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CARTOMIZER WITH ROTATING PARTS FOR AN AEROSOL GENERATION DEVICE

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A cartomizer (1) equips an aerosol generation device (3) and comprises :

- a first part (4) comprising a reservoir (7) storing an aerosol-forming precursor,
- a second part (5) comprising a heating chamber (8) configured for heating the aerosol-forming precursor to generate an aerosol, and rotatable relative to the first part (4) between closed and open positions,
- at least one fluid path (6-1, 6-2) defined between the reservoir (7) and heating chamber (8) and comprising an outlet (15) either facing an inlet (16) in the open position to allow the aerosol-forming precursor to reach the heating chamber (8), or offset from the inlet (16) in the closed position to prevent the aerosol-forming precursor to reach the heating chamber (8),
- a valve (17-1, 17-2) arranged in each fluid path (6-1, 6-2) and being opened in the open position and closed in the closed position.

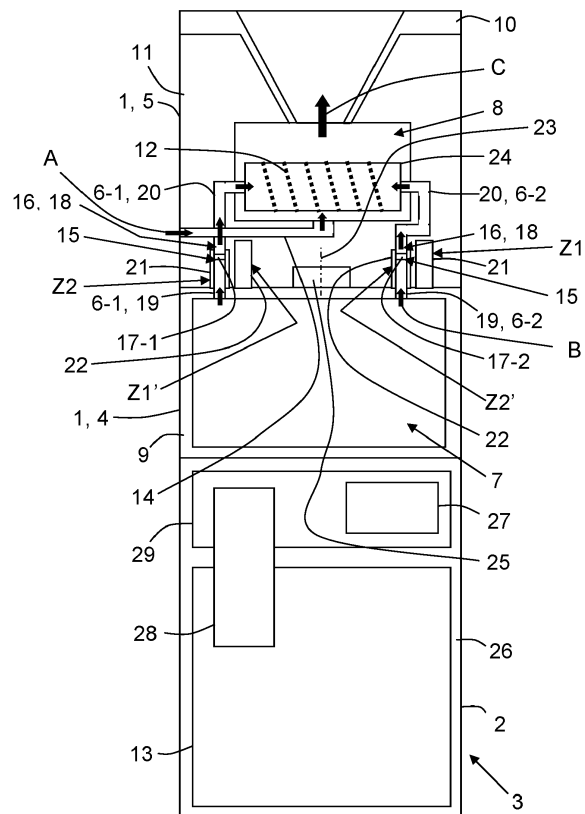


FIG.2

Description

Field of the invention

[0001] The present invention relates to an aerosol generation device, and more precisely to a cartomizer intended for equipping an aerosol generation device.

Background

[0002] Some aerosol generation devices comprise a cartomizer mechanically and electrically coupled to an electrical and control device comprising a power source, possibly a rechargeable battery.

[0003] A cartomizer is generally a consumable formed as an exchangeable assembly of a cartridge (or capsule) containing aerosol-forming precursor and an atomizing device arranged for heating aerosol-forming precursor to generate an aerosol in a heating (or atomization) chamber fluidly coupled to a mouthpiece. When the user sucks on the mouthpiece during a vaping session, the aerosol generated in the heating chamber of the atomization device reaches the mouthpiece, which allows the user to inhale the aerosol.

[0004] The heating of the aerosol-forming precursor is carried out by conduction, convection and/or radiation by a heating device of the atomization device, which is possibly housed inside the heating chamber. Such a heating device may comprise one or more electrically activated resistive and/or inductive heating elements.

[0005] The aerosol generation device may be portable, i.e. usable when held by a user. Moreover the aerosol generation device may be adapted to generate a variable amount of aerosol, e.g. by activating the heating device partially or totally possibly for a variable amount of time (as opposed to a metered dose of aerosol). In this case the variable amount of aerosol can be controlled by the controller and an inhalation sensor and possibly by user's input(s) on the user interface. The inhalation sensor may be sensitive to the strength of inhalation as well as the duration of inhalation to enable a variable amount of vapor to be provided (so as to mimic the effect of smoking a conventional combustible smoking article such as a cigarette, cigar or pipe). Generally, the inhalation sensor is a flow or pressure sensor or microphone positioned in the air flow path in the aerosol generation device. The aerosol generation device may also include a temperature regulation control to drive the temperature of the heating device and/or the heated aerosol-forming precursor to a specified target temperature and thereafter to maintain the temperature at the target temperature that enables an efficient generation of aerosol.

[0006] In the following description the term "aerosol" may include a suspension of precursor as one or more of solid particles, liquid droplets and gas. Such a suspension may be in a gas including air. Aerosol herein may generally refer to, or include, a vapor, and may include one or more components of the precursor.

[0007] Also in the following description the term "aerosol-forming precursor" (or "precursor", or "aerosol-forming substance", or else "substance") may refer to a fluid. The precursor may be processable by the heating device of the cartomizer to form an aerosol, and may comprise components such as one or more nicotinoids, one or more cannabinoids, or caffeine. A component may be carried by a carrier, which may be an aerosolizable liquid comprising aerosol former such as propylene glycol, glycerol for instance, water and oil such as terpene. A flavoring may also be present in the aerosol-forming precursor. The flavoring may include Ethylvanillin (vanilla), menthol, Isoamyl acetate (banana oil) or similar, for instance.

[0008] The invention concerns the cartomizers comprising :

- a first part comprising a reservoir storing an aerosol-forming precursor,
- a second part comprising a heating chamber configured, when it is fed with air and aerosol-forming precursor, for heating the latter to generate an aerosol, and rotatable relative to this first part between closed and open positions, and
- at least one fluid path defined between the reservoir and heating chamber and comprising an outlet and an inlet located in the second part, this outlet facing this inlet in the open position to allow the aerosol-forming precursor to leave the reservoir to reach the heating chamber, and this outlet being offset from this inlet in the closed position to prevent the aerosol-forming precursor to reach the heating chamber.

