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- (54) Title:** AEROSOL GENERATION DEVICE COMPRISING A CONTROL ELEMENT, AND ASSOCIATED AEROSOL GENERATION ASSEMBLY

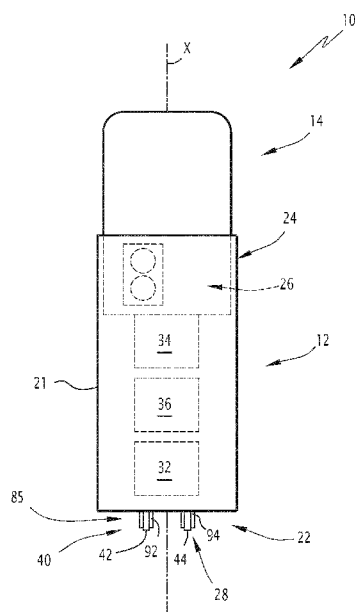


FIG.1

- (57) Abstract:** The present invention concerns an aerosol generation device (12) configured to operate with a removable cartridge (14) comprising a storage portion for storing a liquid vaporizable material, a flow channel and a valve moveable by a switching element between an unlocked position allowing flow passage from the storage portion to the flow channel and a locked position inhibiting flow passage from the storage portion to the flow channel; the aerosol generation device defining a device body (21) comprising: - a cartridge fixing end (24) designed to receive the cartridge (14) to allow the aerosol generation device to operate with the cartridge (14); - a control element (85) configured to be engaged with the switching element, when the cartridge is extracted from the cartridge fixing end (24), to move the valve between said positions by a manual action exerted to the control element (85) by a user.

**Aerosol generation device comprising a control element, and associated  
aerosol generation assembly**

FIELD OF THE INVENTION

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The present invention concerns an aerosol generation device comprising a control element.

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The present invention also concerns an aerosol generation assembly associated to such an aerosol generation device.

BACKGROUND OF THE INVENTION

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Different types of aerosol generation devices are already known in the art. Generally, such devices comprise a storage portion for storing a vaporizable material, which can comprise for example a liquid or a solid. A heating system is formed of one or more electrically activated resistive heating elements arranged to heat said vaporizable material to generate the aerosol. The aerosol is released into a flow path extending between an inlet and outlet of the device. The outlet may be arranged as a mouthpiece, through which a user inhales for delivery of the aerosol.

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In some aerosol generation devices, the vaporizable material is stored in a removable cartridge. Thus, when the vaporizable material is consumed, the cartridge can be easily removed and replaced. In order to attach the removable cartridge to the device body, a screw-threaded connection can for example be used.

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In some cases, while using a liquid vaporizable material, leakage from a cartridge may occur when it is being carried separately from the corresponding aerosol generation device or attached to it. Particularly, there is no guarantee that the cartridge will be always in an upright position and the motion whilst travelling can aid the vaporizable material to exit. If the user knows when the device will be required and when it will be carried it is possible and a significant benefit to the user to take steps with the device to prevent leakage.

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Some cartridges known in the art are provided with an integrated valve which prevents leakage when the cartridge is not being used. In some cases, such a valve can

be actuated automatically from a closed to an open position while attaching the cartridge to the device. However, this does not prevent leakage when the device is being carried together with the attached cartridge. In some cases, the valve can be actuated manually by the user using for example a special key element. However, such a key element can be easily forgotten or lost so as the using of the valve is not very practical. Consequently, using of such a valve is not practical for the user.

## SUMMARY OF THE INVENTION

One of the aims of the present invention is to propose an aerosol generation assembly preventing leakage or any other undesirable loss of the vaporizable material from the cartridge, which is very practical to use in any position or state of the cartridge.

For this purpose, the invention relates to an aerosol generation device configured to operate with a removable cartridge, the cartridge comprising a storage portion for storing a liquid vaporizable material, a flow channel and a valve moveable by a switching element between an unlocked position allowing flow passage from the storage portion to the flow channel and a locked position inhibiting flow passage from the storage portion to the flow channel;

the aerosol generation device defining a device body comprising:

- a cartridge fixing end designed to receive the cartridge to allow the aerosol generation device to operate with the cartridge;
- a control element configured to be engaged with the switching element, when the cartridge is extracted from the cartridge fixing end, to move the valve between said positions by a manual action exerted to the control element by a user.

Indeed, thanks to these features, the user can lock/unlock the cartridge valve manually when the cartridge is not being used. Moreover, no additional element which can be lost or forgotten is needed to perform this operation.

According to some embodiments, the control element presents a complementary shape to an external shape of the switching element.

Thanks to these features, the control element can perfectly fit the switching element of the cartridge.

According to some embodiments, the switching element defines at least one aperture and/or at least one protrusion and the control element defines at least one protrusion and/or at least one aperture configured to be engaged respectfully with said aperture and/or said protrusion of the switching element.

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According to some embodiments, the switching element defines at least two apertures; the control element defines at least two protrusions configured to be engaged simultaneously with said apertures to move the switching element according to a rotating or push/pulling or sliding action.

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According to some embodiments, said manual action exerted by the user is a rotating or push/pulling or sliding action exerted on the control element.

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Thanks to these features, the switching element can be easily switched using the control element.

According to some embodiments, the device body further comprises a battery end and the control element is arranged on said battery end.

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Thanks to these features, the aerosol generation device can be easily held by the user while actuating the switching element of the cartridge. Moreover, in such an arrangement, the control element could not interfere with the electrical connection between the battery and the cartridge in use.

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According to some embodiments, the device body comprises a external surface defining a connector and the control element is arranged on the external surface.

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According to some embodiments, the connector is a charging connector designed to charge a battery of the device from an external source; and the control element and the connector are arranged on the external surface so as to prevent from using the control element with the switching element while the connector is connected to the external source.

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Thanks to these features, it is possible to prevent the user from using the control element to unlock the valve or eventually cause leakage from the cartridge during charging the device.

