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# (54) ATOMIZER AND ELECTRONIC ATOMIZATION DEVICE

(57) An atomizer (10) and an electronic atomization device (100). The atomizer (10) comprises: an atomization assembly (20) inside which a conveying channel (21) and a microwave resonant cavity (23) are formed, the conveying channel (21) being used for accommodating an aerosol-generating substrate, and at least part of the conveying channel (21) being communicated with the microwave resonant cavity (23) to form an atomization region; and a transmission assembly (40), at least partially extending into the conveying channel (21) and controlled to drive the aerosol-generating substrate to move along the conveying channel (21). The conveying channel (21) is provided with an atomization region, the atomization region is communicated with the microwave resonant cavity (23) and located on a moving path of the aerosol-generating substrate, and the aerosol-generating substrate can be pushed by the transmission assembly (40) to move in the axial direction of the aerosol-generating substrate. In the whole atomization process, the next section of the aerosol-generating substrate that is not atomized is continuously conveyed to the atomization region, the materials and dielectric properties of the aerosol-generating substrate in the atomization region are basically consistent at different time periods, and atomization taste can be kept consistent all the time.

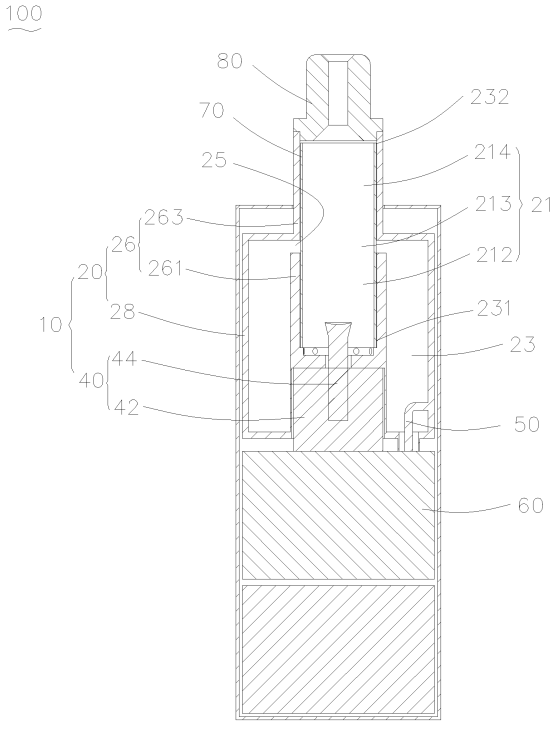


FIG. 1

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## Description

### RELATED APPLICATIONS

**[0001]** The present application claims priority to Chinese patent application No. 202220281366.0, entitled "Atomizer and Electronic Atomization Device" and filed on Feb. 11, 2022, which is hereby incorporated by reference in its entirety.

### TECHNICAL FIELD

**[0002]** The present application relates to the field of atomization technology, in particular to an atomizer and an electronic atomization device.

### BACKGROUND

**[0003]** Aerosol is a colloidal dispersion system formed by dispersing and suspending solid or liquid small particles in a gas medium. Since the aerosol can be inhaled by a human body through respiratory system, a new alternative absorption method is provided for a user, for example, an atomization device, which can bake and heat a herb or paste aerosol generating substrate to generate an aerosol, is applied to different fields to deliver an inhalable aerosol to the user, replacing conventional product forms and absorption methods.

**[0004]** The electronic atomization device generally heats an aerosol generating substrate by means of a resistance heating mode, which, however, needs a relatively long preheating waiting time, and presents disadvantages such as uneven heating, excessive local temperature, and dry burning and coking of the heated pins and blades, and also presents problems such as accumulation of coke and tar on the pins and blades, and inconvenience in cleaning. In recent years, microwave heating is studied as a research direction of heating non-combustion atomization to solve the pain points of the resistance heating mode, however, in the microwave heating, due to the limitation of microwave heating principle, the energy coupling efficiency of the entire aerosol generating substrate in the heating process is low, and taste consistency is poor.

### SUMMARY

**[0005]** Accordingly, it is necessary to provide an atomizer and an electronic atomization device to address the problem of poor taste consistency of microwave heating atomization.

**[0006]** An atomizer includes:

an atomization assembly provided therein with a transport channel and a microwave resonant cavity, wherein the transport channel is configured to accommodate an aerosol generating substrate, and at least a part of the transport channel is in communication with the microwave resonant cavity to form an atomization area; and
a transmission assembly at least partially extending into the transport channel and being configured to controllably drive the aerosol generating substrate to move in the transport channel.

**[0007]** When using the above-mentioned atomizer, the aerosol generating substrate is placed in the transport channel, and then the aerosol generating substrate can be pushed by the transmission assembly to move along the axial direction of the transmission assembly, so that different sections of the aerosol generating substrate can pass through the atomization area successively, and the current section of the aerosol generating substrate is heated and atomized by the microwave transmitted to the atomization area. During use, after the current section of the aerosol generating substrate is atomized and the internal material is changed, a next section, which is next to the current section of the aerosol generating substrate that has been atomized, can be pushed by the transmission assembly to the atomization area for microwave heating atomization. In this way, in the whole atomization process, next sections of the aerosol generating substrate that have not been atomized are transferred to the atomization area continuously, the material and dielectric performance of the aerosol generating substrate in the atomization area are substantially the same in different periods of time, and the performance of the aerosol generating substrate in the atomization area is kept stable, so that the atomization taste is always kept the same, and therefore the atomization performance is improved.

**[0008]** In one embodiment, the transport channel comprises a first end and a second end that are axially opposite to each other, the microwave resonant cavity is spaced apart from the first end and is in communication with the transport channel to form the atomization area;
wherein the transmission assembly is configured to controllably drive the aerosol generating substrate to move in the transport channel in a direction pointing from the first end to the second end.