[0009] This type of cartomizer, in which the user manually rotates the second part relative to the first part to cause a transition between the closed and open positions, is notably described in the patent documents US 2020/0022415 A1 and US 2020/0146351 A1.

[0010] In the above mentioned patent documents, the fluid path outlet is a first through-hole defined in a first cylindrical wall of the reservoir and the fluid path inlet is a second through-hole defined in a second cylindrical wall of the heating (or atomization) chamber which is rotatable relative to the first cylindrical wall. When the cartomizer is in its closed position, there is a mismatch between the first and second through-holes, and a predefined rotation of the heating chamber relative to the reservoir causes the transition from the closed position to the open position in which the first and second through-holes are aligned to allow the aerosol-forming precursor to leave the reservoir to reach the heating chamber.

[0011] In a usual aerosol generation device the reservoir is in continuous fluid communication with the heating chamber, and therefore it can leak through its air inlet or vapour outlet whatever its orientation. So, if there is some remaining fluid in the heating chamber after use, even if the aerosol generation device is maintained in upright position, this fluid may leak to the bottom and air inlet.

Summary of the invention

[0012] The proposed invention provides notably an embodiment of a cartomizer intended for equipping an aerosol generation device and comprising :

- a first part comprising a reservoir storing an aerosol-forming precursor,
- a second part comprising a heating chamber configured, when it is fed with air and aerosol-forming precursor, for heating the latter to generate an aerosol, and rotatable relative to this first part between closed and open positions, and
- at least one fluid path defined between the reservoir and heating chamber and comprising an outlet in the first part and an inlet located in the second part, this outlet facing this inlet in the open position to allow the aerosol-forming precursor to leave the reservoir to reach the heating chamber, and this outlet being offset from this inlet in the closed position to prevent the aerosol-forming precursor to reach the heating chamber.

[0013] This cartomizer is characterized in that it further comprises at least one valve arranged in the fluid path or each fluid path and configured to be opened in the open position and closed in the closed position.

[0014] Thanks to this valve, when the cartomizer is set in its closed position the aerosol-forming precursor cannot leave its reservoir, and therefore the cartomizer cannot leak, even when it is not in its upright position.

[0015] The embodiment of cartomizer may comprise other aspects or features, considered separately or combined, as defined hereafter.

- In an example of embodiment, the valve or each valve may be arranged in the outlet of its fluid path. For instance, the inlet of each fluid path may also comprise another valve.
- The valve or each valve may comprise a resealable wall configured to open when it is subject to a constraint in the open position and to automatically close when the constraint disappears in the closed position. For instance, the fluid path or each fluid path may comprise an element arranged for constraining the resealable wall in the open position to force the opening of the corresponding valve.
- In an example of embodiment, the fluid path or each fluid path may comprise a first sub-part protruding from the first part to be housed in the second part and comprising the outlet, and a second sub-part defined in the second part and comprising the inlet. In this case, the first and second sub-parts of each fluid path are aligned with each other in the open position and are spatially separated in the closed position.
- Each first sub-part may comprise an end defining its outlet and comprising the valve, and each element

may be an end of a second sub-part which comprises the inlet.

- Each second sub-part may comprise an end defining its inlet and comprising the valve, and each element may be an end of a first sub-part which comprises the outlet.
- The second part may comprise a first recess having a variable height decreasing between a first value in a first zone and a second value smaller than this first value in a second zone. In this case, the first zone houses the corresponding first sub-part with its outlet in the closed position and is empty in the open position, and the second zone houses the inlet of the corresponding second sub-part in the closed position and houses the corresponding first sub-part and the inlet of the corresponding second sub-part in the open position.
- The cartomizer may comprise first and second fluid paths comprising respectively first and second valves.
- The first recess may be associated with the first fluid path, and the second part may comprise a second recess associated with the second fluid path and having a variable height decreasing between the first value in a first zone and the second value in a second zone, this first zone housing a first sub-part of the second fluid path with its outlet in the closed position and being empty in the open position, and this second zone housing the inlet of a second sub-part of the second fluid path in the closed position and housing the first sub-part of the second fluid path and the inlet of the second sub-part of the second fluid path in the open position.
- The first and second recesses may be concentric.
- The second part may be rotatably mounted on an external face of a housing of the first part in order to be an extension of the first part.
- The first sub-parts of the first and second fluid paths may be respectively located at first and second distances from an axis of rotation of the second part. For instance, the first sub-parts of the first and second fluid paths and the axis of rotation may be located in a same plane.
- The heating chamber may comprise an aerosol-forming precursor collecting element to collect aerosol-forming precursor flowing into each fluid path, and a heating device in contact with this aerosol-forming precursor collecting element. The aerosol-forming precursor collecting element may be a liquid capillary element, such as a fiber or ceramic wick. The aerosol-forming precursor collecting element may be positioned between two fluid paths so as to collect fluid at its both ends.
- The heating device may be a resistive heater and/or an inductive heater in contact with the liquid capillary element.
- In an example of embodiment, the cartomizer may comprise a pulling force element configured to pro-

vide an attraction force between the first and second parts. For instance, the pulling force element may be a spring-type device or a magnetic device. In this case, the spring-type device or the magnetic device is preferably inserted between the first and second parts to provide attraction force in the open and/or closed positions.

- The first part may be slightly spaced from the second part during a transition between the closed and open positions.

