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(54) **HEATING ASSEMBLY, ATOMIZING HEAD, ATOMIZER AND ELECTRONIC CIGARETTE THEREOF**

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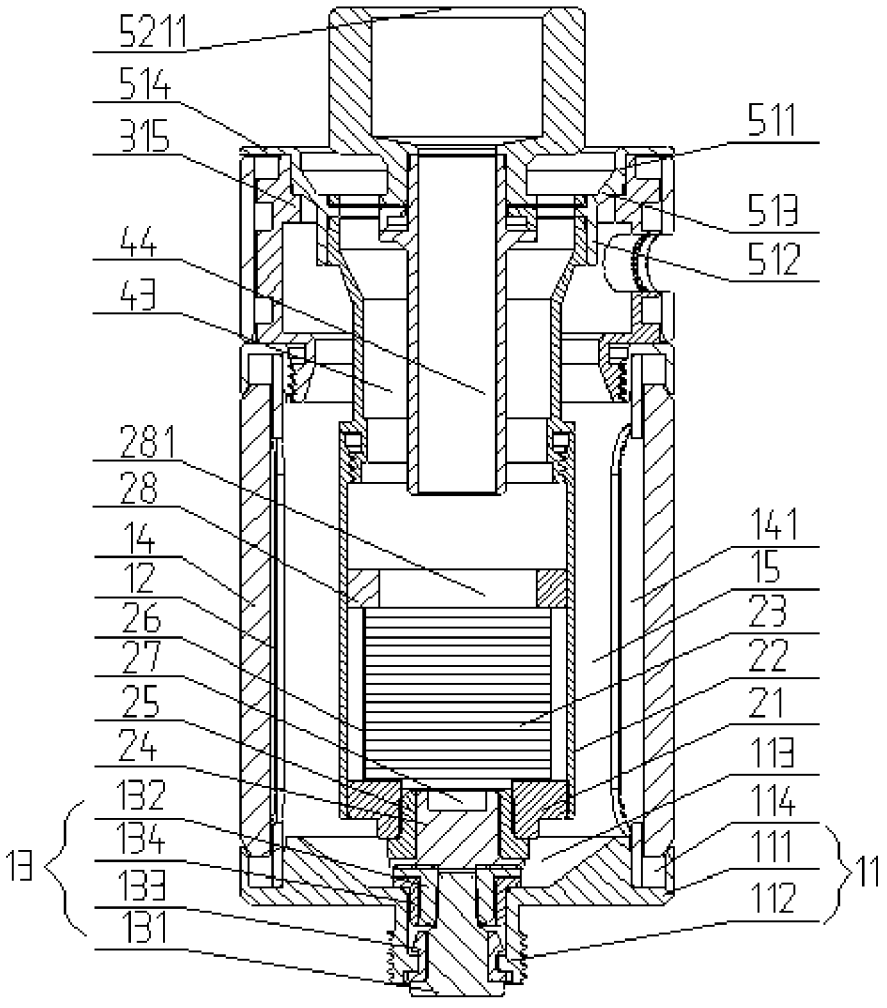
(57) **ABSTRACT**

A heating assembly, an atomizing head, an atomizer, and an electronic cigarette are disclosed. The heating assembly includes two or more laminated heating plates, each heating plate is provided with through hole(s) and/or through groove (s), the gap between the adjacent heating plates is capillary gap, the through hole and/or the through groove of the heating plates are at least partially in communication with the through hole and/or the through groove of the adjacent heating plates. The heating plate, the atomizing head, the atomizer, and the electronic cigarette of the present disclosure use the capillary gap between adjacent heating fins for liquid guiding. Compared with the conventional liquid guiding cotton or glass fiber, there is no odor, and there is no risk that the user in smoke the capillary fiber.