**[0009]** In one embodiment, the transport channel includes a first transport channel and a second transport channel

that are arranged coaxially, the first transport channel is disposed proximal to the first end, the second transport channel is disposed proximal to the second end, and the microwave resonant cavity is in communication between the first transport channel and the second transport channel to form the atomization area.

**[0010]** In one embodiment, the atomization assembly comprises an inner housing and an outer housing that are sleeved with each other, the transport channel is formed in the inner housing, the outer housing is spaced apart from at least a portion of the inner housing and defines the microwave resonant cavity therebetween;
the inner housing is provided with an opening in communication with the microwave resonant cavity and the transport channel, and an area in the transport channel in communication with the opening in a radial direction thereof is the atomization area.

**[0011]** In one embodiment, the inner housing includes an inner conductor, the outer housing includes an outer conductor, the inner conductor is spaced apart from the outer conductor to form the microwave resonant cavity therebetween, the inner conductor defines an edge of the opening proximal to the first end, and the outer conductor defines an edge of the opening proximal to the second end.

**[0012]** In one embodiment, the inner housing further includes an upper housing proximal to the second end, the upper housing being connected to the outer conductor to cooperatively define an edge of the opening proximal to the second end; wherein the first transport channel is formed inside the inner conductor itself, and the second transport channel is formed inside the upper housing itself.

**[0013]** In one embodiment, the transmission assembly includes a transmission member having one end extending into the transport channel and having a bearing surface configured to support the aerosol generating substrate;
wherein the transmission member can be controlled to lift and fall along the axial direction of the transport channel.

**[0014]** In one embodiment, the atomizer further includes a vent pipe sleeved on an inner wall of the transport channel, the vent pipe shields the opening and allows microwave to penetrate; the vent pipe is configured to receive the aerosol generating substrate, and the transmission assembly at least partially extends into the vent pipe.

**[0015]** In one embodiment, the atomization assembly is a metal piece, and walls of the microwave resonant cavity and the transport channel are made of metal.

**[0016]** In one embodiment, the atomizer further includes a coupling antenna, one end of the coupling antenna being connected to a microwave generator, and the other end of the coupling antenna extending into the microwave resonant cavity to emit microwave.

**[0017]** An electronic atomization device comprises a microwave generator and the above-mentioned atomizer, the microwave generator being configured to emit microwave into the microwave resonant cavity.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0018]** In order to describe the embodiments of the present application or the technical solutions in the conventional technology more clearly, the following will briefly introduce the accompanying drawings required for describing the embodiments or the conventional technology. Obviously, the accompanying drawings in the following description are merely the embodiments of the present application. For those of ordinary skill in the art, other drawings may be obtained according to the disclosed drawings without creative efforts.

FIG 1 is a structural schematic view of an electronic atomization device according to an embodiment of the present application.
FIG 2 shows schematic views illustrating changes of the aerosol generating substrate heated by the electronic atomization device shown in FIG 1.

**[0019]** The reference numerals are as follows:
100. Electronic atomization device; 10. Atomizer; 20. Atomization assembly; 21. Transport channel; 212. First transport channel; 213. Atomization area; 214. Second transport channel; 231. First end; 232. Second end; 23. Microwave resonant cavity; 25. Opening; 26. Inner housing; 261. Inner conductor; 263. Upper housing; 28. Outer housing; 40. Transmission assembly; 42. Driving member; 44. Transmission member; 50. Coupling antenna; 60. Microwave generator; 70. Vent pipe; 80. Suction nozzle; s. Section to be heated; a. Preheating section; b. Atomization heating section; c. Maintenance section; d. Cooling section.

## DETAILED DESCRIPTION OF THE EMBODIMENTS

**[0020]** In order to make the above objects, features and advantages of the present application more obvious and easier to be understood, the specific embodiments of the present application are described in detail below with reference to the accompanying drawings. Many specific details are set forth in the following description to fully demonstrate the present application. However, the present application can be implemented in many other manners different from those

described herein, and a person skilled in the art can make similar improvements without violating the connotation of the present application, so the present application is not limited to the specific embodiments disclosed below.

**[0021]** In the description of the present application, it should be understood that the orientation or position relationships indicated by the terms "center", "longitudinal", "transverse", "length", "width", "thickness", "upper", "lower", "front", "rear", "left", "right", "vertical", "horizontal", "top", "bottom", "inner", "outer", "clockwise", "counterclockwise", "axial", "radial", "circumferential" and the like are based on the orientation or position relationships shown in the accompanying drawings, and are only for the convenience of description of the present application and for simplifying the description, rather than indicating or implying that the device or element referred to must have a specific orientation, or be constructed and operated in a specific orientation, and therefore cannot be understood as a limitation of the present application.

**[0022]** In addition, the terms "first", "second", are only used for the purpose of description, and cannot be understood as indicating or implying relative importance or implying the number of the indicated technical feature. Hence, a technical feature defined with "first", "second" can indicate or imply that it includes at least one of the features. In the description of the present application, "multiple" means at least two, for example, two, three, etc., unless otherwise specifically defined.

**[0023]** In the present application, unless otherwise expressly specified and limited, the terms "installation", "connect", "connection", "fixation" and the like shall be understood in a broad sense, for example, it may be fixed connection, removable connection, or be integral; it may be a mechanical connection or an electrical connection; it may be connected directly or indirectly via an intermediate medium, or it may be internal communication of two elements or interaction of two elements, unless otherwise expressly defined. For those of ordinary skill in the art, the specific meaning of the above term in the present application can be understood according to the specific situation.