[0016] The proposed invention provides also an embodiment of an aerosol generation device comprising an electrical and control device and a cartomizer such as the one above introduced and mechanically and electrically coupled to this electrical and control device.

[0017] The embodiment of aerosol generation device may comprise other features, considered separately or combined, as defined hereafter.

- The electrical and control device may comprise a power source storing electrical energy.
- The power source may be a rechargeable battery.
- The aerosol generation device may constitute an electronic cigarette (or e-cigarette).

Brief description of the figures

[0018] The invention and its advantages will be better understood upon reading the following detailed description, which is given solely by way of non-limiting examples and which is made with reference to the appended drawings, in which :

- Figure 1 (FIG.1) schematically illustrates an example of embodiment of an aerosol generation device according to the invention, with a cartomizer set in a closed position, and
- Figure 2 (FIG.2) schematically illustrates the aerosol generation device of figure 1 with its cartomizer set in an open position.

Detailed description of embodiments

[0019] The invention aims, notably, at offering a cartomizer 1 intended for being mechanically and electrically coupled to an electrical and control device 2 to define together an aerosol generation device 3.

[0020] In the following description it will be considered that the aerosol generation device 3 is an electronic cigarette (or e-cigarette or else personal vaporizer). But an aerosol generation device according to the invention could be of another type, as soon as it comprises a cartomizer 1 according to the invention and allows the generation of an aerosol by heating an aerosol-forming precursor. So, for instance, the aerosol generation device 3 could be an inhaler.

[0021] It is recalled that an "aerosol-forming precursor"

(or "aerosol-forming substance") may be a fluid (for instance a liquid), and may comprise one or more components such as nicotinoid(s), cannabinoid(s), or caffeine, and/or a flavoring.

[0022] It is also recalled that the term "aerosol" may include a suspension of precursor as one or more of solid (very small) particles, liquid droplets, vapor and gas, and that such a suspension may be in a gas including air.

[0023] As illustrated in figures 1 and 2 a cartomizer 1, according to the invention and intended for equipping an aerosol generation device 3, comprises a first part 4, a second part 5, at least one fluid path 6-j, and at least one valve 17-j.

[0024] The first part 4 comprises a reservoir 7 arranged for storing an aerosol-forming precursor. In the non-limiting example of figures 1 and 2 the first part 4 comprises only one reservoir 7. But it could comprise several (for instance two, three or four) reservoirs storing identical or different aerosol-forming precursors. It could be possible to have two different aerosol-forming precursors to either have them react with each other in a heating chamber 8 (for instance one with nicotine salts and the other one with an acid source (e.g. a benzoic acid)) or to allow the user to choose between different flavours (first flavour, second flavor, or a mixture of both (possibly the user being able to determine the amount of each of them)).

[0025] The (each) reservoir 7 is defined in a first housing 9 of the first part 4. The (each) reservoir 7 may be integral with, or inserted in, the first housing 9.

[0026] For instance, the coupling between the cartomizer 1 (and more precisely the first housing 9) and the electrical and control device 2 can be done by screwing by means of two corresponding threaded portions, or by clipping. In the case of screwing, the first housing 9 (of the first part 4) may comprise a first threaded portion arranged for being screwed relatively to a corresponding second threaded portion of a third housing 26 of the electrical and control device 2. But the electrical and control device 2 could comprise a cavity for receiving a part of the cartomizer 1. In this case, this cavity may comprise magnets interacting with magnets of the cartomizer 1.

[0027] The second part 5 comprises a heating chamber 8 configured, when it is fed with air and aerosol-forming precursor, for heating the latter to generate an aerosol. This second part 5 is rotatable relative to the first part 4 between a closed position illustrated in figure 1 and an open position illustrated in figure 2. To this effect the first part 4 may comprise a deep guiding hole and the second part may comprise an axis or axle housed into this guiding hole when the first 4 and second 5 parts are coupled together, for instance.

[0028] The heating chamber 8 is configured, when it is fed with air and aerosol-forming precursor, for heating the latter to generate an aerosol. For instance, and as illustrated in the non-limiting example of figures 1 and 2 the heating chamber 8 may be fluidly coupled to a mouthpiece 10, possibly via an aerosol passage (not illustrated).

[0029] The mouthpiece 10 is the piece of the cartomizer 1 through which the user inhales the aerosol generated in the heating chamber 8 (and possibly flowing into an aerosol passage) during a vaping session (as illustrated by the arrow C in figure 2).

[0030] For instance, and as illustrated in the non-limiting example of figures 1 and 2, the heating chamber 8 may be defined in a housing 11 (hereafter referred as the "second housing 11") of the second part 5. This heating chamber 8 may be integral with, or inserted in, the second housing 11.

[0031] In the non-limiting example illustrated in figures 1 and 2 the second housing 11 comprises an end to which the mouthpiece 10 is fixed, for instance by screwing or clipping. But the mouthpiece 10 could also be glued or moulded integrally with the second housing 11.

[0032] In the illustrated example the heating chamber 8 comprises an electrical heating device 12 arranged for heating the aerosol-forming precursor (originating from a (the) reservoir 7) to generate the aerosol, when it receives electrical energy originating from a power source 13 of the electrical and control device 2. This heating device 12 and the heating chamber 8 belongs to the atomization device of the cartomizer 1.

[0033] The heating device 12 may be a resistive heater, such as a resistive coil, and/or an inductive heater, such as a metallic susceptor. In this case, the heating device 12 may comprise one or more electrically activated resistive and/or inductive heating elements. But in a variant (not illustrated) the heating device 12 could be partly outside the heating chamber 8. The heating can be made by conduction, convection and/or radiation.

