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(54) AN AEROSOL GENERATING SYSTEM COMPRISING A DISABLING ELEMENT

(57) An aerosol generating system (10) for generating an aerosol for inhalation by a user. The aerosol generating system (10) comprising an aerosol generating device (12). The aerosol generating device (12) comprises a heating assembly (13), including a heating compartment (15), and a controller (14). The aerosol generating system (10) further comprises an aerosol generating article (16) receivable in the heating compartment (13). The aerosol generating article (16) comprises an aerosol generating substrate and a disabling element (20). The dis-

abling element (20) is configured such that a single use of the aerosol generating article (16) causes a temperature induced change of shape of the disabling element (20) from a first shape configuration (22) to a second shape configuration (24). The controller (14) is configured to detect the shape of the disabling element (20) and to render the aerosol generating device (12) inoperable before initiation of a vaping session if the second shape configuration (24) is detected.

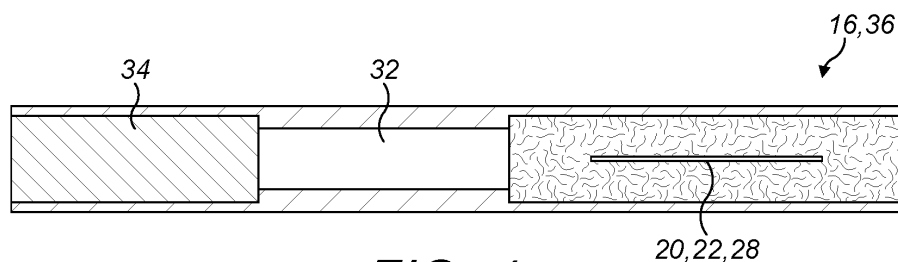


FIG. 4a

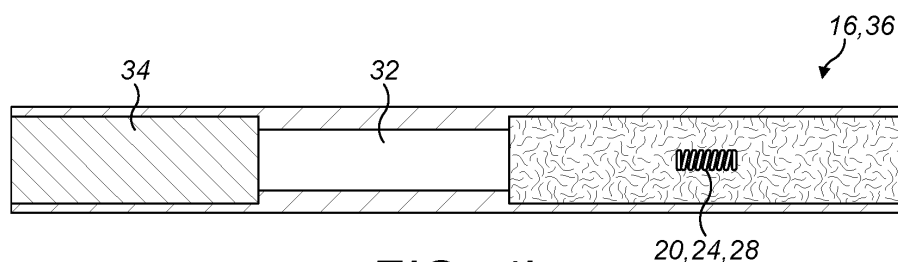


FIG. 4b

Description**Technical Field**

[0001] The present disclosure relates generally to an aerosol generating system, and more particularly to an aerosol generating system comprising an aerosol generating device and an aerosol generating article. Embodiments of the present disclosure also relate to an aerosol generating article and an aerosol generating device.

Technical Background

[0002] The popularity and use of reduced-risk or modified-risk devices (also known as vaporisers) has grown rapidly in recent years as an alternative to the use of traditional tobacco products. Various devices and systems are available that heat or warm, rather than burn, an aerosol generating substrate to generate an aerosol for inhalation by a user.

[0003] A commonly available reduced-risk or modified-risk device is the aerosol generating device, or so-called heat-not-burn device. Devices of this type generate an aerosol or vapour by heating an aerosol generating substrate, for instance comprised in an aerosol generating article such as a heated tobacco stick, to a temperature typically in the range 150°C to 300°C. Heating the aerosol generating substrate to a temperature within this range, without burning or combusting the aerosol generating substrate, generates a vapour which typically cools and condenses to form an aerosol for inhalation by a user of the device during a vaping session. The aerosol generating device and the aerosol generating article together form an aerosol generating system.

[0004] Currently available aerosol generating systems may not prevent re-use of an aerosol generating article, which can be harmful for a user. There is, therefore, a need to provide an aerosol generating system which mitigates this drawback.