According to some embodiments, the connector comprises a pair of pins, the pins being integrated into the control element.

According to some embodiments, the control element forms at least two protrusions and each pin is integrated into one of said protrusions or forms this protrusion

Thanks to these features, the control element can be combined with pins already presented in most of the aerosol generation devices. Thus, it is possible to not affect the device's design or cost by adding the control element.

The present invention also concerns an aerosol generation assembly, comprising:

- a cartridge comprising a storage portion for storing a liquid vaporizable material, a flow channel and a valve moveable by a switching element between an unlocked position allowing flow passage from the storage portion to the flow channel and a locked position inhibiting flow passage from the storage portion to the flow channel;

- an aerosol generation device as defined above, configured to operate with said cartridge.

According to some embodiments, the cartridge defines a cartridge body comprising at least one lateral wall, the switching element being arranged on said lateral wall.

According to some embodiments, the switching element defines at least two apertures formed in said lateral wall, the valve being arranged inside the cartridge body facing said apertures.

Thanks to these features, the switching element can be easily actuated by the control element of the device, for example by a rotating or sliding or pushing or pulling action of the user.

According to some embodiments, the device body comprises an external surface defining a charging connector; the control element is arranged on the external surface; the assembly further comprises an external connector connected to an external source and configured to cooperate with the charging connector to charge a battery of the device, the external connector being configured to cover the control element when the external connector is connected to the charging connector.

According to some embodiments, the external connector defines an internal surface configured to face the external surface when the external connector is connected to the charging connector, the internal surface presenting a complementary shape to the shape of the control element.

Thanks to these features, the charging connector can be used to cover the control element to prevent the user from using the control element to unlock the valve or eventually cause leakage from the cartridge during charging the device.

## BRIEF DESCRIPTION OF THE DRAWINGS

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

- Figure 1 is a schematic front view of an aerosol generation assembly according to the invention, the aerosol generation assembly comprising a cartridge and an aerosol generation device;

- Figure 2 is a schematic view of the cartridge of Figure 1, the cartridge comprising a valve in an unlocked position;

- Figure 3 is a view similar to the view of Figure 2 where the valve is in a locked position; and

- Figure 4 is a schematic front view of the aerosol generation assembly of Figure 1 including an external connector.

## DETAILED DESCRIPTION OF THE INVENTION

Before describing the invention, it is to be understood that it is not limited to the details of construction set forth in the following description. It will be apparent to those skilled in the art having the benefit of the present disclosure that the invention is capable of other embodiments and of being practiced or being carried out in various ways.

As used herein, the term **“aerosol generation device”** or **“device”** may include a vaping device to deliver an aerosol to a user, including an aerosol for vaping, by means of aerosol generating unit (e.g. an aerosol generating element which generates vapor which condenses into an aerosol before delivery to an outlet of the device at, for example, a mouthpiece, for inhalation by a user). The device may be portable. “Portable” may refer to the device being for use when held by a user. The device may be adapted to generate a variable amount of aerosol, e.g. by activating a heater system for a variable amount of time (as opposed to a metered dose of aerosol), which can be controlled by a trigger. The trigger may be user activated, such as a vaping button and/or inhalation sensor. The inhalation sensor may be sensitive to the strength of inhalation as well as the duration of inhalation to enable a variable amount of vapour to be provided (so as to mimic the effect of smoking a conventional combustible smoking article such as a cigarette, cigar or pipe, etc.). The device may include a temperature regulation control to drive the temperature of the heater and/or the heated aerosol generating substance (aerosol pre-cursor) to a specified target temperature and thereafter to maintain the temperature at the target temperature that enables efficient generation of aerosol.

As used herein, the term **“aerosol”** may include a suspension of vaporizable material as one or more of: solid particles; liquid droplets; gas. Said suspension may be in a gas including air. Aerosol herein may generally refer to/include a vapour. Aerosol may include one or more components of the vaporizable material.

As used herein, the term **“vaporizable material”** or **“precursor”** or **“aerosol forming substance”** or **“substance”** is used to designate any material that is vaporizable in air to form aerosol. Vaporization is generally obtained by a temperature increase up to the boiling point of the vaporization material, such as at a temperature less than 400°C, preferably up to 350°C. The vaporizable material may, for example, comprise or consist of an aerosol-generating liquid, gel, wax, foam or the like, an aerosol-generating solid that may be in the form of a rod, which contains processed tobacco material, a crimped sheet or oriented strips of reconstituted tobacco (RTB), or any combination of these. The vaporizable material may comprise one or more of: nicotine, caffeine or other active components. The active component may be carried with a carrier, which may be a liquid. The carrier may include propylene glycol or glycerin. A flavoring may also be present. The flavoring may include Ethylvanillin (vanilla), menthol, Isoamyl acetate (banana oil) or similar.

As used herein, the term “**external device**” may refer to a device, which is able to establish a wireless data connection with the aerosol generation device as it is explained in the specification. Such an external device may be a mobile device like a mobile phone for example. Additionally, such an external device may be a smart device able to process at least some data received from the aerosol generation device or intended to be transmitted to the aerosol generation device. Such a smart device can be a smartphone, a smartwatch, a tablet computer, a laptop, a desktop computer or any other smart object implemented for example according to the IoT (“Internet of things”) technology. Such a smart device can be also another aerosol generation device similar to said aerosol generation device. In some embodiments, the external device may be a distant server able to process data.

Referring to Figure 1, an aerosol generation assembly 10 according to the invention comprises an aerosol generation device 12 and a cartridge 14 configured to store a vaporizable material.