[0034] To allow the feeding of the heating device 12 with electrical energy during a vaping session, the first part 4 and the electrical and control device 2 may comprise respectively electrical pins intended for contacting each other during their coupling.

[0035] The heating chamber 8 is fed with air (sucked in by the user) through at least one air conduit 14. In the non-limiting example of figures 1 and 2, the air conduit 14 is defined in the second part 5 and is in communication with the outside through an air inlet defined in a wall of the second housing 11 (as illustrated by the arrows A in figure 2). But in a variant the air inlet could be defined in the first part 4 and connected to a conduit of the second part 5.

[0036] The (each) fluid path 6-j is defined between the (a) reservoir 7 and the heating chamber 8 and comprises an outlet 15 in the first part 4 and an inlet 16 located in the second part 5. As illustrated in figure 2, the outlet 15 (of each fluid path 6-j) is facing the inlet 16 (of the same fluid path 6-j) in the open position to allow the aerosol-forming precursor to leave the corresponding reservoir 7 to reach the heating chamber 8. As illustrated in figure 1, the outlet 15 (of each fluid path 6-j) is offset from the inlet (of the same fluid path 6-j) in the closed position to prevent the aerosol-forming precursor to reach the heating chamber 8.

[0037] A (each) valve 17-j is arranged in the (a) fluid path 6-j and is configured to be opened in the open position of the cartomizer 1 (illustrated in figure 2) and closed in the closed position of the cartomizer 1 (illustrated in figure 1).

[0038] A valve 17-j being now associated to each fluid path 6-j it is possible to prevent the aerosol-forming precursor to leave the (its) reservoir 7 when the cartomizer 1 is set in its closed position (in which the fluid path outlet 15 is offset from the corresponding fluid path inlet 16). Indeed, in the cartomizer closed position the valve 17-j is in its closed position and therefore the aerosol-forming precursor is prevented from leaving the reservoir 7, and in the cartomizer open position the valve 17-j is in its open position and therefore the aerosol-forming precursor can leave the reservoir 7 to reach the heating chamber 8 via the corresponding fluid path 6-j (see arrows B). So, when the cartomizer 1 is in its closed position it cannot leak, even when it is not in its upright position.

[0039] For instance, and as illustrated in the non-limiting example of figures 1 and 2, each valve 17-j may be advantageously arranged in the outlet 15 of its fluid path 6-j. But in addition the inlet 16 of each fluid path 6-j could also comprise another valve to avoid fluid from dripping from the fluid path inlet 16 back to the reservoir surface.

[0040] In an example of embodiment, each valve 17-j may comprise a resealable wall which is configured to open when it is subject to a constraint in the cartomizer open position and to automatically close when this constraint disappears in the closed position.

[0041] For instance, each resealable wall is a kind of "nib" working in the same way as a valve action marker. When such a nib is pressed aerosol-forming precursor flows in its free end, and when it is not pressed (i.e. not subject to a constraint) the aerosol-forming precursor cannot flow to this free end and therefore the valve 17-j is closed to prevent leakage.

[0042] When each valve 17-j comprises the above described resealable wall, each fluid path 6-j may comprise an element 18 arranged for constraining this resealable wall in the open position to force the opening of the corresponding valve 17-j. So, during a manual transition of the cartomizer 1 from its closed position to its open position (operated by a user), the element 18 exerts a constraint on the corresponding resealable wall which finally forces the opening of the latter and therefore of the corresponding valve 17-j.

[0043] Also in an example of embodiment, each fluid path 6-j may comprise first 19 and second 20 sub-parts. The first sub-part 19 of each fluid path 6-j protrudes from the first part 4 to be housed in the second part 5 and comprises the outlet 15. The second sub-part 20 is defined in the second part 5 and comprises the inlet 16. The first 19 and second 20 sub-parts of each fluid path 6-j are aligned with each other in the open position, and are spatially separated in the closed position, as illustrated in figure 2.

[0044] Each first sub-part 19 is preferably an inserted

rigid pipe (or conduit) having an inlet coupled to the reservoir 7 and an outlet which is the outlet 15 of its fluid path 6-j. Each second sub-part 20 is also preferably an inserted rigid pipe (or conduit) having an inlet which is the inlet 16 of its fluid path 6-j and an outlet coupled to the heating chamber 8.

[0045] As illustrated in the non-limiting example of figures 1 and 2, in the last example of embodiment and in the case where each valve 17-j is arranged in the outlet 15 of its fluid path 6-j, each first sub-part 19 may, for instance, comprise an end defining this outlet 15, comprising the valve 17-j and opposite to the reservoir 7. Furthermore, each element 18 may be an end of the second sub-part 20 which comprises the inlet 16 and opposite to the heating chamber 8.

[0046] In the case where each valve 17-j is arranged in the inlet 16 of its fluid path 6-j, each second sub-part 20 may comprise an end defining its inlet 16, comprising the valve 17-j and opposite to the heating chamber 8. Furthermore, each element 18 may be an end of a first sub-part 19 which comprises the outlet 15 of its fluid path 6-j and opposite to the reservoir 7.

[0047] Also as illustrated in the non-limiting example of figures 1 and 2, in the last example of embodiment the second part 5 may comprise a first recess 21 having a variable height decreasing between a first value v_1 in a first zone Z1 and a second value v_2 smaller than this first value v_1 in a second zone Z2. In this case, the first zone Z1 houses the first sub-part 19 with its outlet 15 in the cartomizer closed position (as illustrated in figure 1), and is empty in the open position (as illustrated in figure 2). This first zone Z1 covers the end of the outlet 15 in the cartomizer closed position to contain any possible leak. Furthermore, the second zone Z2 houses the inlet 16 of the second sub-part 20 in the cartomizer closed position (as illustrated in figure 1), and houses the first sub-part 19 and the inlet 16 of the second sub-part 20 in the open position (as illustrated in figure 2). This second zone Z2 covers the end of the inlet 16 in the cartomizer closed position to contain any possible leak. Such an arrangement allows the first sub-part 19 of the first fluid path 6-1 to remain in a fixed position relative to the first part 4 while the first recess 21 rotates with the corresponding second sub-part 20 (and therefore the second part 5) with respect to it during each manual transition between the closed and open positions.