Summary of the Disclosure

[0005] According to a first aspect of the present disclosure, there is provided an aerosol generating system for generating an aerosol for inhalation by a user, the aerosol generating system comprising:

an aerosol generating device, the aerosol generating device comprising:

a heating assembly including a heating compartment; and
a controller;

the aerosol generating system further comprising:
an aerosol generating article receivable in the heating compartment, the aerosol generating article comprising:

an aerosol generating substrate; and
a disabling element, wherein the disabling element is configured such

that a single use of the aerosol generating article causes a temperature induced change of shape of the disabling element from a first shape configuration to a second shape configuration, wherein the controller is configured to detect the shape of the disabling element and to render the aerosol generating device inoperable before initiation of a vaping session if the second shape configuration is detected.

[0006] A single use of an aerosol generating article is defined as heating an aerosol generating substrate of an un-used, i.e., never used, aerosol generating article above a threshold temperature. The threshold temperature corresponds to the temperature at which the disabling element changes shape from the first shape configuration to the second shape configuration, i.e., the transition temperature of the material of the disabling element. The threshold temperature is between the maximum storage temperature of the aerosol generating article and the starting temperature of a vaping session. The starting temperature of a vaping session is typically more than about 150°C. In some examples, the threshold temperature may be between about 50°C to about 150°C. Accordingly, in such examples the transition temperature of the material of the disabling element is between about 50°C to about 150°C. In other examples, the threshold temperature may be between about 70°C to about 150°C. Accordingly, in such examples the transition temperature of the material of the disabling element is between about 70°C to about 150°C.

[0007] A single use of an aerosol generating article may occur independently of use of the aerosol generating article during a vaping session, provided the aerosol generating substrate of the aerosol generating article has been heated above the threshold temperature. Accordingly, all that is required for a single use of an aerosol generating article is for the aerosol generating substrate to be heated above the threshold temperature.

[0008] Examples of the disclosure therefore permit only a single use of an aerosol generating article based on the detection by the controller of the first shape configuration. Detection of the second shape configuration by the controller, which indicates that the aerosol generating article has already been used, renders the aerosol generating device inoperable before initiation of a vaping session. Accordingly, examples of the disclosure prevent re-use of a previously used aerosol generating article.

[0009] In some examples, detection of the second shape configuration causes the aerosol generating device to be rendered inoperable before commencement of heating of the aerosol generating substrate. In such examples, initiation of a vaping session means commencing heating of the aerosol generating substrate. Accordingly, in such examples the controller is configured

to detect the shape of the disabling element and to render the aerosol generating device inoperable before commencing heating of the aerosol generating substrate if the second shape configuration is detected. In examples of the disclosure, a user is therefore prevented from using the aerosol generating article partially in one session and re-using the same aerosol generating article in another second session.

[0010] The provision of disabling elements in aerosol generating articles can make it more difficult to manufacture counterfeit aerosol generating articles.

[0011] The controller may be configured to render the aerosol generating device inoperable by disabling heating of the aerosol generating substrate. The controller may be configured to enable heating of the aerosol generating substrate to initiate a vaping session only if the first shape configuration is detected.

[0012] Possibly, the aerosol generating device comprises a sensing coil configured to inductively couple with the disabling element, wherein the inductive coupling between the sensing coil and the disabling element is different for the first and second shape configurations, wherein the controller is configured to render the aerosol generating device inoperable based on detection of an inductive coupling corresponding to the second shape configuration. The heating assembly may be an induction heating assembly comprising an induction coil, wherein the induction coil provides the sensing coil. The disabling element may comprise an inductively heatable susceptor, wherein the inductively heatable susceptor is inductively heatable in use by the induction coil to heat the aerosol generating substrate.

[0013] The aerosol generating article may be configured such that the disabling element is in direct contact with the aerosol generating substrate.

[0014] Alternatively, the aerosol generating article may be configured such that the disabling element is spaced apart from the aerosol generating substrate. The disabling element may be disposed in a channel separating the aerosol generating substrate from a mouthpiece of the aerosol generating article.