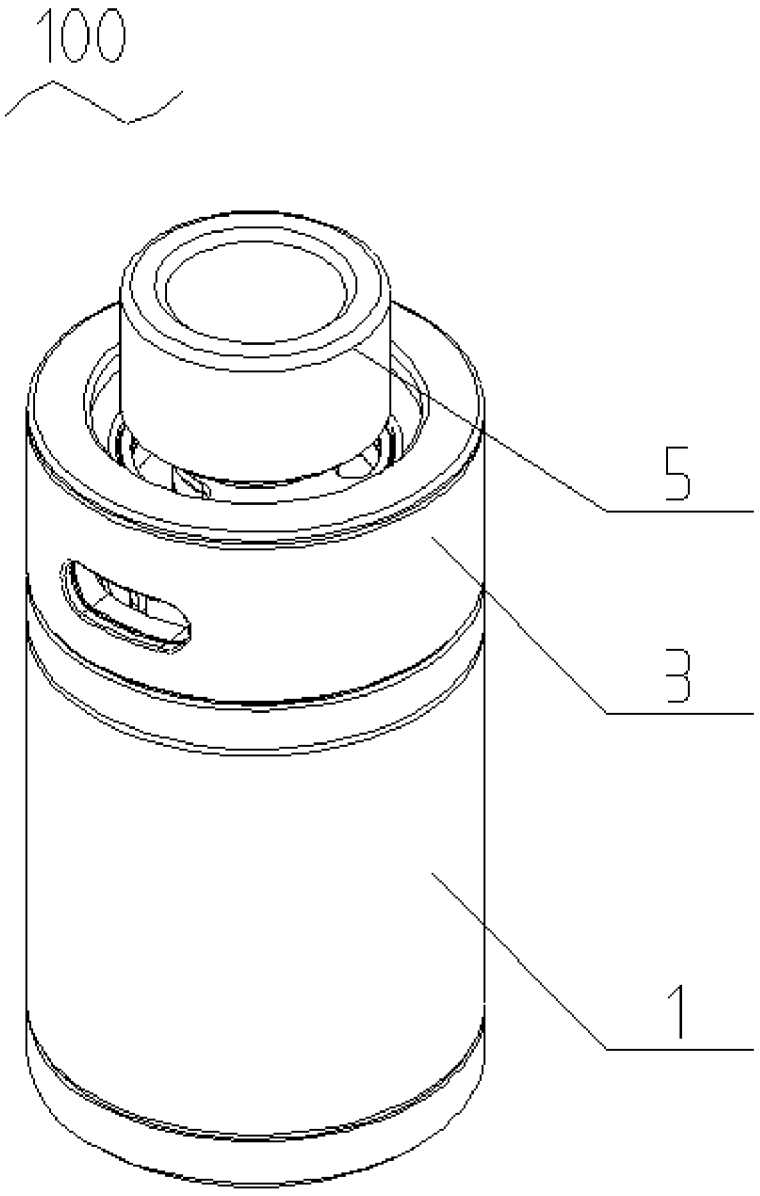


FIG. 1

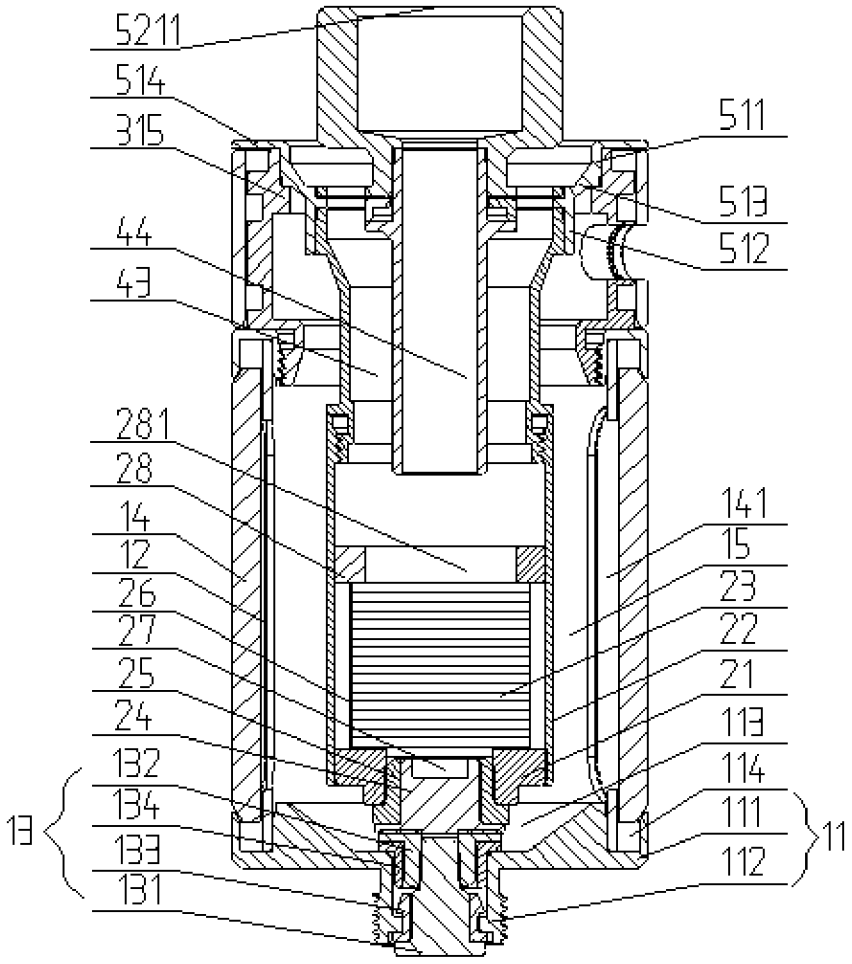

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FIG. 2

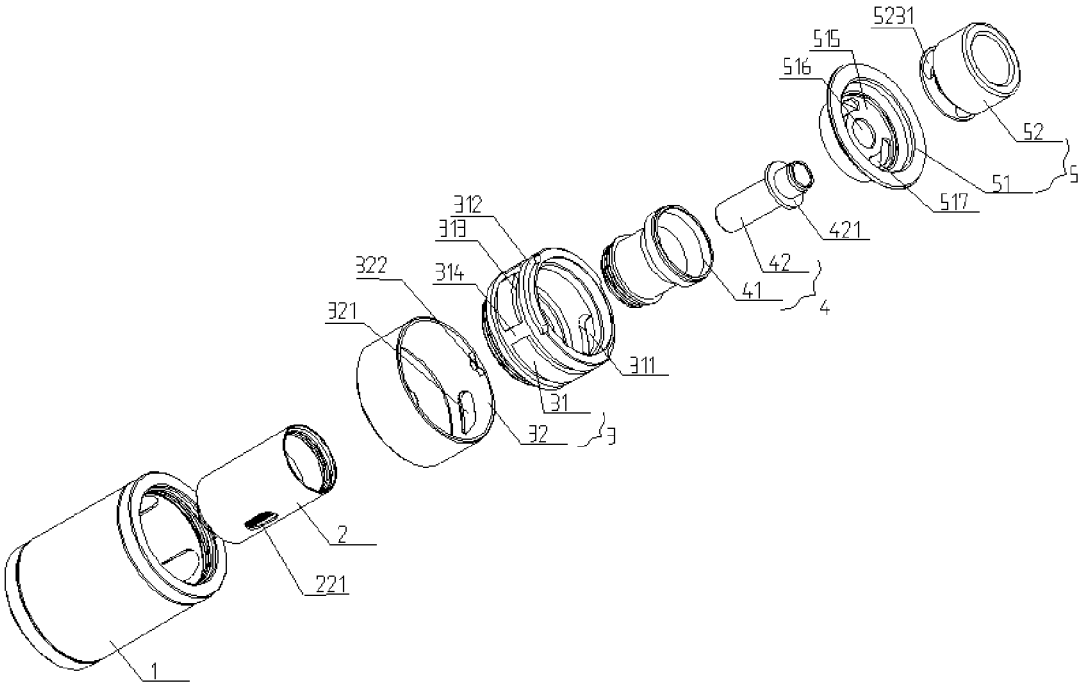
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FIG. 3

