(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 459 372 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
27.03.2019 Bulletin 2019/13

(51) Int Cl.:
A24F 47/00 *(2006.01)*

(21) Application number: **17192996.1**

(22) Date of filing: **25.09.2017**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
MA MD

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(54) **CONSUMABLE CARTRIDGE FOR AN AEROSOL GENERATION DEVICE**

(57) An aerosol generation device 10 is disclosed. The aerosol generation device 10 comprises a coil 12 operatively connected to an energy source 20. The coil 12 includes an end 16 configured to penetrate a casing of a consumable cartridge 30 comprising an aerosol forming material, wherein energy from the energy source 20 causes the coil 12 to transfer heat to the aerosol forming material to form an aerosol.

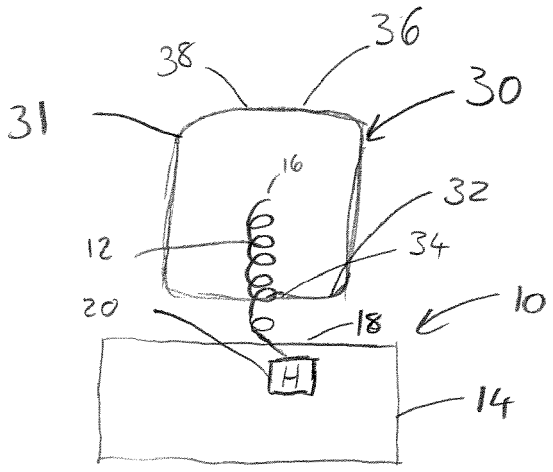

FIG.3

EP 3 459 372 A1

Description

[0001] The present invention relates to a consumable cartridge for use with an aerosol generation device.

[0002] A number of new generation smoking devices have been introduced that seek to provide an alternative to conventional cigarettes. One such device is described in EP 2772148A2. In this arrangement a smoking device is provided with a mouthpiece, a casing, an electrical heater and a battery. A consumable cartridge can be installed in the device adjacent the heater. The consumable cartridge has a casing which encloses tobacco material. The cartridge also includes perforations and aeration wells. The heater can heat the casing of the cartridge, causing the tobacco contained within to heat without burning, which releases an aerosol. This aerosol or vapour can then be inhaled by a user through the mouthpiece.

[0003] After a period of use the consumable cartridge becomes depleted. A user can then remove and replace the consumable cartridge.

[0004] It may be desirable to improve the efficiency of the heat transfer to the tobacco within the cartridge. It may also be desirable to securely and removably attach the cartridge within the device.

[0005] According to an aspect of the invention there is provided an aerosol generation device, comprising: an energy source; and a coil, operatively connected to the energy source, the coil comprising: an end arranged to penetrate a casing of a consumable cartridge comprising an aerosol forming material; wherein energy from the energy source causes the coil to transfer heat to the aerosol forming material to form an aerosol.

[0006] Advantageously, as the coil penetrates the cartridge there is an increased region that is in contact with the aerosol forming material. This can help to reduce the presence of localised hot spots within the aerosol forming material. Thus, the aerosol generation device may require less power, than in other aerosol generation devices, to achieve the same heat transfer to the aerosol forming material.

[0007] The aerosol forming material may include a carrier material, which may include a mixture of propylene glycol (PG) and/or glycerin (G). Preferably, the carrier material has a composition of at least 20wt%. The aerosol forming material may include ground tobacco particles (e.g. in addition to the carrier material). The aerosol forming material may include other materials, such as a flavouring and water etc.

[0008] The coil also provides a secure attachment between the aerosol generation device and the cartridge. Preferably the cartridge cannot be pulled straight off the coil and has to be removed with a screwing motion.

[0009] The coil may have a helical shape. The coil may be either right handed or left handed. In some embodiments, the pitch of the coil, i.e. the height of one complete turn measured parallel to the axis of the coil, may vary along the length of the coil. In other embodiments the pitch may be constant.

[0010] The pitch of the coil may be selected for purpose. Preferably, the coil may have two turns. Alternatively, the coil include three, four, five, or more turns. This may ensure optimum heat transmission balanced against ease of insertion into the cartridge. Having a pitch that is too fine (lots of turns per axial distance) may not be not optimal as removal and replacement of the cartridge may take too long.

[0011] Preferably, the energy source is a heater and the coil is conductively connected to the heater. Advantageously, this enables efficient transfer of heat from the aerosol generation device to the consumable cartridge. In another arrangement the energy source may be an electrical power source electrically connected to the coil, such that the coil generates heat through resistive heating.