[0015] The disabling element may comprise a shape-memory alloy. The shape-memory alloy may have a one-way memory effect such that upon cooling after a single use of the aerosol generating article the disabling element retains the second shape configuration. Possibly, the first shape configuration is substantially straight; and wherein the second shape configuration comprises curved portions. Possibly, the first shape configuration is substantially rod shaped; and wherein the second shape configuration is substantially spiral or spring shaped.

[0016] The inductive coupling between the sensing coil and the disabling element in the first shape configuration is most different from the inductive coupling between the sensing coil and the disabling element in the second shape configuration when the first shape configuration is straight, for example substantially rod shaped, and the

second shape configuration comprises curved portions, for example spiral shaped such as a spring. Such first and second shape configurations therefore best enable the first and second shape configurations to be distinguished from one another.

[0017] The aerosol generating article may be a heated tobacco stick.

[0018] According to a second aspect of the present disclosure, there is provided an aerosol generating article, the aerosol generating article comprising an aerosol generating substrate and a disabling element, wherein the disabling element is configured such that a single use of the aerosol generating article causes a temperature induced change of shape of the disabling element from a first shape configuration to a second shape configuration.

[0019] In use, when the aerosol generating article is received in a heating compartment of the aerosol generating device, detection of the second shape configuration by a controller of the aerosol generating device renders the aerosol generating device inoperable before initiation of a vaping session. Accordingly, the aerosol generating article is configured for only a single use, i.e., to be used only once.

[0020] According to a third aspect of the present disclosure, there is provided an aerosol generating device, the aerosol generating device comprising:

a heating assembly including a heating compartment for receiving an aerosol generating article, the aerosol generating article comprising an aerosol generating substrate and a disabling element, wherein the disabling element is configured such that a single use of the aerosol generating article causes a temperature induced change of shape of the disabling element from a first shape configuration to a second shape configuration; the aerosol generating device further comprising:

a controller, wherein the controller is configured to detect the shape of the disabling element and to render the aerosol generating device inoperable before initiation of a vaping session if the second shape configuration is detected.

[0021] Accordingly, the aerosol generating device prevents re-use of a previously used aerosol generating article according to examples of the disclosure.

Brief Description of the Drawings

[0022]

Figure 1 is a diagrammatic cross-sectional view of an aerosol generating system comprising an aerosol generating device and an aerosol generating article; Figure 2a is a diagrammatic view of a disabling element in a first condition;

Figure 2b is a diagrammatic view of the disabling element of Figure 2a in a second condition;

Figure 3a is a diagrammatic cross-sectional view of another aerosol generating system wherein the aer-

osol generating article has a disabling element in the first condition; and

Figure 3b is a diagrammatic cross-sectional view of the aerosol generating system of Figure 3a wherein the disabling element of the aerosol generating article is in the second condition;

Figure 4a is a diagrammatic cross-sectional view of an aerosol generating article having a disabling element in the first condition;

Figure 4b is a diagrammatic cross-sectional view of the aerosol generating article of Figure 4a wherein the disabling element is in the second condition;

Figure 5a is a diagrammatic cross-sectional view of another aerosol generating article having a disabling element in the first condition; and

Figure 5b is a diagrammatic cross-sectional view of the aerosol generating article of Figure 5a wherein the disabling element is in the second condition.

Detailed Description of Embodiments

[0023] Embodiments of the present disclosure will now be described by way of example only and with reference to the accompanying drawings.

[0024] Referring initially to Figure 1, there is shown diagrammatically an example of an aerosol generating system 10 according to the present disclosure. The aerosol generating system 10 comprises an aerosol generating device 12 and an aerosol generating article 16. The aerosol generating device 12 is configured to be used with the aerosol generating article 16 such that the aerosol generating device 12 and the aerosol generating article 16 together form the aerosol generating system 10.

[0025] The aerosol generating device 12 may equally be referred to as a "heated tobacco device", a "heat-not-burn tobacco device", a "device for vaporising tobacco products", and the like, with this being interpreted as a device suitable for achieving these effects. The features disclosed herein are equally applicable to devices which are designed to vaporise any aerosol generating substrate.