As shown on Figure 1, the aerosol generation device 12 comprises a device body 21 extending between a battery end 22 and a cartridge fixing end 24 along a device axis X. The cartridge fixing end 24 is configured to receive the cartridge 14 and may define fixing means to fix the cartridge 14 in this position. The fixing means may be formed by one or several tabs protruding from the cartridge fixing end 24 along the device axis X. According to the embodiment of Figure 1, the fixing means can be formed by at least a part of lateral walls of the device body 21 extending also along the device axis X. In this last case, the cartridge fixing end 24 forms a cavity 26 configured to receive the cartridge 14 through an opening formed perpendicularly to the device axis X or extending along this axis X, for example in a lateral wall of the device body 21. The cavity 26 can form an internal shape complementary to the external shape of at least an end of the cartridge 14 as it will be explained in further detail below. At the battery end 22, the device body 21 can be sealed or closed by a bottom wall extending for example perpendicularly to the device axis X. This bottom wall forms an external surface 28 shown on Figure 1.

The device body 21 can form a parallelepiped or a cylindrical shape. The device body 21 delimits an interior part of the aerosol generation device 12 comprising for example a power block 32 designed to power the device 12, at least a device part 34 of a heating system designed to heat the vaporizable material comprised in the cartridge 14 and a controller 36. The device body 21 may further comprise other internal components

performing different functionalities of the device 12 known in the art. The device body 21 may also define a flow path (not-shown on Figure 1) extending from a device inlet arranged for example on the battery end 22 of the device 12 or on a lateral wall of the device 12, and a device outlet arranged on the cartridge fixing end 24.

It should be noted that Figure 1 presents only a schematic diagram of different components of the aerosol generation device 12 and does not necessarily show the real physical arrangement and dimensions of these components. Particularly, such an arrangement can be chosen according to the design of the aerosol generation device 12 and technical features of its components.

The heating system is connected to the power block 32 through the controller 36. Depending on the type of the heating system, the device part 34 of this system may be formed by a heating plate, an inductive coil or a pair of contacts. In the first case, the heating system is configured to heat the vaporizable material by heat transfer from the heating plate to another heating element comprised in the cartridge 14. In the second case, the heating system is configured to heat the vaporizable material by magnetic induction further to magnetic cooperation of the coil with a susceptor comprised in the cartridge. In the third case, electrical power is transferred from the pair of contacts to a heating element comprised in the cartridge 14. The pair of contacts may protrude from the cartridge fixing end 24 for example into the cavity 26, in order to be able to cooperate with corresponding contacts of the cartridge 14. This third case is shown on the Figures and will be explained below in further detail. However, it should be understood that the invention can be applied in combination with any other type of heating system.

The controller 36 is able to control the operation of the aerosol generation device 12. Particularly, the controller 36 is configured to power the device part 34 of the heating system from the power block 32 to generate vapour from the vaporizable material. The controller 36 can be actuated by the user via a vaping button or further to a trigger event as for example detection of a user puff. The controller 36 may perform any other additional functionality of the device 12 known *per se*. Such a functionality may for example concern a communication capacity of the device 12 with an external device, a maintenance capacity, an analysis capacity, etc.

The power block 32 comprises a battery and a battery charger. The power block 32 is for example adjacent to the battery end 22 of the device 12. The battery is for example

a known battery designed to be charged using the power supply furnished by an external source and to provide a direct current DC of a predetermined voltage. The battery charger is able to connect the battery to the external source and comprises for this purpose a connector 40. The battery charger is also able to control the power delivered from the external source to the battery according for example a predetermined charging profile. Such a charging profile can for example define a charging voltage of the battery depending on its level of charge.

The connector 40 may present any known connector like for example a mini-USB connector. In the example of Figure 1, the connector 40 is formed by or comprises at a pair of pins 42, 44 extending from a charging surface formed by the external surface 28 of the bottom wall of the device body 21. The pair of pins 42, 44 may be arranged on the charging surface 28 symmetrically in respect with the device axis X. Each pin may form in cross section a known shape, like for example a circle or a square or a rectangle, of known dimensions. The distance d1 between the centres of these pins 42, 44 may also be a known value.

According to some embodiments, the connector 40 may be used to any other type of connection with an external device, as for example data connection. In this case, the connector 40 may include more than a pair of pins. In some embodiments, the connector 40 may be used only for data connection purposes. In this case, the connector 40 may be directly connected to the controller 36 and can be separated from another charging connector designed especially for charging. In some embodiments, instead of a special charging connector, the battery charger can perform a wireless charging.

Referring to Figure 2, the cartridge 14 forms a cartridge body 51 extending between a device end 52 and a mouthpiece end 54 along a cartridge axis Y. The cartridge axis Y coincides with the device axis X when the cartridge 14 is received and fixed on the cartridge fixing end 24 of the device 12. The device end 52 is designed to cooperate with the cartridge fixing end 24 of the aerosol generation device 12 to fix the cartridge 14 on the aerosol generation device 12. For this purpose, the device end 52 can for example define fixing means configured to cooperate with the corresponding fixing means of the cartridge fixing end 24. In the example of Figure 1, the device end 52 of the cartridge 14 can be received entirely or partially in the cavity 26 of the device body 21. For example, the portion of the cartridge 14 received in the cavity 26 can be formed by a part of the cartridge body 51 corresponding to at least 25% of the total axial length of the body 51,

preferably at least 30% and more preferably at least 40% and advantageously at least 50% of this length.

5 The mouthpiece end 54 of the cartridge body 51 can for example define a mouthpiece intended to be in contact with the user's mouth while using the assembly 10. According to another embodiment, the mouthpiece is arranged on the aerosol generation device 12. In this case, the mouthpiece end 54 is designed to be in contact with this mouthpiece when the cartridge 14 is fixed on the cartridge fixing end 24.