[0048] For instance, and as illustrated in the non-limiting example of figures 1 and 2, the cartomizer 1 may comprise first 6-1 ($j = 1$) and second 6-2 ($j = 2$) fluid paths comprising respectively first 17-1 and second 17-2 valves. This arrangement allows to improve the feeding of the heating chamber 8 with the aerosol-forming precursor, or to feed the heating chamber 8 with two different aerosol-forming precursors originating respectively from two different reservoirs 7.

[0049] When the cartomizer 1 comprises the first 6-1 ($j = 1$) and second 6-2 ($j = 2$) fluid paths, the first recess 21 may be associated with the first fluid path 6-1, and

the second part 5 may comprise a second recess 22 associated with the second fluid path 6-2. In this case, the second recess 22 may have a variable height decreasing between the first value v_1 in a first zone Z1' and the second value v_2 in a second zone Z2'. Furthermore, the first zone Z1' of the second recess 22 houses a first sub-part 19 of the second fluid path 6-2 with its outlet 15 in the cartomizer closed position (as illustrated in figure 1), and is empty in the cartomizer open position (as illustrated in figure 2). This first zone Z1' covers the end of the outlet 15 of the second fluid path 6-2 in the cartomizer closed position to contain any possible leak. Moreover, the second zone Z2' of the second recess 22 houses the inlet 16 of a second sub-part 20 of the second fluid path 6-2 in the cartomizer closed position (as illustrated in figure 1), and houses the first sub-part 19 of the second fluid path 6-2 and the inlet 16 of the second sub-part 20 of the second fluid path 6-2 in the cartomizer open position (as illustrated in figure 2). This second zone Z2' covers the end of the inlet 16 of the second fluid path 6-2 in the cartomizer closed position to contain any possible leak. Such an arrangement allows the first sub-parts 19 of the first 6-1 and second 6-2 fluid paths to remain in fixed positions relative to the first part 4 while the first 21 and second 22 recesses rotate simultaneously with the corresponding second sub-parts 20 (and therefore) the second part 5 with respect to them during each manual transition between the closed and open positions.

[0050] For instance, and as illustrated in the non-limiting example of figures 1 and 2, the first 21 and second 22 recesses may be concentric.

[0051] Also for instance, and as illustrated in the non-limiting example of figures 1 and 2, the second part 5 may be rotatably mounted on an external face of the first housing 9 of the first part 4 in order to be an extension of this first part 4. In this case, the electrical and control device 2 and the first 4 and second 5 parts of the cartomizer 1 are aligned with the first part 4 sandwiched between the electrical and control device 2 and the second part 5.

[0052] In the case where the cartomizer 1 comprises first 6-1 and second 6-2 fluid paths, their first sub-parts 19 may be respectively located at first d_1 and second d_2 distances from an axis of rotation 23 of the second part 5. It must be understood that the first distance d_1 differs from the second distance d_2 and therefore the first sub-parts 19 are asymmetrically located with respect to the axis of rotation 23. In the non-limiting example illustrated in figures 1 and 2, the first distance d_1 is greater than the second distance d_2 . But in a variant the first distance d_1 could be smaller than the second distance d_2 .

[0053] The last arrangement may require that the second sub-parts 20 have two different shapes, notably when they are coupled to opposite faces of the heating chamber 8, as illustrated in figures 1 and 2.

[0054] For instance, and as illustrated in the non-limiting example of figures 1 and 2, the first sub-parts 19 of the first 6-1 and second 6-2 fluid paths and the axis of

rotation 23 may be located in a same plane. In this case, each manual transition between the closed and open positions requires a relative rotation of 180° of the second part 5 with respect to the first part 4, and both first 21 and second 22 recesses extend on an angular sector of 180°. But in variants of embodiment one may provide other values for the relative rotation and angular sector, and in these variants the first sub-parts 19 and the axis of rotation 23 are no longer located in the same plane.

[0055] Also for instance, and as illustrated in the non-limiting example of figures 1 and 2, the heating chamber 8 may comprise an aerosol-forming precursor collecting element 24 to collect aerosol-forming precursor flowing into each fluid path 6-j (in the cartomizer open position), and the heating device 12 in contact with this aerosol-forming precursor collecting element 24. In the illustrated example the outlets of the two sub-parts 20 of the first 6-1 and second 6-2 fluid paths are coupled respectively to the two opposite ends of the aerosol-forming precursor collecting element 24.

[0056] For instance, this aerosol-forming precursor collecting element 24 may be a capillary element (possibly a capillary wick). This capillary element 24 can be a fiber or ceramic rod, for instance. For instance, the heating device 12 may comprise a resistive coil wound around the capillary element 24 and coupled to the above mentioned pins via lead wires.

[0057] Also for instance, and as illustrated in the non-limiting example of figures 1 and 2, the cartomizer 1 may comprise a pulling force element 25 configured to provide an attraction force between the first 4 and second 5 parts. This allows the second part 5 to remain in a fixed position with respect to the first part 4 when the cartomizer 1 is not used or when the cartomizer 1 is used during a vaping session. So, this improves not only the flow of aerosol-forming precursor in the cartomizer open position but also leakage prevention in the cartomizer closed position.