[0026] The aerosol generating device 12 is a hand-held, portable, device, by which it is meant that a user is able to hold and support the device unaided, in a single hand. The aerosol generating device 12 has a first (or proximal) end 38 and a second (or distal) end 40 and comprises a device housing 42.

[0027] The aerosol generating device 12 includes a controller 14. The aerosol generating device 12 may include a user interface for controlling the operation of the aerosol generating device 12 via the controller 14.

[0028] The controller 14 is configured to detect the initiation of use of the aerosol generating device 12 in response to a user input, such as a button press to activate the aerosol generating device 12, or in response to a detected airflow through the aerosol generating device 12. As will be understood by one of ordinary skill in the art, an airflow through the aerosol generating device 12

is indicative of a user inhalation or 'puff'. The aerosol generating device 12 may, for example, include a puff detector, such as an airflow sensor (not shown), to detect an airflow through the aerosol generating device 12.

[0029] The controller 14 includes electronic circuitry. The aerosol generating device 12 includes a power source 44, such as a battery. The power source 44 and the electronic circuitry may be configured to operate at a high frequency. The power source 44 and the electronic circuitry may be configured to operate at a frequency of between approximately 80 kHz and 500 kHz, possibly between approximately 150 kHz and 250 kHz, and possibly at approximately 200 kHz. The power source 44 and the electronic circuitry could be configured to operate at a higher frequency, for example in the MHz range, if required.

[0030] The aerosol generating device 12 comprises a heating assembly 13. In the illustrated examples, the heating assembly 13 is an induction heating assembly 18.

[0031] The heating assembly 13 further comprises a heating compartment 15. The heating compartment 15 is arranged to receive an aerosol generating article 16. In some examples, the heating compartment 15 has a substantially cylindrical cross-section. The heating compartment 15 defines a cavity.

[0032] The heating compartment 15 has a first end 48 and a second end 50. The heating compartment 15 includes an opening 52 at the first end 48 for receiving an aerosol generating article 16. In the illustrated example, the heating compartment 15 includes a substantially cylindrical side wall 54, i.e., a side wall 54 which has a substantially circular cross-section.

[0033] The aerosol generating article 16 comprises an aerosol generating substrate. The aerosol generating substrate may be any type of solid or semi-solid material. Example types of aerosol generating solids include powder, granules, pellets, shreds, strands, particles, gel, strips, loose leaves, cut leaves, cut filler, porous material, foam material or sheets. The aerosol generating substrate may comprise plant derived material and in particular, may comprise tobacco. It may advantageously comprise reconstituted tobacco.

[0034] The aerosol generating substrate may comprise an aerosol-former. Examples of aerosolformers include polyhydric alcohols and mixtures thereof such as glycerine or propylene glycol. Typically, the aerosol generating substrate may comprise an aerosol-former content of between approximately 5% and approximately 50% on a dry weight basis. In some example, the aerosol generating substrate may comprise an aerosol-former content of between approximately 10% and approximately 20% on a dry weight basis, and possibly approximately 15% on a dry weight basis.

[0035] Upon heating, the aerosol generating substrate may release volatile compounds. The volatile compounds may include nicotine or flavour compounds such as tobacco flavouring.

[0036] The shape of the aerosol generating article 16 corresponds to the shape of the heating compartment 15. The aerosol generating article 16 may be generally cylindrical or rod-shaped. The aerosol generating article may be formed substantially in the shape of a stick, and may broadly resemble a cigarette, having a tubular region with an aerosol generating substrate arranged in a suitable manner. The aerosol generating article 16 may be a disposable and replaceable article which may, for example, contain tobacco as the aerosol generating substrate. The aerosol generating article 16 may be a heated tobacco stick 36.

[0037] The aerosol generating article 16 has a first end 56 (or mouth end), a second end 58, and comprises a filter 60 at the first end 56. The filter 60 acts as a mouth-piece 34 and may comprise an air-permeable plug, for example comprising cellulose acetate fibres.

[0038] The aerosol generating substrate and filter 60 may be circumscribed by a paper wrapper and may, thus, be embodied as an aerosol generating article 16. One or more vapour collection regions, cooling regions, and other structure may also be included in some designs.