10 The cartridge body 51 defines an interior part of the cartridge 14 comprising a storing portion 62, a flow channel 63 and a cartridge part 64 of the heating system. The storing portion 62 is configured to store the vaporizable material in a liquid and/or solid form. The storing portion 62 defines a pass section 66 opening to the flow channel 63 and allowing releasing of the vaporizable material to the flow channel 63. In the example of  
15 Figure 2, the cartridge part 64 of the heating system is arranged adjacent to the pass section 66 of the storing portion 62. In this example, the cartridge part 64 of the heating system is formed by a wick and a heating element arranged for example around the wick. Thus, when the vaporizable material passes through the pass section 66, it is vaporized at least partially into the flow channel 63 by the heating element. The flow channel 63  
20 extends through the cartridge body 51 between a cartridge inlet formed on the device end 52 and a cartridge outlet formed on the mouthpiece end 54. The cartridge inlet is designed to be in fluid communication with the flow path of the aerosol generation device 12 via the device outlet, when the cartridge 14 is fixed on the fixing cartridge end 24 of the device 12. Thus, in this position of the cartridge 14, the flow path of the device 12 is extended by  
25 the flow channel 63 of the cartridge 14 and makes it possible to conduct air from the exterior of the device 12 while user puffs.

According to the invention, the cartridge body 51 further comprises a valve 71 configured to be actuated by a switching element 75. The valve 71 is moveable by the  
30 switching element 75 between an unlocked position allowing flow passage from the storage portion 62 to the flow channel 63 and a locked position inhibiting flow passage from the storage portion 62 to the flow channel 63. For this purpose, the valve 71 presents for example a closing member arranged in the pass section 66 facing the switching element 75 and moveable between a closed position wherein it seals the pass section 66  
35 and an open position wherein it is extracted at least partially from the pass section 66 and/or turned in the pass section 66 so as to not seal it. The closed position of the closing

member corresponds thus to the locked position of the valve 71 and the open position of the closing member corresponds to the unlocked position of the valve 71. Other embodiments of the valve 71 are still possible.

5 In the example of Figure 2, the switching element 75 is arranged in a recess 80 formed for example in a lateral wall of the cartridge body 51. For example, when the cartridge body 51 presents a rectangular cross-shape defining two wide sides and two narrow sides, the recess 80 can be formed in one of the lateral walls of the cartridge body 51 corresponding to one of the wide sides of this shape. Advantageously, the recess 80 is  
10 formed in the portion of the cartridge body 51 intended to be received in the cavity 26. Thus, when the cartridge 14 is fixed to the aerosol generation device 12, the recess 80 and the switching element 75 can be "hidden", i.e. be inside the cavity 26. Advantageously, the depth of the recess 80 can be adapted so as to prevent actuating of the switching element 75 by the user fingers. Depending on the shape of the switching  
15 element 75, the recess 80 can form a round or rectangular shape.

The switching element 75 is moveable in the recess 80 and is configured to change the position of the valve 71 further to changing its own position in the recess 80. According to one example, the switching element 75 is rotatable in the recess 80. In this  
20 case, the switching element 75 can be actuated by a rotating action. According to other examples, the switching element 75 is moveable in translation in the recess 80. For example, the switching element 75 can be moveable according to a direction perpendicular to the plane of Figure 2 or according to a direction of this plane which is for example perpendicular to the cartridge axis Y. In the first case, the switching element 75  
25 can be actuated by a push/pulling action and in the second case, the switching element 75 can be actuated by a sliding action. In the examples of Figures 2 and 3, the switching element 75 is moveable in the recess 80 according to a direction of the plane of these figures which is perpendicular to the cartridge axis Y. Thus, in the example of Figure 2, the switching element 75 is in a first position causing the unlocked position of the valve 71  
30 and in the example of Figure 3, the switching element 75 is in a second position causing the locked position of the valve 71. According to this example, the recess 80 and the switching element 75 have both a rectangular shape and the area of the recess 80 can be double of the area of the switching element 75 to allow two different positions of the switching element 75 inside the recess 80.

The switching element 75 can be retained in one of its positions for example by friction and/or by retaining means designed for this purpose. In the first case, the switching element 75 can for example be retained by friction exerted by walls delimiting the recess 80.

In the embodiment of the Figures, the switching element 75 defines two apertures 82, 84. These apertures 82, 84 can for example be formed by a same shape, for example a circular shape. The apertures 82, 84 can present the same dimensions and can for example be arranged along the cartridge axis Y with a distance  $d_2$  between their centres. Advantageously, the switching element 75 can be moveable from one position to the other only if it is simultaneously actuated using both apertures 82, 84. This for example can be achieved by fitting its dimensions with those of the recess 80. For example, in the case where the switching element 75 is intended to be actuated by a rotating action, the rotation axis can be formed perpendicularly to the plane of the switching element 75 with the same distance from the centres of both apertures 82, 84. Thus, in this case, the rotating action is possible only if both apertures 82, 84 are turned simultaneously in the same direction. In the case where the switching element 75 is intended to be actuated by a push/pulling or sliding action, the switching element 75 can be adapted to move in the recess 80 only when it is actuated in translation from both apertures 82, 84.

According to a particular example, the switching element 75 is provided with special locking/unlocking means intended to be actuated from the apertures 82, 84 to allow a movement of the switching element 75 inside the recess 80. For example, the locking/unlocking means may allow a movement of the switching element 75 only when a force is exerted simultaneously through both apertures 82, 84.

Other embodiments of the switching element 75 are still possible. For example, the switching element 75 can be provided with any other number of apertures having for example same and different shapes/dimensions. In a general case, the arrangement of these apertures and/or their shapes and/or dimensions form a control code of the switching element 75 making it possible to move the switching element 75 only by a control element having a shape corresponding to this code. In some embodiments, instead of apertures, the control code may be formed by protrusions or a combination of apertures and protrusions.

