounted within the air intake body 25.

The air intake sleeve 30 has a sleeve wall 31. The sleeve wall 31 has a sleeve edge 32. The sleeve edge 32 is circular and connects to the air intake O-ring seal 26 on an inside surface of the sleeve edge 32 and on an outside surface of the air intake O-ring seal 26. The sleeve aperture 33 is of greater diameter than the air intake body 25 such that an air gap is formed between the sleeve aperture 33 and the air intake body 25. The air intake sleeve can be made of clear plastic as well such that it is transparent. The sleeve edge 32 facing the sleeve retainer 40 seals against the sleeve retainer O-ring seal 44.

The sleeve retainer 40 as a generally cylindrical sleeve retainer body 41 which extends from a sleeve retainer grip 42. The sleeve retainer O-ring seal 44 is mounted on an external surface of the sleeve retainer body 41, preferably at a groove located at the base of the sleeve retainer body 41 were the sleeve retainer body meets the sleeve retainer grip 42. The sleeve retainer grip 42 preferably at least one sleeve retainer vent 43 that allows an intake of air through the sleeve retainer vent. The sleeve retainer aperture as an internal thread that faces and engages the air intake threaded connection 22. The sleeve retainer aperture may retain a nicotine cartridge for heating up by the heater. The sleeve retainer internal thread 46 can also be located on an inside surface of the sleeve retainer grip 42. The sleeve retainer internal thread 46 preferably engages with the coupler 60.

The heating assembly 50 is a replaceable module that can be replaced whenever the heating coil burns out. The heating assembly 50 has an external heating assembly thread 51 that connects the heating assembly heat element 52 and the coupler 60. The external heating assembly thread 51 engages with the internal heating assembly thread 63 as a user turns the heating assembly 55 the heating assembly grip 53. The heating assembly has a heating element 52 located in the middle of the heating assembly. The heating assembly 50 may also have a heating assembly vent opening 58 which allows airflow to the heating assembly. The heating assembly heat element 52 is in the middle of the heating assembly 50 and is preferably a resistance heated coil.

The coupler 60 connects to the heating assembly 50, the sleeve retainer 40 and the power supply. The coupler 60 has a coupler body 61 that is generally cylindrical. The coupler body has a first coupler vent 62 and a second coupler vent 66. The coupler 60 has an internal heating assembly thread 63 that engages the heating assembly external thread 51. The coupler also has an external sleeve retainer thread 64 that engages the sleeve retainer internal thread 46 of the sleeve retainer 40. The coupler 60 and the other parts of the electronic cigarette are preferably made of stainless steel, with the air intake sleeve 30 being made of glass. The coupler 60 also has a coupler rim 65 that has a smaller diameter than a coupler shoulder 67 of the coupler 60. The coupler rim 65 is a tubular projection from the coupler shoulder 67. The coupler rim 65 has an internal threaded surface that forms the internal heating assembly thread 63 and the coupler rim 65 has an external threaded surface which is the external sleeve retainer thread 64. The coupler connection thread 68 is located opposite the coupler rim 65 and the coupler connection thread 68 is configured to connect to a power supply.

A user loads a tobacco or cartridge into the area near the heating element 52. The cartridge is placed in the sleeve retainer 40 which has a sleeve retainer aperture 45 that forms a hollow chamber for receiving the cartridge. The cartridge is a cylindrical pellet that has a housing and a wick such as a cotton or synthetic fiber that can hold a liquid or gel. Alternatively, the cartridge can also be a lump of tobacco. The liquid or gel can contain nicotine or a drug for inhaling. The user can grip the sleeve retainer grip 42 and the air intake retainer 24 grip and unscrew the electronic cigarette atomizer. Once loaded, the user consumes the cartridge or tobacco by atomizing or combusting its contents with the application of heat via the heating assembly heat element 52. The vapor exits the atomization chamber, which is the sleeve retainer aperture 45 at the valve plate 27 which can be controlled by a user from a closed position to an open position. In closed position, the vapor may only exit through the small valve opening 23, but when in open position, the vapor can pass around the valve plate 27 and into the air intake body 25 and accordingly through the air intake opening 20. While the physical process of atomizing versus combusting are notably different, the words ‘atomizing’ and ‘combusting’ may as well be used interchangeably because of the dual fuel capability of this electronic cigarette.

The power supply 70 generally includes a housing having a battery 72 held within the housing. A CPU 73 may control the power supply, and a pushbutton 75 can be used for manually operating the power supply. The tip of the power supply can have an LED tip 71 that lights up to indicate battery draw and stimulate a lighted cigarette or cigar. The power supply connector 74 can be externally threaded to allow a threaded connection with the internal coupler connection thread 68 of the coupler 60. The battery makes an electrical circuit with the electrical resistance heater and CPU.