[0012] Preferably, the end configured to penetrate the casing is sharp. This improves the ability of the coil to pierce and penetrate the casing of the cartridge. The tapering of the end of the coil forms the sharp end. The coil may decrease in thickness towards its end, forming a sharp point.

[0013] According to a further aspect there is provided a system which comprises the aerosol generation device of the above aspect and a consumable cartridge. The casing of the consumable cartridge provides an outer surface that is configured to be perforated when the coil is incident upon it, whilst also containing the aerosol generating material.

[0014] Preferably, the casing comprises a base portion with a receiving region for the coil to penetrate. In this way the coil can penetrate the cartridge in a predetermined position. This aids the user when inserting the cartridge into the aerosol generation device. In some instances, the thickness of the receiving region may be less than the thickness of other parts of the casing.

[0015] Preferably, the receiving region comprises a well, the well configured to be perforated and penetrated by the coil. The well may include a perforation in the casing, or a region of weakness, which the coil can penetrate. The well is preferably circular. However, any shape of well could be provided such as rectangular, or square.

[0016] Preferably, the receiving region comprises a hole through which the coil can penetrate. It is preferable that the hole is small such that the contents of the cartridge do not fall out of the cartridge. The size of the hole may be selected so that it is smaller than the smallest typical size of particle in the aerosol generating material. The size of the hole may enlarge when the coil is inserted into the cartridge.

[0017] Preferably, the casing comprises a top portion distal to the base portion, wherein the coil is configured to extend through a portion of the consumable cartridge between the base portion and the top portion. This can help to prevent the presence of local hot spots within the aerosol forming material. In another arrangement the coil may be configured to extend through the entire length of

the consumable cartridge between the base portion and the top portion.

[0018] Preferably, the casing of the consumable cartridge comprises metal. Advantageously, metal casing provides reliable protection for the contents of the cartridge. Metal casing is also capable of withstanding the temperatures at which the device operates. Accordingly, the coil must be made of a material that is sufficiently durable and strong such that it can pierce and/or penetrate the casing.

[0019] Alternatively, the casing may be comprised of another type of material, such as ceramic or high temperature plastic.

[0020] In one arrangement the base portion is comprised of a different material to the other parts of the casing. Alternatively, or additionally, the receiving region may be made out of a different material to other parts of the casing. This may make the base portion easier to pierce and/or penetrate. For instance, this may be a softer metal, or a plastic material. The thickness of the base portion may also be thinner than the rest of the casing.

[0021] The casing may comprise a point of weaking. Alternatively, or in addition, the casing comprises a material selected to be perforated by an end of the coil under the action of a user. This may be a deformable metal such as aluminium.

[0022] Preferably, the coil is shorter than the cartridge. Advantageously, as the coil is shorter than the cartridge, it does not pierce the opposite side of the cartridge which could lead to injury, as this may inadvertently impact the user's hand.

[0023] According to a further aspect there is provided a consumable cartridge for an aerosol generation device, the consumable cartridge comprising: an aerosol forming material that can form an aerosol upon receiving heat from the aerosol generation device; and a casing configured to be perforated by a coil of the aerosol generation device, such that the coil can transfer heat to the aerosol forming material to form an aerosol.

[0024] According to a further aspect there is provided, the use of a cartridge for the aerosol generation device according to the previous aspect, or the system of the previous aspect.

[0025] According to a further aspect there is provided, a method of generating an aerosol comprising: rotating a consumable cartridge relative to an aerosol generating device to effect a coil of the aerosol generating device to perforate the consumable cartridge; and applying heat through the coil to an aerosol forming material arranged in the consumable cartridge to generate aerosol therefrom.

[0026] The method may be performed using the consumable cartridge, aerosol generation device or system of the previous aspects.

[0027] Embodiments of the invention are now described, by way of example, with reference to the drawings, in which:

Figure 1 is a front view of an example aerosol generation device in an embodiment of the invention;

Figure 2 is a is a front view of an example aerosol generation device in another embodiment of the invention;

Figure 3 is a front view of an example aerosol generation device depicted in Figure 1 connected to a cartridge according to an embodiment of the invention;

Figure 4 is a bottom view of the cartridge depicted in Figure 3.