Referring again to Figure 1, according to the invention, the device body 21 comprises a control element 85 configured to be engaged with the switching element 75 to move the valve 71 by a manual action between the unlocked and locked positions. In other words, the control element 85 defines a shape complementary to the shape of the control code of the switching element 75 which makes it possible to move the switching element 75 between said first and second positions. Additionally, the control element 85 is configured to be actuated by a manual action corresponding to the action needed to actuate the switching element 75, i.e. rotating action, push/pulling action or sliding action, as explained above. Additionally, the control element 85 is configured to be engaged with the switching element 75 when the cartridge 14 is not fixed on the cartridge fixing end 24 of the device body 21, for example when the cartridge 14 is completely extracted from the cavity 26 in the example of Figure 1.

According to the invention, the control element 85 is attached or fixed permanently on a wall of the device body 21. It can for example form a single piece with this wall. In some embodiments, the control element 85 can protrude from a lateral wall of the device body 21. In the example of Figure 1, the control element 85 is arranged on the battery end 22 of the device body 21. Particularly, in this example, the control element 85 protrudes from the charging surface 28 of the bottom wall of the device body 21.

In one embodiment, the control element 85 is formed by at least a part of the connector 40. For example, the control element 85 can be formed by the pair of pins 42, 44 of the connector 40. In this case, the values  $d1$  and  $d2$ , and the shape/dimensions of the pins 42, 44 are adapted to be received in the apertures 82, 84.

In the embodiment of Figure 1, the control element 85 is formed by a pair of protrusions 92, 94 extending from the charging surface 28. These protrusions 92, 94 can be made in a single piece with the corresponding bottom wall of the device body 21 or can be attached to this bottom wall, for example by screwing. Advantageously, the protrusions 92, 94 can be made of a dielectric material. The distance  $d3$  between the centres of these protrusions 92, 94 is for example equal to the distance  $d2$  between the apertures 82, 84 and the shape/dimensions of the protrusions 92, 94 are adapted to be received in the apertures 82, 84. According to this example, the pins 42, 44 of the connector 40 can be integrated in the protrusions 92, 94 and can for example protrude slightly from the corresponding protrusions 92, 94 to come in electric contact with external contacts.

According to another example, the pair of pins 42, 44 may be recessed in the corresponding protrusions 92, 94.

Referring to Figure 4, the aerosol generation assembly 10 may further comprise an external connector 95 connected to an external source and configured to cooperate with the connector 40 for example to charge the battery. Advantageously, the external connector 95 may be configured to cover the control element 85 when the external connector 95 is connected to the connector 40. For this purpose, the external connector 95 may define an internal surface 97 configured to face the charging surface 28 when the external connector 95 is connected to the charging connector 40. This internal surface 97 presents for example a complementary shape to the shape of the control element 85. In a more general case, the external connector 95 may present a cap or a support designed to cover entirely the charging surface 28 of the device body 21.

An operation method of the aerosol generation assembly 10 will now be explained.

Initially, it is considered that the cartridge 14 is not fixed to the aerosol generation device 12 and the valve 71 is in the locked position as shown on Figure 3. When the user wishes to use the aerosol generation assembly 10, he/she can use the control element 85 of the device body 21 to actuate the switching element 75 which allows the valve 71 passing to the unlocked position, like it is shown on Figure 2. The cartridge 14 can be then fixed on the cartridge fixing end 24 of the device body 21 and used to generate vapour.

When the user wishes to store the cartridge 14 and prevent its leakage, he/she extracts the cartridge 14 from the cartridge fixing end 24 and actuates the switching element 75 using the control element 85 to move the valve 71 into the locked position. This is possible only if the device 12 is not being charged. Then the user can store the cartridge 14 separately from the device 12 or fix it again to the cartridge fixing end 24 of the device. In this last position, the cartridge 14 can be carried together with the device 12 without leakage.

CLAIMS

1. An aerosol generation device (12) configured to operate with a removable cartridge (14), the cartridge (14) comprising a storage portion (62) for storing a liquid vaporizable material, a flow channel (63) and a valve (71) moveable by a switching element (75) between an unlocked position allowing flow passage from the storage portion (62) to the flow channel (63) and a locked position inhibiting flow passage from the storage portion (62) to the flow channel (63);

the aerosol generation device (12) defining a device body (21) comprising:

- a cartridge fixing end (24) designed to receive the cartridge (14) to allow the aerosol generation device (12) to operate with the cartridge (14);

- a control element (85) configured to be engaged with the switching element (75), when the cartridge (14) is extracted from the cartridge fixing end (24), to move the valve (71) between said positions by a manual action exerted to the control element (85) by a user.

2. The aerosol generation device (12) according to claim 1, wherein the control element (85) presents a complementary shape to an external shape of the switching element (75).

3. The aerosol generation device (12) according to claim 1 or 2, wherein:

- the switching element (75) defines at least one aperture (82, 84) and/or at least one protrusion;

- the control element (85) defines at least one protrusion (92, 94) and/or at least one aperture configured to be engaged respectfully with said aperture (82, 84) and/or said protrusion of the switching element (75).

4. The aerosol generation device (12) according to claim 3, wherein:

- the switching element (75) defines at least two apertures (82, 84);

- the control element (85) defines at least two protrusions (92, 94) configured to be engaged simultaneously with said apertures (82, 84) to move the switching element (75) according to a rotating or push/pulling or sliding action.

5. The aerosol generation device (12) according to any one of the preceding claims, wherein said manual action exerted by the user is a rotating or push/pulling or sliding action exerted on the control element (85).

6. The aerosol generation device (12) according to any one of the preceding claims, wherein:

- the device body (21) further comprises a battery end (22);
- the control element (85) is arranged on said battery end (22).

7. The aerosol generation device (12) according to any one of the preceding claims, wherein:

- the device body (21) comprises a external surface (28) defining a connector (40);
- the control element (85) is arranged on the external surface (28).

8. The aerosol generation device (12) according to claim 7, wherein:

- the connector (40) is a charging connector designed to charge a battery of the device (12) from an external source;
- the control element (85) and the connector (40) are arranged on the external surface (28) so as to prevent from using the control element (85) with the switching element (75) while the connector (40) is connected to the external source.