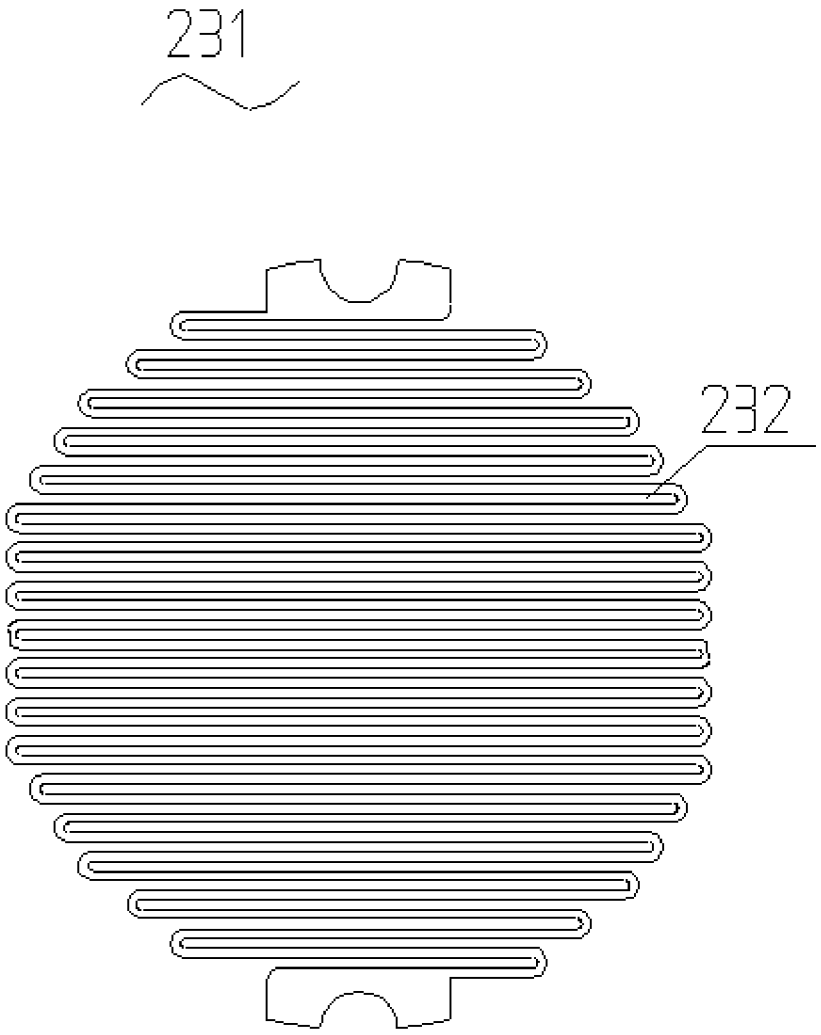

FIG. 4

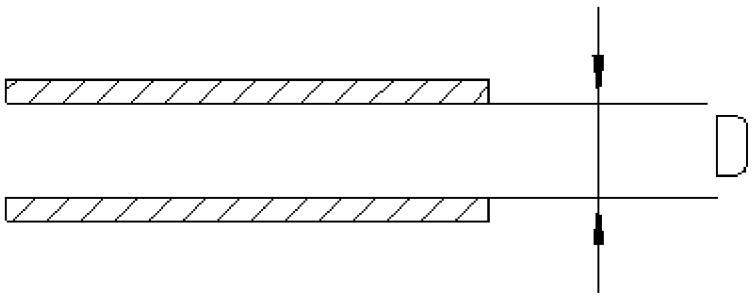

FIG. 5

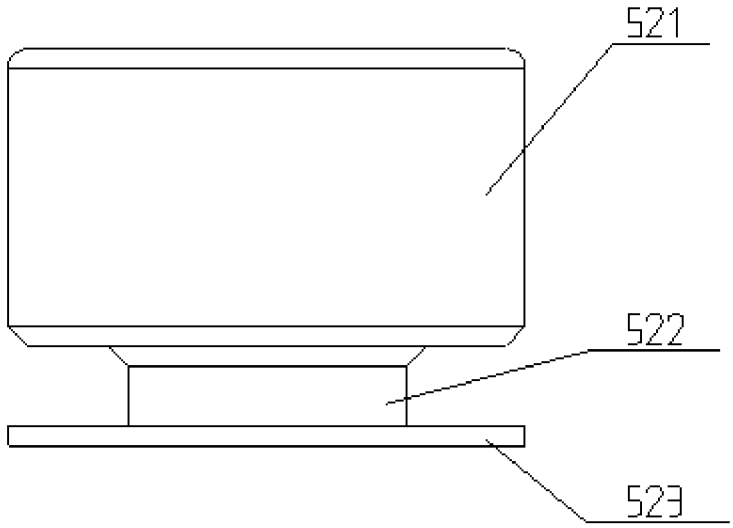

FIG. 6

HEATING ASSEMBLY, ATOMIZING HEAD, ATOMIZER AND ELECTRONIC CIGARETTE THEREOF

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is a continuation of International Patent Application No. PCT/CN2016/098529, filed on Sep. 9, 2016, entitled "heating assembly, atomizing head, atomizer and electronic cigarette thereof", which claims priority to Chinese Patent Application No. 201610465536.X, filed on Jun. 23, 2016, entitled "heating assembly, atomizing head, atomizer and electronic cigarette thereof". All of the aforementioned patent applications are hereby incorporated by reference in their entireties.