Airflow is controlled by the vents and passages through the electronic cigarette. The first coupler vent 62 and the second coupler vent 66 allow a primary airflow to enter a gap in the electronic cigarette between the power supply and coupler. The air can then pass through the heating coil or the heating assembly heating element 52 via the heating assembly vent opening 58 to be heated from a cold to a hot state at a heating coil. The air can then continue through to atomize a nicotine liquid suspended in a cartridge. Additionally, a secondary airflow can enter the electronic cigarette through a sleeve retainer vent 43 which allows air to enter the electronic cigarette without passing through the heating assembly heating element 52. The secondary airflow that intakes through the sleeve retainer vent 43 is fed to the side of the heating assembly heating element 52. Preferably, a pair of sleeve retainer vents allow a secondary or supplemental airflow to pass along a side of the heating coils so that there is air passing through the heating coils and also air passing alongside the heating coils. The supplemental or secondary airflow mixes with the primary airflow immediately ahead of the heating coil to provide a mixed airflow that heats the nicotine liquid. The user can cover one or more of the primary or secondary air holes with a finger to change the proportion of airflow and
consequently the temperature of the mixed airflow airstream. All of the vents including the sleeve retainer vent 43, the first coupler vent 62, the second coupler vent 63 and the heating assembly vent opening 58 are orthogonal to the common coaxial axis of the electronic cigarette.

1. An electronic cigarette comprising:
   a. an air intake having an air intake opening stem mounted to slide relative to an air intake retainer, wherein an air intake body extends from the air intake retainer, wherein the air intake opening stem has an air intake opening;
   b. a valve plate connected to the air intake opening stem, wherein the valve plate is mounted to slide relative to the air intake retainer;
   c. a coupler connected to the air intake, wherein the coupler has a coupler body that is configured to attach to a power supply;
   d. a heating assembly mounted to the coupler and having a heating element for producing a smoke or vapor.

2. The electronic cigarette of claim 1, further comprising a valve opening located on the valve plate, wherein the valve opening is in fluid communication with the air intake opening of the air intake opening stem.

3. The electronic cigarette of claim 1, further comprising an air intake sleeve, wherein the air intake sleeve has a sleeve wall defining a sleeve aperture, wherein the sleeve wall has a sleeve edge that engages an air intake O-ring seal, wherein the air intake O-ring seal is mounted to the air intake body.

4. The electronic cigarette of claim 3, further comprising a valve opening located on the valve plate, wherein the valve opening is in fluid communication with the air intake opening of the air intake opening stem.

5. The electronic cigarette of claim 1, wherein the air intake further comprises a sleeve retainer, wherein the sleeve retainer retains an air intake sleeve, wherein the air intake sleeve has a sleeve wall defining a sleeve aperture, wherein the sleeve wall has a sleeve edge that engages an air intake O-ring seal, wherein the air intake O-ring seal is mounted to the air intake body.

6. The electronic cigarette of claim 5, further comprising a valve opening located on the valve plate, wherein the valve opening is in fluid communication with the air intake opening of the air intake opening stem.

7. The electronic cigarette of claim 6, wherein the sleeve retainer has a sleeve retainer aperture formed on the sleeve retainer body, wherein the sleeve retainer further includes a sleeve retainer grip having a sleeve retainer vent formed on the sleeve retainer grip.

8. The electronic cigarette of claim 7, wherein the sleeve retainer further includes a sleeve retainer O-ring seal mounted to the sleeve retainer body, wherein the sleeve retainer O-ring seal engages a second sleeve edge of the sleeve wall.

9. The electronic cigarette of claim 1, wherein the air intake further comprises a sleeve retainer internal thread formed on a sleeve retainer, wherein the sleeve retainer internal thread engages with the coupler.

10. The electronic cigarette of claim 1, wherein the heating assembly has a heating assembly external thread that engages the coupler, wherein the heating assembly also has a heating assembly grip on an external periphery of the heating assembly.

11. The electronic cigarette of claim 1, wherein the heating assembly has a heating assembly vent opening.

12. The electronic cigarette of claim 1, wherein the coupler has a coupler shoulder that extends from a coupler rim, wherein the coupler has a first coupler vent and a second coupler vent.

13. The electronic cigarette of claim 1, wherein the air intake further comprises a sleeve retainer having an external sleeve retainer thread, wherein the external sleeve retainer thread engages the air intake body.

14. The electronic cigarette of claim 1, wherein the coupler has a coupler connector thread that connects to a power supply.

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