**[0024]** In the present application, unless otherwise expressly defined, a first feature being "on" or "under" a second feature may mean the first feature directly contacting the second feature, or the first feature indirectly contact the second feature via an intermediate medium. And a first feature being "over", "above" the second feature may mean the first feature being directly above or obliquely above the second feature, or merely indicate that the first feature has a higher horizontal height than the second feature. And a first feature being "under", "below" the second feature may mean the first feature is directly below or obliquely below the second feature, or merely indicates that the horizontal height of the first feature is less than the second feature.

**[0025]** It should be noted that when an element is referred to as "fixed" or "disposed" on another element, the former element may be directly on the other element or there may be an intermediate element therebetween. When an element is considered to be "connected" to another element, it may be directly connected to another element or it may be possible to have an intermediate element at the same time. The terms "vertical", "horizontal", "up", "down", "left", "right" and similar expressions used herein are for illustrative purposes only and are not intended to be the only embodiments.

**[0026]** As described in the background technology, the resistance heating mode is that the resistance element is heated by an external power source, and then the heated resistance element transfers the heat to the aerosol generating substrate by heat conduction. Therefore, the conventional resistance heating mode has the following disadvantages: 1. The temperature of the local position of the aerosol generating substrate in contact with the heating element is relatively high, while other positions the cannot be quickly receive the heat, there is a certain temperature gradient, the heating is uneven, and the smoking taste is affected. 2. In the smoking process, the heating element is heated up continuously, so there is a potential safety risk, and it also tends to cause high temperature decomposition which produces harmful substances. 3. It belongs to contact heating, and the aerosol generating substrate is in contact with the heating element for a long time, which is prone to carbon deposition and pasty smell, and is extremely inconvenient for cleaning. 4. Since it belongs to conductive heating, a large temperature difference between the heating element and the aerosol generating substrate to be heated is required to shorten the preheating time, resulting in high temperature, high heat insulation cost and long cooling time of the electronic atomization device 100. 5. Most heating elements are pin or blade shaped, and the removal of aerosol generating substrate is not convenient.

**[0027]** As radiant heating, microwave heating does not require heat transfer from the heating element, and the above resistance heating deficiencies can be solved. However, in the related microwave heating atomization mode, the entire aerosol generating substrate is placed in the microwave environment for overall heating. Since the aerosol generating substrate needs to maintain about 12 times of suction volume, the smoke composition released by the smoke bomb in each time stage during the entire heating process is greatly different, which will further affect the consistency of the taste.

**[0028]** Specifically, according to the principle of microwave heating, the absorbing ability (dielectric constant) of the material is affected by temperature and composition. During the suction process, the temperature of the aerosol generating substrate is increased from the normal temperature to above 300 °C; the mass of the aerosol generating substrate is reduced by about 40% after atomization of the volatile fractions, and the plant fibers are carbonized. In the whole process, the dielectric properties of the aerosol generating substrate change dramatically, and the microwave energy cannot always act on the aerosol generating substrate of the same material and dielectric properties, the microwave energy loading cannot always match the impedance, and the resonant frequency for heating the resonant cavity cannot be maintained at the frequency of the microwave emission source. That is to say, the microwave coupling efficiency cannot be maintained to a high state all the time, resulting in different taste in each of time periods with different atomization

quantities; and the microwave emission source has a relatively large configuration power and a relatively low efficiency.

**[0029]** In addition, in the microwave electromagnetic field environment, the temperature sensor is highly susceptible to electromagnetic interference. While the dynamic change of the microwave energy coupling efficiency in the heating process is different from the use of different users, that is, closely related to the using habit of a user when using the electronic atomization device 100, which makes it extremely difficult to control the atomization temperature using a fixed power output curve.

**[0030]** Based on the above research and development background, the object of the present application is to provide an electronic atomization device 100 in view of the above problems in the prior art. The device uses microwave to heat and atomize an aerosol generating substrate, which can continuously and uniformly heat the aerosol generating substrate by microwave while avoiding the problems of uneven heating and harmful substances caused by excessive temperature of deposited carbon on the heated pin/blade when using resistance heating, to maximize the microwave heating efficiency and realize rapid atomization, so as to ensure the consistency of atomization taste and improve the suction feelings of consumers.

**[0031]** Referring to FIG 1 and FIG 2, an electronic atomization device 100 is provided in an embodiment. The device 100 includes an atomizer 10 and a microwave generator 60. The atomizer 10 includes an atomization assembly 20 and a transmission assembly 40, and a transport channel 21 and a microwave resonant cavity 23 are formed inside the atomization assembly 20. The transport channel 21 is configured to accommodate an aerosol generating substrate. At least a part of the transport channel 21 is in communication with the microwave resonant cavity 23 to form an atomization area 213. The transmission assembly 40 at least partially extends into the transport channel 21 and is configured to controllably drive the aerosol generating substrate to move along the transport channel 21. That is, an atomization area 213 is formed in an area of the transport channel 21 in communication with the microwave resonant cavity 23, such that microwaves generated in the microwave resonant cavity 23 can be transferred to the atomization area 213 of the transmission channel 21. That is, the microwave resonant cavity 23 is formed in the atomization assembly 20, the microwave generator 60 is configured to emit microwave into the microwave resonant cavity 23, so as to form a coaxial resonant cavity for electromagnetic oscillation in the microwave resonant cavity 23, and the microwave resonant cavity 23 is in communication with the atomization area 213 of the transport channel 21, so that the microwave in the microwave resonant cavity 23 can be transmitted to the atomization area 213.