FIELD OF TECHNOLOGY

[0002] The present disclosure relates to the field of electronic cigarette technology, and more particularly to a heating assembly, an atomizing head, an atomizer and an electronic cigarette using the same.

BACKGROUND

[0003] At present, the heating assembly of electronic cigarettes usually use liquid cotton, glass fiber or liquid-conducting ceramic to guide cigarette liquid. However, at high temperatures, both the liquid guiding cotton and the glass fiber are easily scorched, a small amount of flue gas generated after being scorched affect the taste of the electronic cigarette. On the other hand, the liquid guide cotton and the glass fiber easily release the capillary fibers, which may be inhaled into the human body during smoking, causing damage to the user's body. In the preparation process, the pore-forming ceramics usually use pore-forming agents to make pores, the residual pore-forming agent of ceramics may precipitate harmful substances at high temperatures, which may cause certain harm to the user's body.

SUMMARY

[0004] In view of at least one of the above technical problems, an object of the present disclosure provides a heating assembly, an atomizing head, an atomizer, and an electronic cigarette.

[0005] A heating assembly for an electronic cigarette includes two or more laminated heating plates, each heating plate is provided with through hole(s) and/or through groove (s), the gap between the adjacent heating plates is capillary gap, the through hole and/or the through groove of the heating plates are at least partially in communication with the through hole and/or the through groove of the adjacent heating plates.

[0006] In one embodiment, the surface roughness Ra of the heating plates is 2.5 μm≤Ra≤40 μm.

[0007] In one embodiment, the thickness of the heating plate is 0.1 mm≤d≤3 mm.

[0008] In one embodiment, the heating plate is made of metal.

[0009] In one embodiment, the heating plate is made of at least one material selected from iron chromium aluminum alloy, nickel chromium alloy, stainless steel, nickel, titanium, iron, copper, and tungsten.

[0010] In one embodiment, some of the through holes in the heating plate are capillary through holes, and/or some of the through grooves of the heating plate are capillary through grooves.

[0011] An atomizing head, for an electronic cigarette, the atomizing head includes any one of the above heating assemblies.

[0012] In one embodiment, the surface roughness Ra of the heating plates is 2.5 μm≤Ra≤40 μm.

[0013] In one embodiment, the thickness of the heating plate is 0.1 mm≤d≤3 mm.

[0014] In one embodiment, the heating plate is made of metal.

[0015] In one embodiment, the heating plate is made of at least one material selected from iron chromium aluminum alloy, nickel chromium alloy, stainless steel, nickel, titanium, iron, copper, and tungsten.

[0016] In one embodiment, some of the through holes of the heating plate are capillary through holes and/or some of the through grooves of the heating plate are capillary through grooves.

[0017] In one embodiment, the atomizing head comprises an atomizing head base, an atomizing head sleeve, a heating assembly, an atomizing head electrode contact, and an atomizing head insulating ring, the atomizing head sleeve is a hollow structure opens at both ends, the atomizing head base is sealed and abuts against one end of the atomizing head sleeve, and the other end of the atomizing head sleeve opposite to the atomizing head base is an open end, the upper surface of the atomizing head base and the inner surface of the atomizing head sleeve cooperatively define an atomizing chamber, the heating assembly is received in the atomizing chamber and is supported by the atomizing head base, the atomizing head base is further provided with a receiving hole extending through the two opposite ends of the atomizing head base, the atomizing head electrode contact is housed in the receiving hole, the atomizing head insulating ring is disposed between the atomizing head electrode contact and the receiving hole, the inlet wall of the atomizing head sleeve is provided with a liquid inlet hole.

[0018] In one embodiment, the atomizing head further includes a gland, the gland is disposed on the topmost heating plate, the gland is provided with gland openings, the gland openings are in communication with some of the through holes and/or the through grooves of the topmost heating plate.

[0019] An atomizer for an electronic cigarette includes any one of the above heating assemblies.

[0020] In one embodiment, the surface roughness Ra of the heating plates is 2.5 μm≤Ra≤40 μm.

[0021] In one embodiment, the thickness of the heating plate is 0.1 mm≤d≤3 mm.

[0022] In one embodiment, the heating plate is made of metal.

[0023] In one embodiment, the heating plate is made of at least one material selected from iron chromium aluminum alloy, nickel chromium alloy, stainless steel, nickel, titanium, iron, copper, and tungsten.

[0024] In one embodiment, some of the through holes of the heating plate are capillary through holes and/or some of the through groove of the heating plates are capillary through grooves.

[0025] In one embodiment, the atomizer includes a liquid storage assembly, an atomizing head, a liquid injection

assembly, a ventilation assembly, and a mouthpiece assembly, the liquid storage assembly has a closed end and an open end, the atomizing head is received in the liquid storage assembly, the liquid injection assembly is coupled with the open end of the liquid storage assembly, one end of the ventilation assembly is pass through the liquid injection assembly and connected to the atomizing head, the ventilation assembly is in communication with the atomizing head.

[0026] An electronic cigarette includes any one of the above atomizer and a battery device electrically connected to the atomizer for powering.

[0027] In one embodiment, the surface roughness Ra of the heating plates is 2.5 μm≤Ra≤40 μm.

[0028] In one embodiment, the thickness of the heating plate is 0.1 mm≤d≤3 mm.

[0029] In one embodiment, the heating plate is made of metal.

[0030] In one embodiment, the heating plate is made of at least one of iron chromium aluminum alloy, nickel chromium alloy, stainless steel, nickel, titanium, iron, copper, and tungsten.