9. The aerosol generation device (12) according to claim 7 or 8, wherein the connector (40) comprises a pair of pins (42, 44), the pins (42, 44) being integrated into the control element (85).

10. The aerosol generation device (12) according to claim 9, wherein:

- the control element (85) forms at least two protrusions (92, 94);
- each pin (42, 44) is integrated into one of said protrusions (92, 94) or forms this protrusion.

11. An aerosol generation assembly (10), comprising:

- a cartridge (14) comprising a storage portion (62) for storing a liquid vaporizable material, a flow channel (63) and a valve (71) moveable by a switching element (75) between an unlocked position allowing flow passage from the storage portion (62) to the flow channel (63) and a locked position inhibiting flow passage from the storage portion (62) to the flow channel (63);
- an aerosol generation device (12) according to any one of the preceding claims, configured to operate with said cartridge (14).

12. The aerosol generation assembly (10) according to claim 11, wherein the cartridge (14) defines a cartridge body (51) comprising at least one lateral wall, the switching element (75) being arranged on said lateral wall.

5           13. The aerosol generation assembly (10) according to claim 12, wherein the switching element (75) defines at least two apertures (82, 84) formed in said lateral wall, the valve (71) being arranged inside the cartridge body (51) facing said apertures (82, 84).

10           14. The aerosol generation assembly (10) according to any one of claims 11 to 13, wherein:

- the device body (21) comprises an external surface (28) defining a charging connector (40);

- the control element (85) is arranged on the external surface (28);

15           - the assembly (10) further comprises an external connector (95) connected to an external source and configured to cooperate with the charging connector (40) to charge a battery of the device (12), the external connector (95) being configured to cover the control element (85) when the external connector (95) is connected to the charging connector (40).

20           15. The aerosol generation assembly (10) according to claim 14, wherein the external connector (95) defines an internal surface (97) configured to face the external surface (28) when the external connector (95) is connected to the charging connector (40), the internal surface (97) presenting a complementary shape to the shape of the control element (85).

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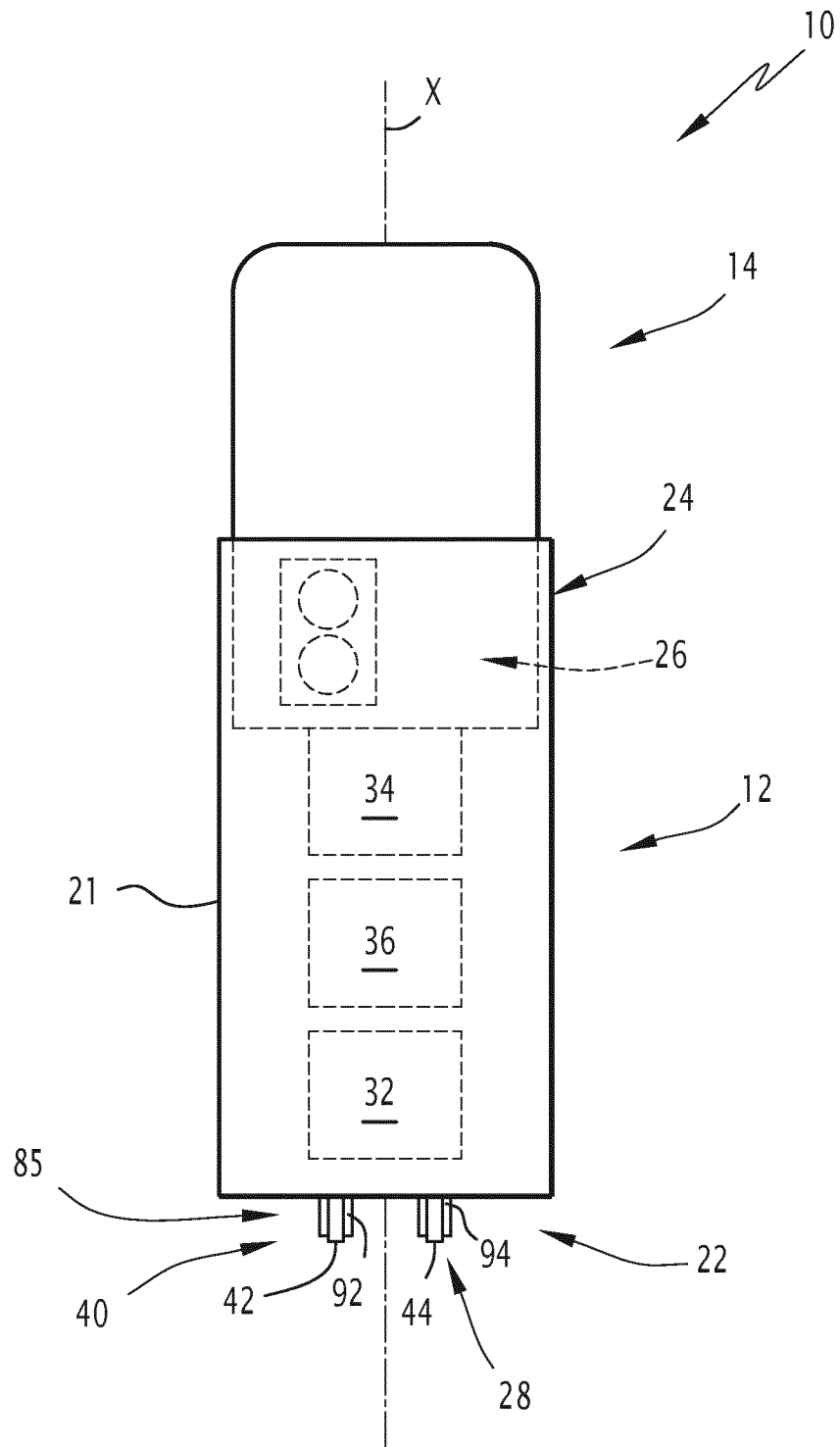