**[0032]** In this way, the atomization area 213 in the transport channel 21 is located in a movement path of the aerosol generating substrate. When using the electronic atomization device 100, the aerosol generating substrate is placed in the transport channel 21, and the aerosol generating substrate can be pushed by the transmission assembly 40 to move along the axial direction of the transmission assembly 40, so that different sections of the aerosol generating substrate pass through the atomization area 213 successively, and the current section of the aerosol generating substrate is heated and atomized by microwaves conducted to the atomization area 213. During use, after the current section of the aerosol generating substrate is atomized and the internal material thereof changes, the next section of the aerosol generating substrate can be pushed by the transmission assembly to the atomization area 213 for microwave heating atomization. In this way, in the whole atomization process, next sections in which the aerosol generating substrate is not atomized is continuously transferred to the atomization area 213, the materials and dielectric properties of the aerosol generating substrate in the atomization area 213 are substantially the same in different time periods, and the performance of the aerosol generating substrate in the atomization area 213 is kept stable, so that the atomization taste is always kept the same, and therefore the atomization performance is improved.

**[0033]** Optionally, the atomization area 213 in the transport channel 21 is in communication with the microwave resonant cavity 23 at a position where the electric field is strongest, so that the microwave having relatively large electric field intensity in the microwave resonant cavity 213 is transmitted to the atomization area 213, and the aerosol generating substrate at the atomization area 213 is heated by the high-strength time-varying electric field.

**[0034]** In some embodiments, the atomizer 10 further includes a coupling antenna 50. One end of the coupling antenna 50 is connected to the microwave generator 60, and the other end of the coupling antenna 50 extends into the microwave resonant cavity 23 to emit microwaves, such that the microwaves generated by the microwave generator 60 is transmitted into the microwave cavity 23 by the coupling antenna 50. Optionally, the coupling antenna 50 is suspended in the microwave generating cavity, or connected to the cavity wall of the microwave resonant cavity 23, and specific forms may be configured according to the actual requirements.

**[0035]** Referring to FIG 2, in some embodiments, the transport channel 21 comprises a first end 231 and a second end 232 that are arranged axially opposite to each other. The microwave resonant cavity 23 is spaced apart from the first end 231 and is in communication with the transport channel 21, thereby forming an atomization area 213. The transmission assembly 40 is configured to controllably drive the aerosol generating substrate to move in the transport channel 21 along a direction pointing from the first end 231 to the second end 232. That is to say, the atomization area 213 in the transport channel 21 in communication with the microwave resonant cavity 23 is spaced apart from the first end 231 by a distance, so that when the transmission assembly 40 drives the aerosol generating substrate to move along the direction from the first end 231 to the second end 232, different sections of the aerosol generating substrate

sequentially moves from the first end 231 to the atomization area 213 spaced apart from the first end 231 by a distance, and the different sections of the aerosol generating substrate are heated and atomized in the atomization area 213.

**[0036]** Optionally, the electric field strength in the microwave resonant cavity 23 is gradually increased along the direction pointing from the first end 231 to the second end 232, that is, the electric field strength reaches the maximum at a side of the microwave resonant cavity 23 proximal to the second end 232, and the side of the microwave resonant cavity 23 proximal to the second end 232 is the position where the electric field strength is strongest. It can be understood that a resonant cavity for electromagnetic oscillation is formed in the microwave resonant cavity 23. Specifically, the resonant cavity is a coaxial resonant cavity, a capacitance-loaded resonant cavity or a loaded cylindrical cavity or the like. The microwave energy injected into the microwave resonant cavity 23 concentrates a high-strength time-varying electric field at the atomization area 213, so as to provide an energy point for microwave heating atomization. The transmission assembly 40 is configured to controllably drive the aerosol generating substrate to move in the transport channel 21 along the direction pointing from the first end 231 to the second end 232, so that the moving direction of the aerosol generating substrate is consistent with the direction that the electric field strength changes from weak to strong in the microwave cavity 23. In this way, different sections of the aerosol generating substrate can be gradually pushed into the atomization area 213 with strong electric field strength, so as to gradually and uniformly heat and atomize the aerosol generating substrate.

**[0037]** Referring to FIG 2, it can be understood that during the heating operation, the strip-shaped aerosol generating substrate can be divided into a to-be-heated section s, a preheating section a, an atomization heating section b, a maintaining section c and a cooling section d. The maintaining section c and the preheating section a are located on both sides of the atomization heating section b respectively, and the cooling section d is located on a side of the maintaining section c away from the atomization heating section b. In this way, for the heating atomization system, new atomization heating sections b are always transferred to the atomization area 213, and the microwave atomization system is always in a steady state.

**[0038]** Further, the atomization assembly 20 is a metal piece, and the cavity walls of the microwave resonant cavity 23 and the transport channel 21 are made of metal. In this way, the cavity wall of the microwave resonant cavity 23 is made of a metal material, so as to form a resonant cavity for electromagnetic oscillation in the microwave resonant cavity 23. Specifically, the resonant cavity is a coaxial resonant cavity, a capacitance-loaded resonant cavity or a loaded cylindrical cavity or the like. The microwave energy injected into the microwave resonant cavity is concentrated in a high-strength time-varying electric field at the atomization area 213 to provide an energy point for microwave heating and atomization. In addition, the cavity wall of the transport channel is made of a metal material, which cuts off the microwave frequency of the disposed microwave generator 60, so that the microwave energy is attenuated in a geometric multiple in the transport channel 21 along the direction away from the atomization area 213, that is, the farther the microwave energy from the atomization area 213, the weaker the microwave energy, and therefore, the microwave energy is concentrated in the atomization area 213 to conduct a small-range heating atomization, thereby achieving the purpose of keeping the taste uniform.

**[0039]** Specifically, the microwave transmission is cut off in the cartridge transport channel 21, and the energy attenuation is very rapid; if the diameter of the transport channel 21 is d (mm), according to the transmission theory of microwave circular waveguide, the attenuation coefficient a (dB/m) of microwave energy in the transmission channel 21 is:

$$\alpha=8.69\times 2\pi\sqrt{\frac{1}{\lambda_c^2}-\frac{1}{\lambda_0^2}} \qquad (1)$$

**[0040]** Where $\alpha$ (dB/m) is the attenuation coefficient of the microwave in the circular waveguide; $\lambda 0$ (m) is the wavelength of the heating microwave; $\lambda c$ (m) is the cut-off wavelength of different modes in the circular waveguide.