[0031] In one embodiment, some of the through holes of the heating plate are capillary through holes, and/or some of the through grooves of the heating plate are capillary through grooves.

[0032] The beneficial effects of the device are:

[0033] The heating plate, the atomizing head, the atomizer, and the electronic cigarette of the present disclosure use the capillary gap between adjacent heating fins for liquid guiding. Compared with the conventional liquid guiding cotton or glass fiber, there is no odor, and there is no risk that the user inhales the capillary fiber.

BRIEF DESCRIPTION OF THE DRAWINGS

[0034] Many aspects of the disclosure can be better understood with reference to the following drawings. The components in the drawings are not necessarily drawn to scale, the emphasis instead being placed upon clearly illustrating the principles of the disclosure. Moreover, in the drawings, like reference numerals designate corresponding parts throughout the several views.

[0035] FIG. **1** is a perspective view of an atomizer according to the present application;

[0036] FIG. **2** is a cross-sectional view of the atomizer of FIG. **1**;

[0037] FIG. **3** is an exploded view of the atomizer of FIG. **1**;

[0038] FIG. **4** is a perspective view of the heating plate of the heating assembly of FIG. **2**;

[0039] FIG. **5** is a cross-sectional view of two adjacent heating plates of the heating assembly of FIG. **2**;

[0040] FIG. **6** is a front view of the mouthpiece shown in FIG. **1**.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0041] The specific embodiments of the present disclosure will be described in detail below with reference to the accompanying drawings. It should be understood that the specific embodiments described herein are only used to illustrate and explain the present disclosure and are not intended to limit the present disclosure.

[0042] Referring to FIG. **1** to FIG. **3**, the present disclosure provides an electronic cigarette (not shown). The electronic cigarette includes an atomizer **100** and a battery device (not shown). The battery device is electrically connected to the atomizer **100** for powering the atomizer **100**. The atomizer **100** is configured for atomizing the cigarette liquid stored therein to generate smoke for use to inhale.

[0043] Specifically, the atomizer **100** includes a liquid storage assembly **1**, an atomizing head **2**, a liquid injection assembly **3**, a ventilation assembly **4**, and a mouthpiece assembly **5**. The liquid storage assembly **1** has a closed end and an opposite open end. The atomizing head **2** is housed in the liquid storage assembly **1**. The liquid injection assembly **3** is deposed at the open end of the liquid storage assembly **1** and in communication with the liquid storage assembly **1**. One end of the ventilation assembly **4** passes through the liquid injection assembly **3** and is connected to the atomizing head **2**. The opposite end of the ventilation assembly **4** is connected to and in communication with the mouthpiece assembly **5**. The cigarette liquid is injected into the liquid storage assembly **1** through the liquid injection assembly **3**. The atomizing head **2** atomizes the cigarette liquid stored in the liquid storage assembly **1** to generate smoke, the smoke flows through the ventilation assembly **4**, and finally, it flows out of the mouthpiece assembly **5** for the user to inhale.

[0044] Specifically, the liquid storage assembly **1** includes a base **11**, a liquid storage tube **12**, and an electrode contact assembly **13**. The base **11** includes a cover bottom plate **111** and a tube **112**. The upper surface of the cover bottom plate **111** is recessed inwardly to form a receiving cavity **113**. Especially, the receiving cavity **113** is defined at the center of the upper surface of the cover bottom plate **111**. A groove **114** is defined between the upper surface edge of the cover bottom plate **111** and the receiving cavity **113**. The tube **112** passes through the cover bottom plate **111** and is in communication with the receiving cavity **113**. In the embodiment, the tube **112** is disposed at the center of the lower surface of the cover bottom plate **111**. The liquid storage tube **12** is a hollow structure that opens at both ends, the bottom end the liquid storage tube **12** is embedded in the groove **114**. The electrode contact assembly **13** is disposed in the tube **112**. The electrode contact assembly **13** includes a first positive electrode contact **131**, a second positive electrode contact **132**, a first insulating ring **133**, and a second insulating ring **134**. The first positive electrode contact **131** is located in the tube **112** and is insulated from the tube wall of the tube **112** by the first insulating ring **133**. The second positive electrode contact **132** is sleeved on the top end of the first positive electrode contact **131** and is insulated from the tube wall of tube **112** by the second insulating ring.

[0045] Further, the liquid storage assembly **1** further includes a window tube **14**. The window tube **14** is sleeved on the outer circumference of the liquid storage tube **12**, the bottom end of the window tube **14** is embedded in the groove **114** together with the bottom end of the liquid storage tube **12**. The liquid storage tube **12** is made of transparent material, such as glass. The window tube **14** is made of hard material such as stainless steel, for protecting the liquid storage tube **12**. A window **141** is defined on the window tube **14** for the user to observe the remaining amount of the cigarette liquid.

[0046] Specifically, the atomizing head **2** includes an atomizing head base **21**, an atomizing head sleeve **22**, a heating assembly **23**, an atomizing head electrode contact **24**, and an atomizing head insulating ring **25**. The atomizing head sleeve **22** is a hollow structure that opens at both ends. The atomizing head base **21** is sealed and abuts against one end of the atomizing head sleeve **22**, the other end of the atomizing head sleeve **22** opposite to the atomizing head base **21** is an open end. The upper surface of the atomizing head base **21** and the inner surface of the atomizing head sleeve **22** cooperatively define an atomization chamber **26**. The heating assembly **23** is received in the atomization chamber **26** and is supported by the atomizing head base **21**. The atomizing head base **21** is further provided with a receiving hole **27** extending through the opposite two ends of the atomizing head base **21**. The atomizing head electrode contact **24** is housed in the receiving hole **27**, one end of the atomizing head electrode contact **24** is electrically connected to the heating assembly **23**, the opposite end of the atomizing head electrode contact **24** is electrically connected to the electrode contact component **13**. The atomizing head insulating ring **25** is disposed between the atomizing head electrode contact **24** and the receiving hole **27**, thereby the atomizing head electrode contact **24** is insulated from the wall of the receiving hole **27**. In the embodiment, the atomizing head electrode contact **24** functions as the positive electrode contact of the atomizing head **2**, the atomizing head base **21** and the atomizing head sleeve **22** are made of conductive material and both function as negative contact of the atomizing head **2**. The atomizing head **2** is housed in the liquid storage tube **12**, the atomizing head **2** is entirely supported by the atomizing head electrode contact **24** on the electrode contact assembly **13**. Thereby the upper surface of the base **11**, the inner surface of the liquid storage tube **12**, and the outer peripheral surface of the atomizing head **2** collectively define a reservoir chamber **15** for storing the cigarette liquid. The inlet wall of the atomizing head sleeve **22** is provided with a liquid inlet hole **221** in communication between the liquid storage chamber **15** and the atomization chamber **26**.