[0058] For instance, the pulling force element 25 may be a spring-type device or a magnetic device. In this case, the spring-type device or the magnetic device is preferably inserted between the first 4 and second 5 parts to provide attraction force in the open and/or closed positions.

[0059] In the case where the cartomizer 1 comprises a pulling force element 25, its first part 4 is preferably slightly spaced from its second part 5 by a manual operation of the user during a transition between the closed and open positions. In other words, when the user wants to make a transition he must pull apart the first 4 and second 5 parts first before starting the rotation. To ease such a transition there is preferably an axial guidance along a central axle (parallel to the axis of rotation 23). This allows to prevent accidental rotation and activation of the cartomizer 1 with the added benefit of preventing use by a child. Stable closed and open positions resistant to rotation can be obtained by providing cooperating stopping means in the first 4 and second 5 parts.

[0060] As illustrated in figures 1 and 2 the third housing

26 of the electrical and control device 2 may comprise at least a controller (or control device) 27 and a user interface 28 in addition to the power source 13 (storing electrical energy).

[0061] For instance, the power source 13 may be a rechargeable battery. In this case the third housing 26 may comprise an electrical connector to which a charger cable may be connected during a charging session of the rechargeable battery 13. Such a charger cable may be coupled to an (AC) adapter or to a wall socket. The charger cable and/or the (AC) adapter may belong to the aerosol generation device 3.

[0062] The controller 27 is electrically coupled to the power source 13 and controls operation of the cartomizer 1 (and notably its heating device 12) during a vaping session and also during a possible charging session. For instance, and as illustrated in the non-limiting example of figures 1 and 2, the controller 27 may be fixed onto a printed circuit board 29 (housed in the third housing 26).

[0063] Explicit use of the term "controller" should not be construed to refer exclusively to hardware capable of executing software, and may implicitly include, without limitation, digital signal processor (DSP) hardware, processor, application specific integrated circuit (ASIC), field programmable gate array (FPGA), read only memory (ROM) for storing software, random access memory (RAM), and non volatile storage. Other hardware, conventional and/or custom, may also be included. The functions of the controller 27 may be carried out through the operation of program logic, through dedicated logic, through the interaction of program control and dedicated logic, or even manually (by the user). These functions may be provided through the use of dedicated hardware as well as hardware capable of executing software in association with appropriate software.

[0064] The user interface 28 is coupled to the controller 27 and the power source 13 and allows the user to control at least partly the controller 27. For instance, the user interface 28 may comprise a display (such as a screen or light emitting diode (or LED)-type interface) arranged for displaying information relative to a current vaping session or a possible current charging session and for allowing the user to control the controller 27. Also for instance, the displayed information may be a current status representing the current percentage of remaining (or elapsed) vaping time (with respect to a programmed (or chosen) vaping duration) during a vaping session, or the current percentage of charge (with respect to the full charge) of the power source 13 during a possible charging session. The current percentage may be represented by the length of a straight line or by a number of parallel bars or else by a value, for instance.

[0065] Also for instance, and as illustrated in the non-limiting example of figures 1 and 2, the user interface 28 may be fixed partly to the printed circuit board 29 to ease and simplify its connections with the controller 27. The user interface 28 may have its own printed circuit board connected to the printed circuit board 29 by wires of flex-

ible circuit(s) in order to be deported anywhere.

[0066] Also for instance, the second part 5 may comprise a puff sensor (not illustrated) intended for detecting when the user sucks in (or inhales) during a vaping session, and for informing the controller 27 each time such a detection occurs. The puff sensor can be a flow or pressure sensor or microphone positioned in the air flow path. For instance, if the air inlet is defined in the first part 4 the puff sensor can be placed in this first part 4.

[0067] It should be appreciated by those skilled in the art that some block diagrams of figures 1 and 2 herein represent conceptual views of illustrative circuitry embodying the principles of the invention.

[0068] The description and drawings merely illustrate the principles of the invention. It will thus be appreciated that those skilled in the art will be able to devise various arrangements that, although not explicitly described or shown herein, embody the principles of the invention and are included within its spirit and scope. Furthermore, all examples recited herein are principally intended expressly to be only for pedagogical purposes to aid the reader in understanding the principles of the invention and the concepts contributed by the inventor(s) to furthering the art, and are to be construed as being without limitation to such specifically recited examples and conditions. Moreover, all statements herein reciting principles, aspects, and embodiments of the invention, as well as specific examples thereof, are intended to encompass equivalents thereof.

Claims

1. Cartomizer (1) for an aerosol generation device (3), said cartomizer (1) comprising :

- a first part (4) comprising a reservoir (7) storing an aerosol-forming precursor,
- a second part (5) comprising a heating chamber (8) configured, when it is fed with air and aerosol-forming precursor, for heating the latter to generate an aerosol, and rotatable relative to said first part (4) between closed and open positions, and
- at least one fluid path (6-j) defined between said reservoir (7) and said heating chamber (8) and comprising an outlet (15) in said first part (4) and an inlet (16) located in said second part (5), said outlet (15) facing said inlet (16) in said open position to allow said aerosol-forming precursor to leave said reservoir (7) to reach said heating chamber (8), and said outlet (15) being offset from said inlet (16) in said closed position to prevent said aerosol-forming precursor to reach said heating chamber (8),

wherein it further comprises at least one valve (17-j) arranged in said fluid path (6-j) and configured to

be opened in said open position and closed in said closed position.