**[0041]** For a circular waveguide of radius R,

$$\lambda c=3.41*d/2 \qquad (2)$$

**[0042]** Where the minimum root value of the Bessel function of the circular waveguide transmission main mode TE11 is 2.62. When the diameter of the adapted aerosol generating substrate is 7 mm, and the aperture of the inserted shield section (i.e. the transport channel 21) of the microwave resonant cavity 23 is designed to be d=8 mm, then $\lambda c$= 13.64 mm.

**[0043]** When the microwave frequency in the heating chamber is 2.45 G, the formula (1) is substituted to obtain $\alpha\approx 4$ dB/mm, that is, the microwave energy attenuation is 4 dB for every 1 mm of the shield section waveguide.

**[0044]** The common heating frequencies and aperture diameters required for HNB cigarettes are brought into the formulae (1) and (2) to calculate as follows:

| Frequency (MHz) | d (mm) | $\alpha$ (dB/mm) | Away from the atomization area 213, microwave energy attenuation per millimeter |
|---|---|---|---|
| 915 | 6 | 5.3 | 70.4% |
| 2450 | 6 | 5.3 | 70.4% |
| 5800 | 6 | 5.2 | 70% |
| 915 | 8 | 4.0 | 60.2% |
| 2450 | 8 | 4.0 | 60.2% |
| 5800 | 8 | 3.9 | 60% |

**[0045]** Thus, it can be seen that the energy decays 60%-70% for every 1 mm away from the atomization area 213, and the energy at 2 mm away from the atomization area 213 is less than 1/10 of that at the atomization area 213, so that only a portion of the aerosol generating substrate in the transport channel 21 that is positioned in the atomization area 213 is heated and atomized, thereby achieving the above-mentioned purpose of keeping the taste consistent.

**[0046]** Further, the electronic atomization device 100 automatically controls the transmission speed and the microwave power of the transmission assembly 40 according to factors such as the number of suction times, the interval length and the temperature, so that the microwave power matches and couples with the current section of the aerosol generating substrate in the atomization area 213, high electromagnetic coupling efficiency is maintained, and consistency of the taste is automatically ensured.

**[0047]** Referring to FIG 1, in some embodiments, the transport channel 21 includes a first transport channel 212 and a second transport channel 214 that are coaxially arranged. The first transport channel 212 is proximal to the first end 231, the second transport channel 214 is proximal to the second end 232, and a microwave resonant cavity 23 is in communication between the first transport channel 212 and the second transport channel 214 to form the atomization area 213. That is, the transport channel 21 includes a first transport channel 212 and a second transport channel 214 that are provided on axially opposite sides of the atomization area 213, and the atomization area 213 is located between the first transport channel 212 and the second transport channel 214, so that the aerosol generating substrate in the transport channel 21 is pushed by the transmission assembly 40 to move from the first transport channel 212 to the second transport channel 214, so as to allow each section of the aerosol generating substrate to move axially through the atomization area 213 and provide sufficient movement space for the aerosol generating substrate.

**[0048]** In addition, the microwave resonant cavity 23 is arranged around the outer periphery of the first transport channel 212 and the atomization area 213, so as to generate microwave energy that can be transmitted to the atomization area 213. The second transport channel 214 protrudes out of the microwave resonant cavity 23 to accommodate the cooling section d formed after the aerosol generating substrate is heated and atomized in the second transport channel 214.

**[0049]** Further, as shown in FIG 1, the atomization assembly 20 further includes an inner housing 26 and an outer housing 28 which are sleeved with each other. A transport channel 21 is formed inside the inner housing 26. The outer housing 28 and at least a portion of the inner housing 26 are spaced apart from each other and define the microwave cavity 23 therebetween. In this way, the transport channel 21 and the microwave resonant cavity 23 are formed by the enclosing of the inner housing 26 and the outer housing 28, so as to heat and atomize the aerosol generating substrate in the transport channel 21.

**[0050]** In addition, an opening 25 is provided on the inner housing 26, and the opening 25 is in communication with the microwave resonant cavity 23 and the transport channel 21. An area in the transport channel 21 that is in communication with the opening 25 along the radial direction of the transport channel 21 is the atomization area 213, that is, an area in the transport channel 21 that is radially and correspondingly in communication with the opening 25 is constructed to form the atomization area 213. The high-strength time-varying electric field in the microwave resonant cavity 23 can act on the atomization area 213 through the opening 25, and thus conduct microwave heating and atomization on the aerosol generating substrate in the atomization area 213. In this way, when different sections of the aerosol generating substrate continuously pass through the atomization area 213 under the action of the transmission assembly 40, the smoking can be achieved immediately start and stop due to the following reasons: the atomization area 213 has a high field strength and a narrow region, the amount of the aerosol generating substrate heated in a unit time is small, the temperature is increased quickly, the preheating time is short, and the switching inertia is small. In addition, the aerosol generating substrate can be pushed out by the transmission assembly 40 after the atomization of the entire aerosol generating substrate is completed, thereby facilitating the removal of the aerosol generating substrate.

**[0051]** Further, in some embodiments, the opening 25 is annular, and the atomization area 213 is sleeved in the

opening 25, so that the annular space formed inside the opening 25 itself is constructed to form the atomization area 213. Microwave energy can be efficiently transmitted to the atomization area 213 through the opening 25.