[0047] Referring to FIG. **4**, the heating assembly **23** is formed by laminating two or more heating plates **231** having through holes (not shown) and/or through grooves **232**. The gap between the adjacent heating plates **231** is capillary gap, some of the through holes and/or the through grooves **232** of the heating plates **231** are in communication with the through holes and/or the through grooves **232** of the adjacent heating plates **231**. Thereby, the cigarette liquid flowing into the atomization chamber **26** from the liquid inlet hole **221** is guided to the corresponding heating plate **231** under the capillary action of the capillary gap, the corresponding heating plate **231** heats the cigarette liquid under electric driving to generate smoke. When the user inhales, the smoke flows upward from the communication passage located between the through holes and/or the through grooves of the adjacent heating plates **231**, to the through holes and/or the through grooves **232** of the heating plates **231** located at the top of the heating assembly **23**, and to the open end of the atomizing head sleeve **22**. It can be understood that, when the user inhales, the cigarette liquid can also flow upward through the through hole of the adjacent heating piece **231** and/or the through grooves **232**, so that the cigarette liquid can further infiltrate the heating plates **231**, thereby the possibility of dry burning of the heating plates **231** is reduced.

[0048] Referring to FIG. **5** in combination, the gap between adjacent heating plates **231** is a capillary gap, that is the distance D between adjacent heating plates **231** is $0<D\leq 1$ mm. In order to make the gap between the adjacent heating plates **231** is the capillary gap, in one embodiment, the surface roughness Ra of the heating plates **231** is 2.5 $\mu m\leq Ra\leq 40$ μm. The heating plates **231** can be processed by at least one of the following processes: turning, rough grinding, fine grinding, planning, milling, and laser micro-engraving, thereby to get the heating plates **231** having a surface roughness Ra of 2.5 $\mu m\leq Ra\leq 40$ μm. The thickness of the heating plates is 0.1 $mm\leq d\leq 3$ mm. The heating plate **231** is a metal heating plate made of at least one material selected from iron chromium aluminum alloy, nickel chromium alloy, stainless steel, nickel, titanium, iron, copper, and tungsten. Since the heating plate **231** is a metal heating plates having a thickness of 0.1 to 3 mm, the heating plate **231** is easily processed to form a through hole and/or a through grooves **232**. The through holes and/or the through grooves **232** of the heating plate **231** are processed by at least one of the following processes: stamping, fast wire cutting, slow wire cutting, wire cutting, laser cutting, chemical etching, and photo etching.

[0049] Further, some of the through holes of the heating plate **231** are capillary through holes, and/or some of the through grooves of the heating plate **231** are capillary through grooves. The capillary through hole and the capillary through groove can store cigarette liquid, so that the heating plate **231** can keep sufficiently wet to prevent the heating plate **231** from being dry and affecting the user's suction taste.

[0050] Further, the atomizing head **2** further includes a gland **28**. The gland **28** is disposed on the heating plate **231** located at the top of the heating assembly **23** for pressing the heating plate **231** to prevent the heating plates **231** from swaying and loosening. Gland openings **281** are defined on the gland **28**, the gland openings **281** are in communication with one or more of the through hole(s) and/or the through groove(s) **232** of the heating plate **231** located at the top of the heating assembly **23**.

[0051] Specifically, the liquid injection assembly **3** includes an inner ring cover **31** and an outer ring cover **32**. The inner ring cover **31** is detachably covered at the top end of the liquid storage tube **12**, the outer ring cover **32** is rotatably sleeved on the outer circumference of the inner ring cover **31**. The inner ring cover **31** is provided with a first liquid injection hole **311** in communication with the liquid storage chamber **15**. The outer ring cover **32** is provided with a second liquid injection hole **321**. Rotating the outer ring cover **32** can make the first liquid injection hole **311** to communicate with or be staggered from the second liquid injection hole **321**. When injecting cigarette liquid, the outer ring cover **32** can be rotated to make the second liquid injection hole **321** in communication with the first liquid injection hole **311**, and then the cigarette liquid is injected into the liquid storage chamber **15** through the second liquid injection hole **321** and the first liquid injection hole **311**. When the injecting is completed, the outer ring cover **32** is rotated to make the second liquid injection hole **321** staggered from the first liquid injection hole **311**, then the first liquid injection hole **311** is blocked by the annular wall of

the outer ring cover **32**. Thereby the user can inject cigarette liquid without disassembling the inner ring cover **31**, which can make the liquid injection more simple and convenient. In the embodiment, the first liquid injection hole **311** is circumferentially defined on the inner wall of the inner ring cover **31**, the second liquid injection hole **321** is circumferentially defined on the outer ring cover **32**.