**FIG.1**

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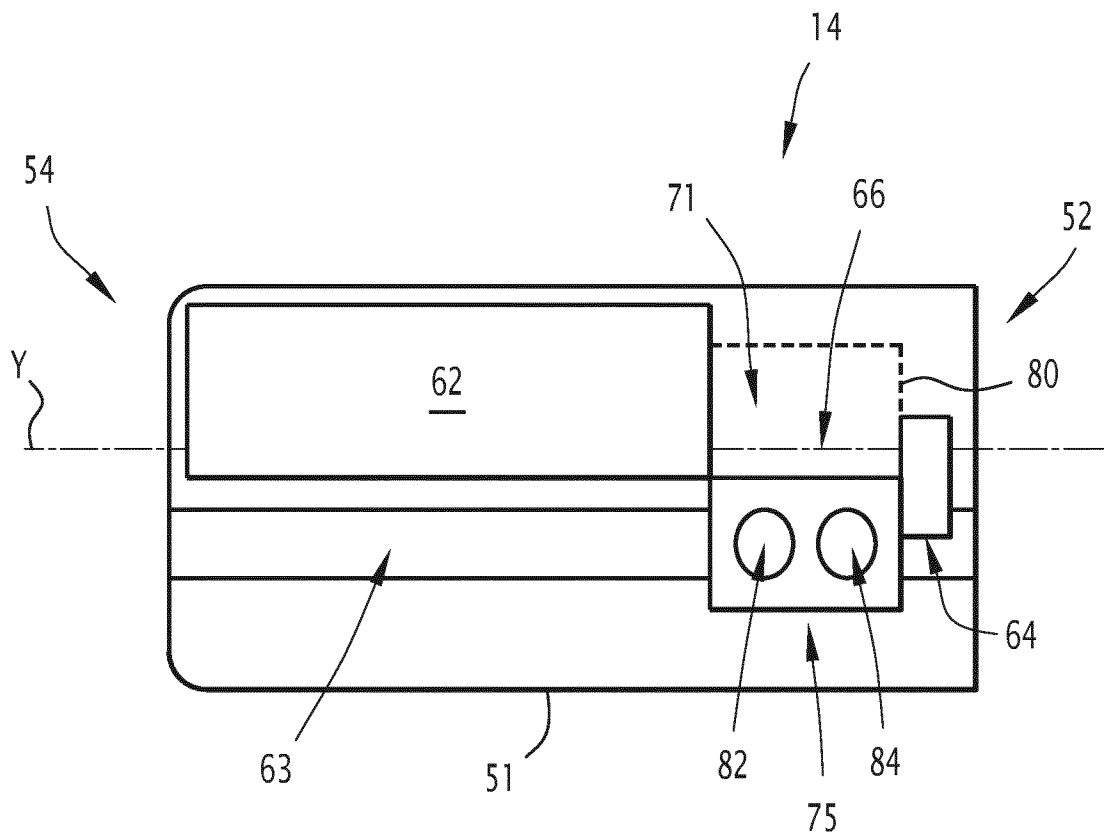


FIG.2

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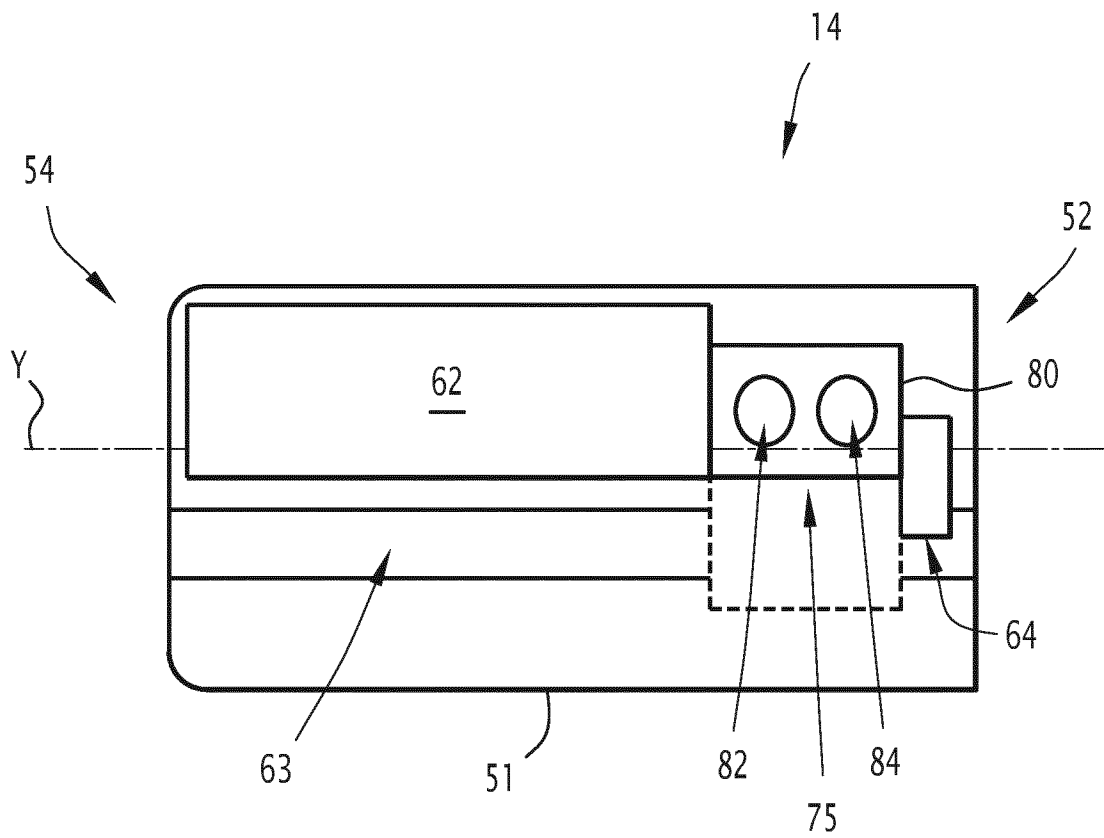