**[0052]** In some embodiments, the inner housing 26 includes an inner conductor 261, and the outer housing 28 includes an outer conductor. The inner conductor 261 is spaced apart from the outer conductor to form the microwave resonant cavity 23. The inner conductor 261 defines an edge of the opening 25 proximal to the first end 231, and the outer conductor defines an edge of the opening 25 proximal to the second end 232. In this way, the microwave resonant cavity 23 and the opening 25 are formed by the cooperation of the inner conductor 261 and the outer conductor, so as to atomize and heat the local area of the aerosol generating substrate through the opening 25 using the energy at the strongest electric field in the resonant cavity.

**[0053]** Further, in some embodiments, the inner housing 26 further includes an upper housing 263 proximal to the second end 232. The upper housing 263 is connected to the outer conductor, so as to cooperatively define an edge of the opening 25 proximal to the second end 232. Moreover, the inner conductor 261 itself forms the first transport channel 212 therein, and the upper housing 263 itself forms the second transport channel 214 therein. In this way, the upper housing 263 connected to the outer conductor is provided above the inner conductor 261 so that the upper housing 263 is positioned at the top end of the inner conductor 261, and the transport channel 21 including the first transport channel 212 and the second transport channel 214 is formed by the inner conductor 261 and the upper housing 263 in combination. In addition, the opening 25 is defined between the inner conductor 261 and the connection position of the upper housing 263 and the outer conductor, so that the microwave resonant cavity 23 between the outer conductor and the inner conductor 261 is in communication with the transport channel 21 in the inner housing 26.

**[0054]** Further, in some embodiments, an accommodation cavity is also provided in the inner conductor 261. The accommodation cavity is located on the side of the first transport channel 212 away from the second transport channel 214 and serves to receive at least a portion of the transmission assembly 40. As such, the transmission assembly 40 is located at the bottom of the first transport channel 212, and can constantly push the aerosol generating substrate in the first transport channel 212 to the second transport channel 214 at the top. In addition, the opening 25 is provided at an end of the inner conductor 261 away from the accommodation cavity, equivalent to being provided at the top of the inner conductor 261, that is, the opening 25 is provided at the top of a microwave reinforcing cavity positioned around the outer periphery of the inner conductor 261, where the electric field strength is the strongest in the resonant cavity, so as to effectively use the microwave energy for atomization heating.

**[0055]** In some embodiments, the transmission assembly 40 includes a transmission member 44. One end of the transmission member 44 extends into the transport channel 21 and has a bearing surface configured to support the aerosol generating substrate. The transmission member 44 is able to be controlled to lift and fall along the axial direction of the transport channel 21, thereby pushing the aerosol generating substrate to move along the axial direction of the transport channel 21.

**[0056]** Further, the transmission assembly 40 further includes a driving member 42. The driving member 42 is provided outside the transport channel 21. One end of the transmission member 44 is connected to the output end of the driving member 42, and the other end of the transmission member 44 extends telescopically into the transport channel 21. The driving member 42 is configured to drive the transmission member 44 to lift and fall in the axial direction of the transport channel 21, thus providing a drive force for the transmission member 44. Specifically, the driving member 42 is provided in the accommodation cavity of the inner conductor 261.

**[0057]** In some embodiments, the atomizer 10 further includes a vent pipe 70 sleeved on the inner wall of the transport channel 21. The vent pipe 70 shields the opening 25 and allows microwave to penetrate. The vent pipe 70 is configured to accommodate the aerosol generating substrate. The transmission assembly 40 extends at least partially into the vent pipe 70, so that the vent pipe 70 is sleeved outside the aerosol generating substrate. The generated atomization aerosol is accumulated by the vent pipe 70, thus preventing the atomization aerosol from flowing to other regions through the opening 25. Meanwhile, the vent pipe 70 is configured to allow microwave to penetrate without affecting microwave heating in the atomization area 213.

**[0058]** Further, the atomizer 10 further includes a mouthpiece 80 which is sleeved on the atomization assembly 20 and is in communication with the transport channel 21. The atomization aerosol generated in the transport channel 21 may enter the mouthpiece 80 for the user to inhale. Optionally, the mouthpiece 80 is in communication with the interior of the vent pipe 70, so as to allow the atomization aerosol in the vent pipe 70 to be inhaled by the user.

**[0059]** In an embodiment of the present application, an atomizer 10 is further provided. The atomizer 10 includes an atomization assembly 20 and a transmission assembly 40. A transport channel 21 and a microwave resonant cavity 23 are formed inside the atomizing unit 20. The microwave resonant cavity 23 is provided around at least part of the outer periphery of the transport channel 21. The transmission assembly 40 at least partially extends into the transport channel 21 and is configured to controllably drive the aerosol generating substrate to move in the transport channel 21 along the axial direction of the transmission assembly 40. The transport channel 21 has an atomization area 213, and the atomization area 213 is correspondingly in communication with a region in the microwave resonant cavity 23 where the electric field strength is strongest. That is to say, the microwave resonant cavity 23 is formed in the atomization assembly 20. A

microwave generator 60 is configured to emit microwave into the microwave resonant cavity 23, so as to form a coaxial resonant cavity for electromagnetic oscillation in the microwave resonant cavity 23, and the region in the microwave resonant cavity 23 where the electric field strength is strongest is in communication with the atomization area 213 of the transport channel 213, so that the microwaves with relatively large electric field strength in the microwave resonant cavity 23 are transmitted to the atomization area 213.