[0052] Further, the inner ring cover **31** is provided with a sliding slot **312**. In the embodiment, the sliding slot **312** is located along the edge of the top surface of the inner ring cover **31**. The top end of the inner circumferential surface of the outer ring cover **32** is provided with a protrusion **322**. When the outer ring cover **32** is rotating around the inner ring cover **31**, the protrusion **322** cooperates with the sliding slot **312**, and then the projections **322** can be stopped by the groove walls at both ends of the sliding slot **312**, thereby limiting the rotational travel of the outer ring cover **32**.

[0053] Further, both ends of the outer circumferential surface of the inner ring cover **31** are provided a seal ring groove **313** along the circumferentially of the inner ring cover **31**. The outer circumferential surface of the inner ring cover **31** is provided with sealing grooves **314** disposed along the axial direction of the inner ring cover **31**. The sealing grooves **314** are spaced apart from each other. A sealing member is disposed in the seal ring groove **313** and the sealing groove **314** (not shown). The sealing member may be a silicone ring or the like. The sealing member causes the inner ring cover **31** to closely cooperate with the outer ring cover **32**, to prevent the smoke liquid from flowing out of the gap between the inner ring cover **31** and the outer ring cover **32**. On the other hand, the sealing member increases the frictional force between the outer circumferential surface of the inner ring cover **31** and the inner circumferential surface of the outer ring cover **32** so as to prevent the outer ring cover **32** from rotating arbitrarily with respect to the inner ring cover **31**.

[0054] Specifically, the ventilating assembly **4** includes an atomizing tube **41** and a vent tube **42**, both of which has a hollow structure opens at both ends. One end of the atomizing tube **41** is detachably connected to the open end of the atomizing head sleeve **22**, the opposite end extends into the inner cavity of the inner ring cover **31**. The vent tube **42** is sleeved in the atomizing tube **41**, the outer diameter of the vent tube **42** is smaller than the inner diameter of the atomizing tube **41**. Thus, the inner surface of the atomizing tube **41** and the outer surface of the vent tube **42** define an intake passage **43**, the inner cavity of the vent tube **42** constitutes a smoke outlet passage **44**. The intake passage **43** and the outlet passage **44** are communication with the open end of the atomizing head sleeve **22**. The outside air flows into the open end of the atomizing head sleeve **22** via the intake passage **43**, mixes with the formed smoke, and then flows out of the smoke outlet passage **44**.

[0055] Specifically, the mouthpiece assembly **5** includes a mouthpiece connector **51** and a mouthpiece **52**. The mouthpiece connector **51** includes a cover plate **511**, a connecting board **513**, and a connection pipe **512**. The cover plate **511** and the connection pipe **512** are connected together through the connecting board **513**. The connecting board **513** is located between the cover plate **511** and the connecting tube **512** and is inclined toward the connecting tube **512**. The radial dimension of the cover plate **511**, the connecting board **513** and the connecting tube **512** are gradually reduced so that the mouthpiece connector **51** has a funnel-like structure. A flange **514** extends outwardly from the circumferential side of the cover plate **511**. The flange **514** abuts against one end of the inner ring cover **31** opposite to the liquid storage tube **12**. The cover plate **511** and the connecting tube **512** extend into the cavity of the inner ring cover **31**. A boss **315** is protruded from the inner circumferential surface of the inner ring cover **31**. The cover plate **511** is supported on the boss **315**, the connecting tube **512** is interference-fitted with one end of the atomizing head sleeve **22** opposite to the atomizing tube **41**. The end surface of one end of the cover plate **511** away from the connecting tube **512** is recessed to the bottom surface of the connecting board **513** to form a receiving groove **515**. A central hole **516** is defined in a center of the bottom wall of the receiving groove **515** (i.e., the bottom surface of the connecting board **513**). The bottom wall of the receiving groove **515** defines an air inlet hole **517** surrounding the central hole **516** and is in communication with the air intake passage **43**. The vent tube **42** provides an abutting edge **421** extending outwardly from the circumferential side opposite to one end of the atomizing head sleeve **22**. When one end of the vent tube **42** away from the atomizing head sleeve **22** passes through the center hole **516**, the abutting edge **421** abuts against the lower side of the bottom wall of the receiving groove **515**.

[0056] Referring to FIG. **6**, the mouthpiece **52** includes a sucking section **521**, a connecting section **522**, and a support plate **523**, the sucking section **521** and the support plate **523** are connected by a connecting section **522**.

[0057] The support plate **523** is supported on the upper side of the bottom wall of the receiving groove **515**. The connecting section **522** is sleeved over the outer circumference of the end of the vent tube **42** passing through the center hole **516**. The sucking section **521** is provided with a vent **5211** in communication with the smoke outlet passage **44**.

[0058] Thereby, the outside air flows into the atomizer **100** via the air inlet hole **517** and the intake passage **43** successively, and mixed with smoke at the open end of the atomizing head sleeve **22**, and then flows through the outlet passage **44**, and finally flows out of the sucking section **521** via the vent **5211**.

[0059] Further, in order to facilitate the adjustment of the amount of the intake air, the support plate **523** is provided with an air vent **5231**, the connecting section **522** is circumferentially rotatable around the central axis of the mouthpiece connector **51**. Thereby, the air vent **5231** can be in communication with or be staggered from the air inlet hole **517** to adjust the amount of intake air.

[0060] The heating assembly **23**, the atomizing head **2**, the atomizer **100**, and the electronic cigarette of the present disclosure uses the capillary gap between adjacent heating plates **231** for liquid guiding. Compared with the conventional liquid guiding cotton or glass fiber, there is no odor, and there is no risk that the user inhales the capillary fiber during suction.

[0061] Further, since the heating plate **231** is a metal heating plate. Compared with the existing liquid-conducting ceramics, no residual pore-forming agent is generated during the atomizing process, thereby avoiding the possibility of harm to the human body.