FIG.3

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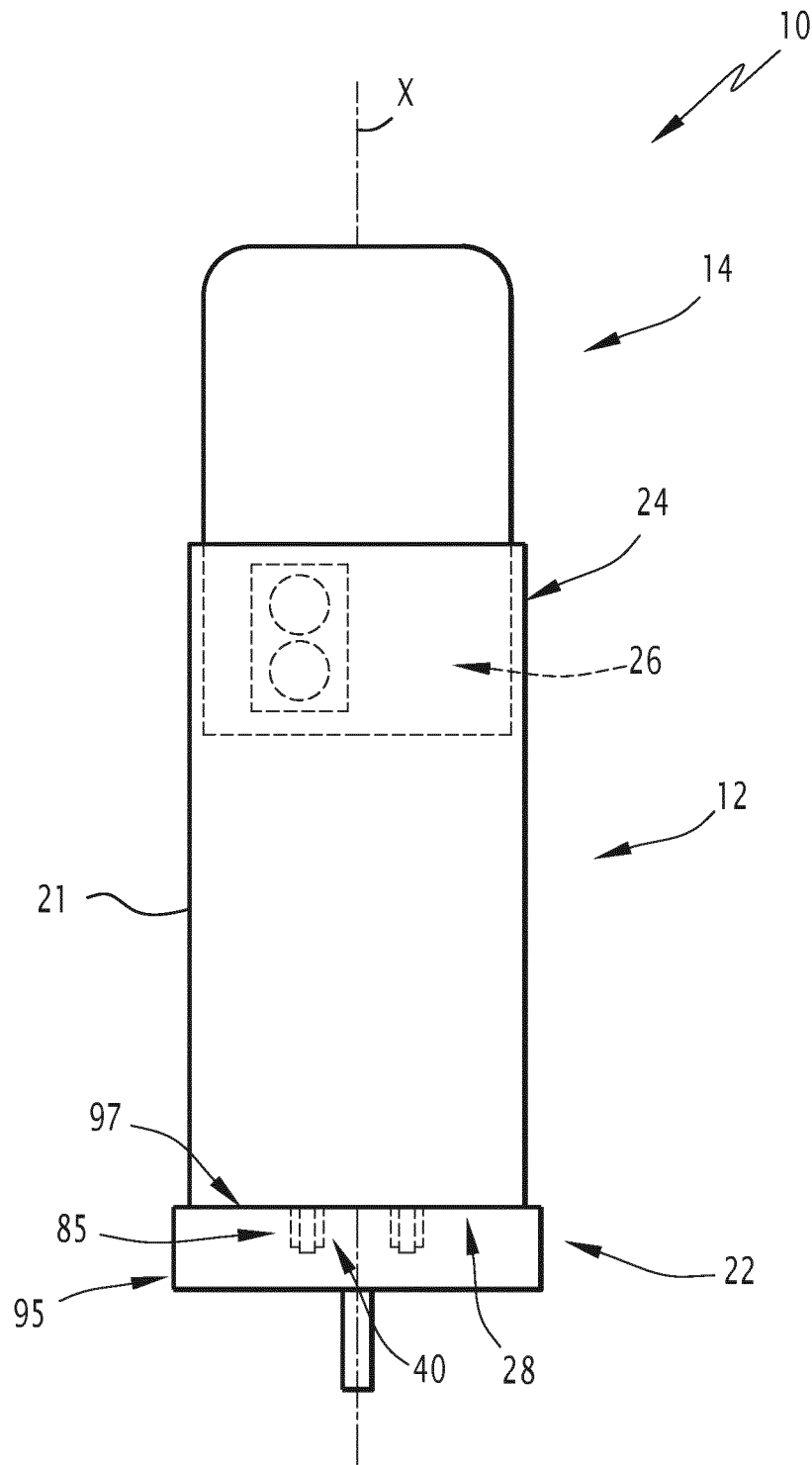


FIG.4

## INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2021/086436

## A. CLASSIFICATION OF SUBJECT MATTER

INV. **A24F40/42** **A24F40/485**

ADD.

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)

**A24F A61M**

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)

**EPO-Internal, WPI Data**

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages  | Relevant to claim No.    |
|-----------|-------------------------------------------------------------------------------------|--------------------------|
| <b>X</b>  | <b>WO 2020/124259 A1 (HEXO OPERATIONS INC [CA]) 25 June 2020 (2020-06-25)</b>       | <b>1, 3, 5-7, 11, 12</b> |
| <b>Y</b>  | <b>figures 6-12</b>                                                                 | <b>2, 4, 9, 10, 13</b>   |
| <b>A</b>  | <b>paragraph [0194] - paragraph [0195]</b>                                          | <b>8, 14, 15</b>         |
|           | -----                                                                               |                          |
| <b>X</b>  | <b>US 2015/027470 A1 (KANE DAVID B [US] ET AL) 29 January 2015 (2015-01-29)</b>     | <b>1, 3, 5-7, 11, 12</b> |
| <b>Y</b>  | <b>figures 2, 5 and 6</b>                                                           | <b>2, 4, 9, 10, 13</b>   |
| <b>A</b>  | <b>paragraph [0033] - paragraph [0035]</b>                                          | <b>8, 14, 15</b>         |
|           | -----                                                                               |                          |
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|           | <b>passages of the description relating to figures 5-8;</b>                         |                          |
|           | <b>figures 5-8</b>                                                                  |                          |
|           | -----                                                                               |                          |



Further documents are listed in the continuation of Box C.



See patent family annex.

\* Special categories of cited documents :

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"&amp;" document member of the same patent family

Date of the actual completion of the international search

**28 March 2022**

Date of mailing of the international search report

**05/04/2022**

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2021/086436

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