**[0060]** In addition, the atomization area 213 is located on a movement path of the aerosol generating substrate. When the electronic atomization device 100 is in use, the aerosol generating substrate is placed in the transport channel 21, and the aerosol generating substrate can be pushed by the transmission assembly 40 to move along the axial direction of the transmission assembly 40, so that different sections of the aerosol generating substrate can pass through the atomization area 213 successively, thereby heating and atomizing the current section of the aerosol generating substrate by the high-strength time-varying electric field conducted to the atomization area 213. During use, after the current section of the aerosol generating substrate is atomized and the internal material is changed, the aerosol generating substrate is pushed by the transmission assembly 40 to move along the axial direction of the transmission assembly 40, such that a next section, which is next to the atomized current stage, is moved to the atomization area 213 for microwave heating atomization. Thus, throughout the atomization process, next sections of the aerosol generating substrate that have not yet be atomized is continuously transferred to the atomization area 213, the materials and dielectric properties of the aerosol generating substrate in the atomization area 213 are substantially the same in different periods of time, and the performance of the aerosol generating substrate in the atomization area 213 remains stable, so that the atomization taste is always the same, and the atomization performance is improved.

**[0061]** The technical features of the above-described embodiments may be arbitrarily combined. For the sake of brevity, all possible combinations of the technical features in the above-described embodiments are not described. However, as long as there is no contradiction between the combinations of these technical features, those combinations should be considered as belong to the scope of this specification.

**[0062]** The above-described embodiments only express several embodiments of the present application, and the description thereof is more specific and detailed, but cannot be understood as a limitation to the scope of the patent. It should be noted that, for those of ordinary skill in the art, several modifications and improvements may be made without departing from the concept of the present application, which are within the protection scope of the present application. Therefore, the scope of protection of this patent application shall be subject to the appended claims.

## Claims

1. An atomizer, comprising:

   an atomization assembly provided therein with a transport channel and a microwave resonant cavity, wherein the transport channel is configured to accommodate an aerosol generating substrate, and at least a part of the transport channel is in communication with the microwave resonant cavity to form an atomization area; and
   a transmission assembly at least partially extending into the transport channel and being configured to controllably drive the aerosol generating substrate to move in the transport channel.

2. The atomizer of claim 1, wherein the transport channel comprises a first end and a second end that are axially opposite to each other, the microwave resonant cavity is spaced apart from the first end and is in communication with the transport channel to form the atomization area;
   wherein the transmission assembly is configured to controllably drive the aerosol generating substrate to move in the transport channel in a direction pointing from the first end to the second end.

3. The atomizer of claim 2, wherein the transport channel comprises a first transport channel and a second transport channel that are arranged coaxially, the first transport channel is disposed proximal to the first end, the second transport channel is disposed proximal to the second end, and the microwave resonant cavity is in communication between the first transport channel and the second transport channel to form the atomization area.

4. The atomizer of claim 3, wherein the atomization assembly comprises an inner housing and an outer housing that are sleeved with each other, the transport channel is formed in the inner housing, the outer housing is spaced apart from at least a portion of the inner housing and defines the microwave resonant cavity therebetween;
   wherein the inner housing is provided with an opening in communication with the microwave resonant cavity and the transport channel, and an area in the transport channel in communication with the opening in a radial direction thereof is the atomization area.

5. The atomizer of claim 4, wherein the inner housing comprises an inner conductor, the outer housing comprises an outer conductor, the inner conductor is spaced apart from the outer conductor to form the microwave resonant cavity, the inner conductor defines an edge of the opening proximal to the first end, and the outer conductor defines an edge of the opening proximal to the second end.

6. The atomizer of claim 5, wherein the inner housing further comprises an upper housing proximal to the second end, the upper housing is connected to the outer conductor to cooperatively define an edge of the opening proximal to the second end;
wherein the first transport channel is formed inside the inner conductor itself, and the second transport channel is formed inside the upper housing itself.

7. The atomizer of any one of claims 1 to 6, wherein the transmission assembly comprises a transmission member having one end extending into the transport channel and having a bearing surface configured to support the aerosol generating substrate; wherein the transmission member is controlled to lift and fall along an axial direction of the transport channel.

8. The atomizer of any one of claims 4 to 6, further comprising a vent pipe sleeved on an inner wall of the transport channel, the vent pipe shielding the opening and allowing microwave to penetrate; wherein the vent pipe is configured to receive the aerosol generating substrate, and the transmission assembly at least partially extends into the vent pipe.

9. The atomizer of any one of claims 1 to 6, wherein the atomization assembly is a metal piece, and walls of the microwave resonant cavity and the transport channel are made of metal.

10. The atomizer of any one of claims 1 to 6, further comprising a coupling antenna, one end of the coupling antenna being connected to a microwave generator, and the other end of the coupling antenna extending into the microwave resonant cavity to emit microwave.

11. An electronic atomization device, comprising a microwave generator and the atomizer according to any one of claims 1 to 10, the microwave generator being configured to emit microwave into the microwave resonant cavity.