2. Cartomizer according to claim 1, wherein each valve (17-j) is arranged in the outlet (15) of its fluid path (6-j).
3. Cartomizer according to claim 2, wherein said inlet (16) of each fluid path (6-j) comprises another valve.
4. Cartomizer according to any one of claims 1 to 3, wherein each valve (17-j) comprises a resealable wall configured to open when it is subject to a constraint in the open position and to automatically close when said constraint disappears in the closed position.
5. Cartomizer according to claim 4, wherein each fluid path (6-j) comprises an element (18) arranged for constraining said resealable wall in the open position to force the opening of said corresponding valve (17-j).
6. Cartomizer according to any one of claims 1 to 5, wherein each fluid path (6-j) comprises a first sub-part (19) protruding from said first part (4) to be housed in said second part (5) and comprising said outlet (15), and a second sub-part (20) defined in said second part (5) and comprising said inlet (16), said first (19) and second (20) sub-parts of each fluid path (6-j) being aligned with each other in the open position and being spatially separated in the closed position.
7. Cartomizer according to the combination of claims 2 to 6, wherein each first sub-part (19) comprises an end defining its outlet (15) and comprising said valve (17-j), and each element (18) is an end of a second sub-part (20) which comprises said inlet (16).
8. Cartomizer according to claim 6 or 7, wherein said second part (5) comprises a first recess (21) having a variable height decreasing between a first value in a first zone (Z1) and a second value smaller than said first value in a second zone (Z2), said first zone (Z1) housing said first sub-part (19) with its outlet (15) in said closed position and being empty in said open position, and said second zone (Z2) housing said inlet (16) of said second sub-part (20) in said closed position and housing said first sub-part (19) and said inlet (16) of said second sub-part (20) in said open position.
9. Cartomizer according to any one of claims 1 to 8, wherein it comprises first (6-1) and second (6-2) fluid paths comprising respectively first (17-1) and second (17-2) valves.

10. Cartomizer according to the combination of claims 8 and 9, wherein said first recess (21) is associated with said first fluid path (6-1), and wherein said second part (5) comprises a second recess (22) associated with said second fluid path (6-2) and having a variable height decreasing between said first value in a first zone (Z1') and said second value in a second zone (Z2'), said first zone (Z1') housing a first sub-part (19) of said second fluid path (6-2) with its outlet (15) in said closed position and being empty in said open position, and said second zone (Z2') housing said inlet (16) of a second sub-part (20) of said second fluid path (6-2) in said closed position and housing said first sub-part (19) of said second fluid path (6-2) and said inlet (16) of said second sub-part (20) of said second fluid path (6-2) in said open position.
11. Cartomizer according to any one of claims 1 to 10, wherein said second part (5) is rotatably mounted on an external face of a housing (9) of said first part (4) in order to be an extension of said first part (4).
12. Cartomizer according to claim 10 taken in combination with claim 11, wherein said first sub-parts (19) of said first (6-1) and second (6-2) fluid paths are respectively located at first and second distances from an axis of rotation of said second part (5).
13. Cartomizer according to claim 12, wherein said first sub-parts (19) of said first (6-1) and second (6-2) fluid paths and said axis of rotation are located in a same plane.
14. Cartomizer according to any one of claims 1 to 13, wherein it comprises a pulling force element (25) configured to provide an attraction force between said first (4) and second (5) parts.
15. Aerosol generation device (3) comprising an electrical and control device (2), wherein it further comprises a cartomizer (1) according to any one of the preceding claims, mechanically and electrically coupled to said electrical and control device (2).

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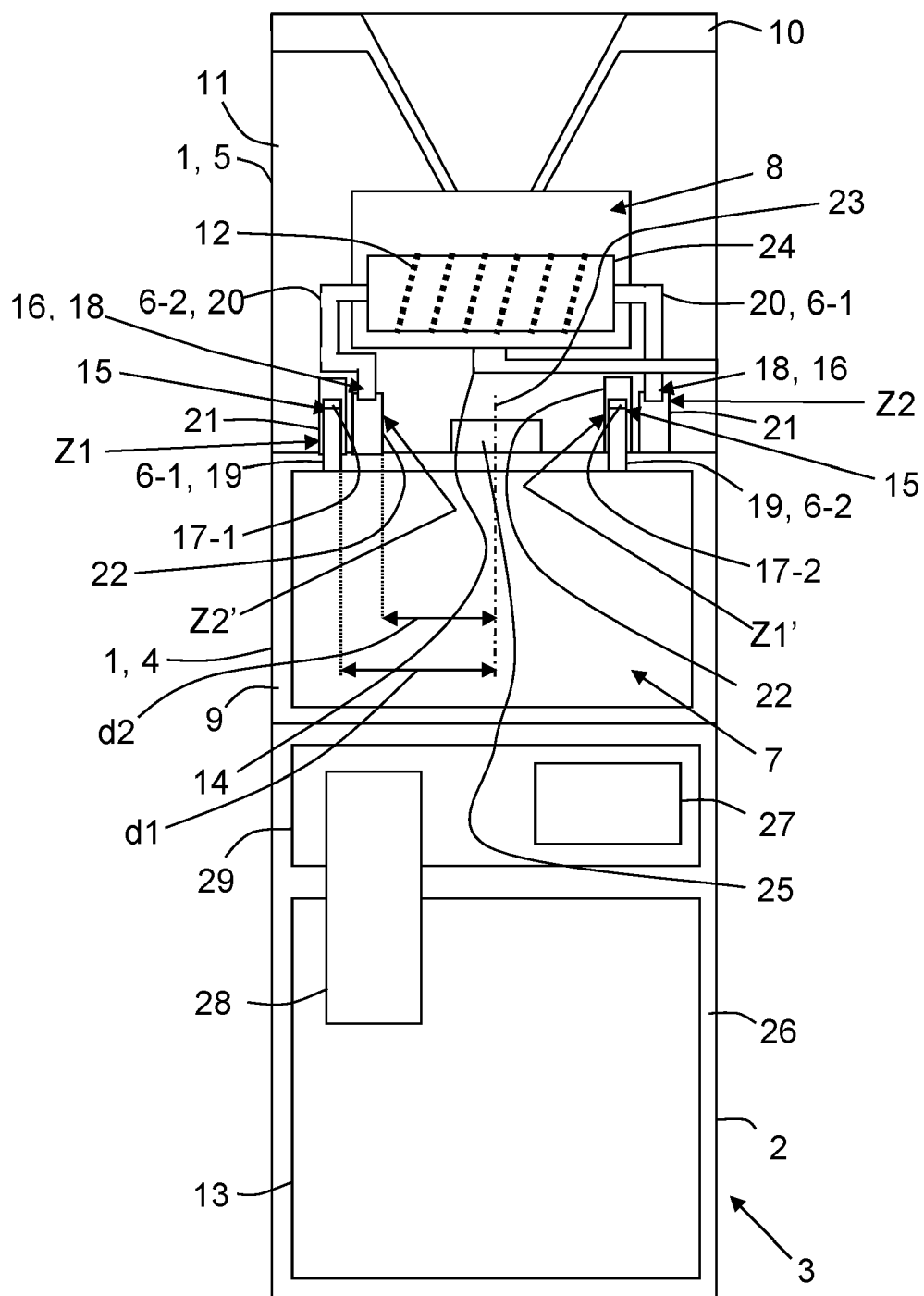