[0062] The cigarette holder assembly **5** has a function of adjusting inlet addition to the function of suction by the user, so that the atomizer **100** and the electronic cigarette including the atomizer **100** do not need to be separately provided

with an adjusting component, which simplifies the structure of the atomizer **100** and reduces production cost.

[0063] The above-mentioned embodiments merely represent several implementations of the present application, and the descriptions thereof are more specific and detailed, but they shall not be understood as a limitation on the scope of the present application. It should be noted that, for those of ordinary skill in the art, variations and improvements may still be made without departing from the concept of the present application, and all of which shall fall into the protection scope of the present application. Therefore, the scope of protection of the present application shall be subject to the appended claims.

What is claimed is:

1. A heating assembly for an electronic cigarette comprising:

two or more laminated heating plates, each heating plate is provided with through hole(s) and/or through groove (s), the gap between the adjacent heating plates is capillary gap, the through hole and/or the through groove of the heating plates are at least partially in communication with the through hole and/or the through groove of the adjacent heating plates.

2. The heating assembly according to claim **1**, wherein the surface roughness Ra of the heating plates is 2.5 μm≤Ra≤40 μm.

3. The heating assembly according to claim **1**, wherein the thickness of the heating plate is 0.1 mm≤d≤3 mm.

4. The heating assembly according to claim **1**, wherein the heating plate is made of metal.

5. The heating assembly according to claim **4**, wherein the heating plate is made of at least one material selected from iron chromium aluminum alloy, nickel chromium alloy, stainless steel, nickel, titanium, iron, copper, and tungsten.

6. The heating assembly according to claim **1**, wherein some of the through holes of the heating plate are capillary through holes, and/or some of the through grooves of the heating plate are capillary through grooves.

7. An atomizing head, for an electronic cigarette, wherein the atomizing head comprises a heating assembly, the heating assembly comprises two or more laminated heating plates, each heating plate is provided with through hole(s) and/or through groove(s), the gap between the adjacent heating plates is capillary gap, the through hole and/or the through groove of the heating plates are at least partially in communication with the through hole and/or the through groove of the adjacent heating plates.

8. The atomizing head according to claim **7**, wherein the surface roughness Ra of the heating plates is 2.5 μm≤Ra≤40 μm.

9. The atomizing head according to claim **7**, wherein the thickness of the heating plate is 0.1 mm≤d≤3 mm.

10. The atomizing head according to claim **7**, wherein the heating plate is made of metal.

11. The atomizing head according to claim **10**, wherein the heating plate is made of at least one material selected from iron chromium aluminum alloy, nickel chromium alloy, stainless steel, nickel, titanium, iron, copper, and tungsten.

12. The atomizing head according to claim **7**, wherein the atomizing head comprises an atomizing head base, an atomizing head sleeve, a heating assembly, an atomizing head electrode contact, and an atomizing head insulating ring; the atomizing head sleeve is a hollow structure opens at both ends, the atomizing head base is sealed and abuts against one end of the atomizing head sleeve, and the other end of the atomizing head sleeve opposite to the atomizing head base is an open end, the upper surface of the atomizing head base and the inner surface of the atomizing head sleeve cooperatively define an atomizing chamber, the heating assembly is received in the atomizing chamber and is supported by the atomizing head base, the atomizing head base is further provided with a receiving hole extending through the two opposite ends of the atomizing head base, the atomizing head electrode contact is housed in the receiving hole, the atomizing head insulating ring is disposed between the atomizing head electrode contact and the receiving hole, the inlet wall of the atomizing head sleeve is provided with a liquid inlet hole.

13. The atomizing head according to claim **12**, wherein the atomizing head further comprises a gland, the gland is disposed on the topmost heating plate, the gland is provided with gland openings, the gland openings are in communication with some of the through holes and/or the through grooves of the topmost heating plate.

14. An atomizer for an electronic cigarette, wherein the atomizer comprises an atomizing head, the atomizing head comprises a heating assembly, the heating assembly comprises two or more laminated heating plates, each heating plate is provided with through hole(s) and/or through groove (s), the gap between the adjacent heating plates is capillary gap, the through hole and/or the through groove of the heating plates are at least partially in communication with the through hole and/or the through groove of the adjacent heating plates.

15. The atomizer according to claim **14**, wherein the surface roughness Ra of the heating plates is 2.5 μm≤Ra≤40 μm.

16. The atomizer according to claim **14**, wherein the thickness of the heating plate is 0.1 mm≤d≤3 mm.

17. The atomizer according to claim **14**, wherein the heating plate is made of metal.

18. The atomizer according to claim **17**, wherein the heating plate is made of at least one material selected from iron chromium aluminum alloy, nickel chromium alloy, stainless steel, nickel, titanium, iron, copper, and tungsten.

19. The atomizer according to claim **14**, wherein the atomizer comprises a liquid storage assembly, an atomizing head, a liquid injection assembly, a ventilation assembly, and a mouthpiece assembly, the liquid storage assembly has a closed end and an open end, the atomizing head is received in the liquid storage assembly, the liquid injection assembly is coupled with the open end of the liquid storage assembly, one end of the ventilation assembly is pass through the liquid injection assembly and is connected to the atomizing head, the ventilation assembly is in communication with the atomizing head.

20. An electronic cigarette, comprising:

an atomizer, the atomizer comprises an atomizing head, wherein the atomizing head comprises a heating assembly, the heating assembly comprises two or more laminated heating plates, each heating plate is provided with through hole(s) and/or through groove(s), the gap between the adjacent heating plates is capillary gap, the through hole and/or the through groove of the heating plates are at least partially in communication with the through hole and/or the through groove of the adjacent heating plates; and

a battery device, the battery device is electrically connected to the atomizer for powering the atomizer.

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