[0028] Figure 1 shows an aerosol generation device 10 in a first embodiment of the invention. The aerosol generation device 10 includes a coil 12 attached to a body 14 of the aerosol generation device 10. The body 14 is the region of the aerosol generation device 10 configured to be in contact with the cartridge. The coil 12 has a first end 18 attached to the body 14 and a second sharp end 16 that extends outwards, protruding from the body 14 of the aerosol generation device 10. The first end 18 of the coil 12 is attached to a heater 20.

[0029] Figure 2 shows a further embodiment of the aerosol generation device 10 where rather than having a heater 20, an electric power source 24 is electrically connected to the first end 18 of the coil 12.

[0030] In the embodiment shown in Figure 2, the electrical power source 24 is in the form of the first end of the coil 18 having two electrical connections, which are insulated from one another along the length of the coil 12 to prevent a short circuit. The electrical paths are electrically connected to one another near the second sharp end 16 of the coil 12.

[0031] Figure 3 shows the aerosol generation device 10 of Figure 1 along with a consumable cartridge 30.

[0032] The cartridge 30 has a generally cylindrical shape with a circular cross-section and a domed top. However, the cartridge 30 may have any shape that the skilled person would understand. The cartridge 30 has an outer metal casing 31 which accommodates tobacco (not shown) within. A number of other products and ingredients may be provided within the outer casing 31, as will be appreciated by a person skilled in the art.

[0033] The coil 12 of the aerosol generation device 10 is shown to extend through a bottom end 32 of the outer casing 31 of the cartridge 30 such that the second end 16 of the coil 12 is located within the body of the cartridge 30.

[0034] Figure 4 shows a bottom view of the consumable cartridge 30 of Figure 3, showing a receiving region 34 located on the bottom end 32, for receiving the second end 16 of the coil 12. The receiving region 34 shown in Figure 4 is a circular well. Alternatively, the receiving region 34 may be a hole that extends through the casing 31. The shape of the receiving region 34 may be any

shape that can accommodate the second end 16 of the coil 12.

[0035] The bottom end 32 of the casing 31 may be made of the same material as the rest of the casing 31. Alternatively, the entire bottom end 32, or a portion of it, may be made of a different type of material to the rest of the casing 31 to enable the coil 12 to easier pierce the casing 31.

[0036] In use, the sharp second end 16 of the coil 12 pierces the metal casing 31 of the cartridge 30 through the weakened receiving portion 34 on the bottom end 32. The cartridge 30 is threaded onto the coil 12, such that the coil 12 is located internally within the cartridge 30. Depending on the length of the coil 12 and the cartridge 30, and how far the coil 12 is inserted into the cartridge 30, the coil 12 may extend through the entire length of the cartridge 30, or may only extend through a portion of the cartridge 30.

[0037] Once the cartridge 30 is attached to the aerosol generation device 10 through engagement with the coil 12, the heater 20 can supply heat conductively to the coil 12, such that heat is transferred to the cartridge 30 through the coil 12. This causes the tobacco within the cartridge 30 to be heated. Vapours that are produced by the tobacco can exit the cartridge 30 through the vent holes 36 located in the top of the cartridge 38. Although it should be understood that vent holes 36 may be present in any section of the outer casing 31 of the cartridge 30.

[0038] In the embodiment shown in Figure 2, the heat is provided by an electric current supplied by the electric power source 24 to the coil 12, via the two electrical connections. The electrical current causes the coil 12 to resistively heat, with the heat transferred from the coil 12 to the aerosol forming material within the cartridge 30 when attached as shown in Figure 3.

[0039] Other types of heating devices may be used that the skilled person would be aware of.

[0040] The coil 12 provides a secure attachment between the aerosol generation device 10 and the cartridge 30, whilst increasing the surface area that is in contact with the aerosol generation device 10, enabling efficient transfer of heat.

[0041] After use the cartridge 30 can be unscrewed from the coil 12 and disposed of or alternatively refilled.

Claims

1. An aerosol generation device, comprising:

an energy source; and
a coil, operatively connected to the energy source, the coil comprising:

an end arranged to penetrate a casing of a consumable cartridge comprising an aerosol forming material;
wherein energy from the energy source causes the coil to transfer heat to the aerosol forming material to form an aerosol.

2. The aerosol generation device of claim 1, wherein the energy source is a heater and the coil is conductively connected to the heater.

3. The aerosol generation device of claim 1, wherein the energy source is an electrical power source electrically connected to the coil, such that the coil generates heat through resistive heating.