FIG.1

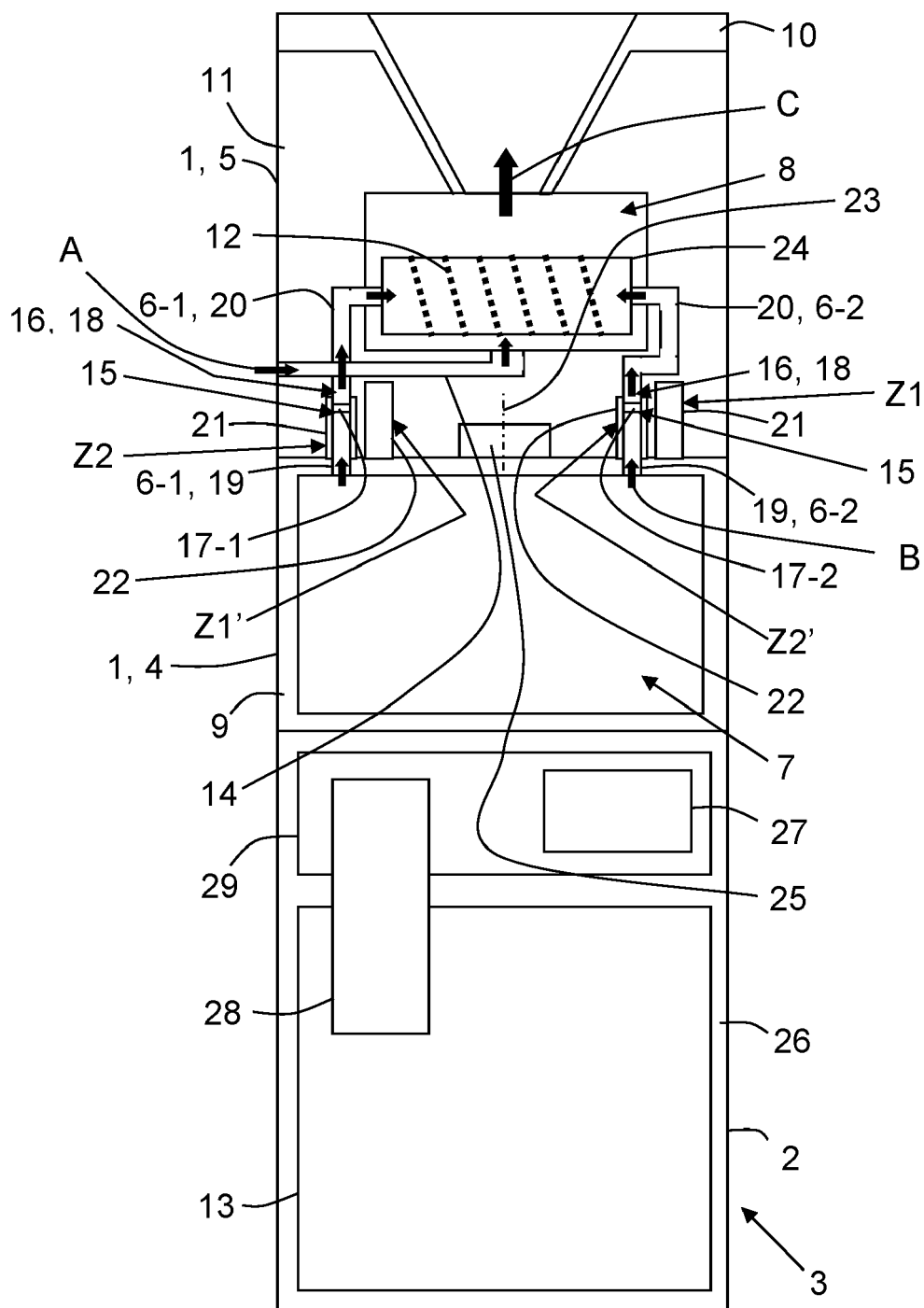


FIG.2



EUROPEAN SEARCH REPORT

Application Number
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Place of search Munich		Date of completion of the search 11 May 2021	Examiner Fernández Cuenca, B
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