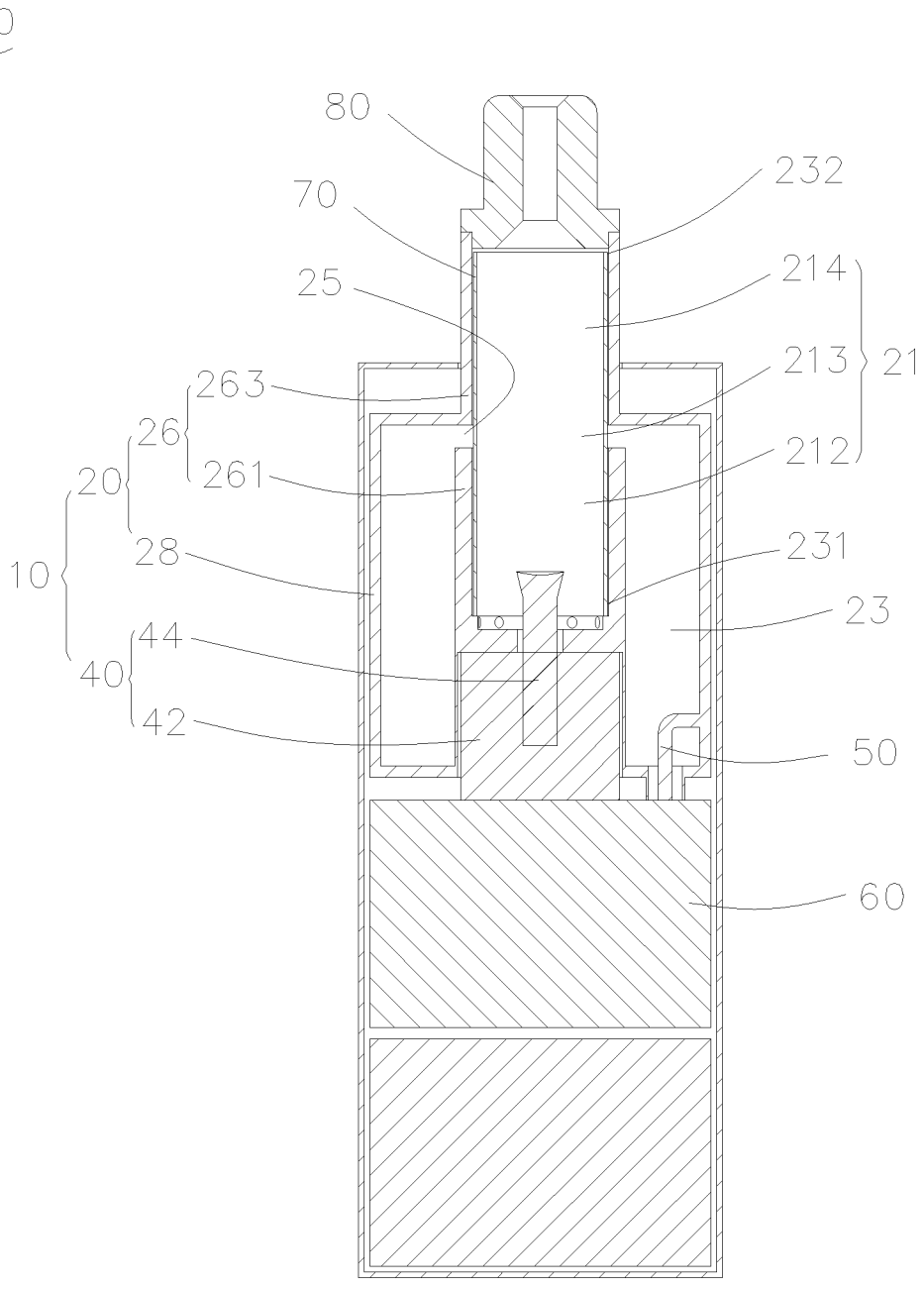
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FIG. 1

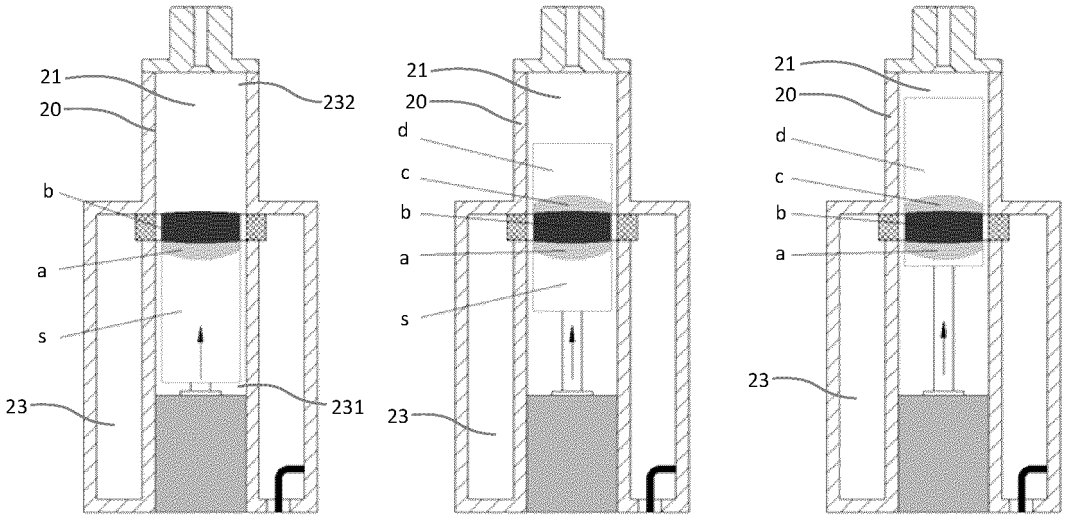


FIG. 2

**INTERNATIONAL SEARCH REPORT**

International application No.
**PCT/CN2022/131240**

**A. CLASSIFICATION OF SUBJECT MATTER**

A24F 40/46(2020.01)i;A24F 40/40(2020.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC: A24F 47/-; A24F 40/-; A61M 11/-; A61M 15/-

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CNKI, CNTXT, ENTXTC, VEN: 电子烟, 气溶胶, 雾化, 加热, 微波, 谐振, 移动, 运动, electrical, electronic, cigar+, smoking, tobacco, atomiz+, heat+, microwave, resonant, mov+

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

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* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"D" document cited by the applicant in the international application
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

| Date of the actual completion of the international search | Date of mailing of the international search report |
|---|---|
| **31 January 2023** | **07 February 2023** |
| Name and mailing address of the ISA/CN<br>**China National Intellectual Property Administration (ISA/CN)**<br>**China No. 6, Xitucheng Road, Jimenqiao, Haidian District, Beijing 100088**<br>Facsimile No. **(86-10)62019451** | Authorized officer<br>Telephone No. |

Form PCT/ISA/210 (second sheet) (July 2022)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2022/131240

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**Information on patent family members**

International application No.
**PCT/CN2022/131240**

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