4. A system comprising the aerosol generation device of any preceding claim, and a consumable cartridge.

5. The system of claim 4, wherein the casing comprises a base portion with a receiving region for the coil to penetrate.

6. The system of claim 5, wherein the receiving region comprises a well, the well configured to be perforated and penetrated by the coil.

7. The system of claim 5, wherein the receiving region comprises a hole through which the coil can penetrate.

8. The system of claims 5 to 7, wherein the casing comprises a top portion distal to the base portion, wherein the coil is configured to extend through a portion of the consumable cartridge between the base portion and the top portion.

9. The system of claims 5 to 8 wherein the casing comprises a top portion distal to the base portion, wherein the coil is configured to extend through the entire length of the consumable cartridge between the base portion and the top portion.

10. The system of claims 4 to 9, wherein the casing of the consumable cartridge comprises metal.

11. A consumable cartridge for an aerosol generation device, the consumable cartridge comprising:

an aerosol forming material adapted to form an aerosol upon receiving heat from the aerosol generation device; and
a casing configured to be perforated by a coil of the aerosol generation device, such that the coil can transfer heat to the aerosol forming material to form an aerosol.

12. The consumable cartridge of claim 11, wherein the casing comprises a base portion having a receiving region for the coil to penetrate.

13. The consumable cartridge of claim 12, wherein the

receiving region comprises a well, the well configured to be perforated and penetrated by the coil.

14. The consumable cartridge of claim 12, wherein the receiving region comprises a hole through which the coil can penetrate.

15. The consumable cartridge of claims 11 to 14, wherein the casing of the consumable cartridge comprises metal.

16. Use of a cartridge for the aerosol generation device according to any of claims 1 - 3, or the system of claims 4 to 10.

17. A method of generating an aerosol comprising:

rotating a consumable cartridge relative to an aerosol generating device to effect a coil of the aerosol generating device to perforate the consumable cartridge; and
applying heat through the coil to an aerosol forming material arranged in the consumable cartridge to generate aerosol therefrom.

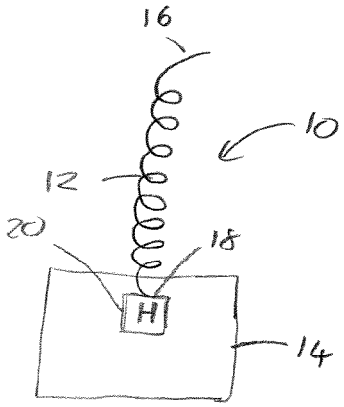

FIG. 1

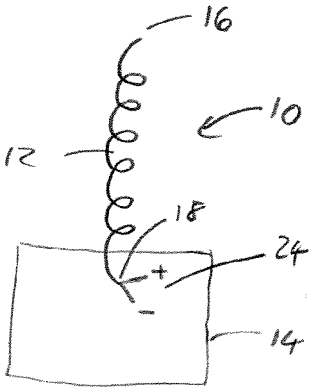

FIG. 2

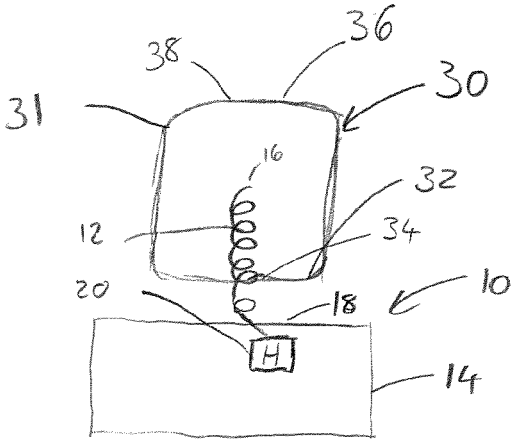

FIG. 3

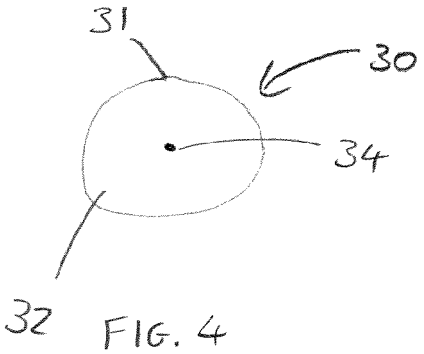

FIG. 4

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EUROPEAN SEARCH REPORT

Application Number
EP 17 19 2996

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	19 December 2017	Caballero Martínez

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