[0039] To use the aerosol generating device 12, a user inserts an aerosol generating article 16 through the opening 52 into the heating compartment 15, so that the second end 58 of the aerosol generating article 16 is positioned at the second end 50 of the heating compartment 15 and so that the filter 60 at the first end 56 of the aerosol generating article 16 projects from the first end 48 of the heating compartment 15 to permit engagement by a user's lips.

[0040] The induction heating assembly 18 of the illustrated example further comprises an induction coil 30. The induction coil 30 is arranged to be energised to generate an alternating electromagnetic field for inductively heating an induction heatable susceptor 28.

[0041] In the example illustrated in Figure 1, the induction heatable susceptor 28 is arranged around the periphery of the heating compartment 15. Alternatively, the induction heatable susceptor 28 may be arranged to project into the heating compartment 15 from the second end 50 (e.g., as a heating blade or pin) to penetrate the aerosol generating substrate. In other examples, the induction heatable susceptor 28 is instead provided in the aerosol generating substrate during manufacture of the aerosol generating article 16. In such examples, the aerosol generating article 16 comprises the induction heatable susceptor 28.

[0042] In use, i.e., during a vaping session, heat from the induction heatable susceptor 28 is transferred to the aerosol generating substrate of an aerosol generating article 16 positioned in the heating compartment 15, for example by conduction, radiation and convection, to heat the aerosol generating substrate (without burning the aerosol generating substrate) and thereby generate a vapour which cools and condenses to form an aerosol for inhalation by a user of the aerosol generating device 12, for instance, through the filter 60. The vaporisation

of the aerosol generating substrate is facilitated by the addition of air from the surrounding environment, e.g., through an air inlet (not shown). Initiation of a vaping session therefore requires that the aerosol generating substrate of the aerosol generating article 16 is heated to a temperature required to generate a vapour, which is typically above 150°C and in the range of 150°C to 300°C.

[0043] In general terms, a vapour is a substance in the gas phase at a temperature lower than its critical temperature, which means that the vapour can be condensed to a liquid by increasing its pressure without reducing the temperature, whereas an aerosol is a suspension of fine solid particles or liquid droplets, in air or another gas. It should, however, be noted that the terms 'aerosol' and 'vapour' may be used interchangeably in this specification, particularly with regard to the form of the inhalable medium that is generated for inhalation by a user.

[0044] The induction coil 30 can be energised by the power source 44 and controller 14. The induction coil 30 may comprise a Litz wire or a Litz cable. It will, however, be understood that other materials could be used.

[0045] In the illustrated example, the induction coil 30 extends around the heating compartment 15. Accordingly, the induction coil 30 is annular. In the illustrated example, the induction coil 30 is substantially helical in shape. In some examples, the circular cross-section of a helical induction coil 30 may facilitate the insertion of an aerosol generating article 16 and optionally one or more induction heatable susceptors 28, into the heating compartment 15 and ensure uniform heating of the aerosol generating substrate.

[0046] The induction heatable susceptor 28 comprises an electrically conductive material. The induction heatable susceptor 28 may comprise one or more, but not limited to, of graphite, molybdenum, silicon carbide, niobium, aluminium, iron, nickel, nickel containing compounds, titanium, mild steel, stainless steel, low carbon steel and alloys thereof, e.g., nickel chromium or nickel copper, and composites of metallic materials. In some examples, the induction heatable susceptor 28 comprises a metal selected from the group consisting of mild steel, stainless steel and low carbon stainless steel.

[0047] In use, with the application of an electromagnetic field in its vicinity, the induction heatable susceptor(s) 28 generate heat due to eddy currents and magnetic hysteresis losses resulting in a conversion of energy from electromagnetic to heat.

[0048] The induction coil 30 may be arranged to operate in use with a fluctuating electromagnetic field having a magnetic flux density of between approximately 20mT and approximately 2.0T at the point of highest concentration.

[0049] The aerosol generating article 16 further comprises a disabling element 20. The disabling element 20 may otherwise be referred to as a disabling fuse. The disabling element 20 is integrated with the aerosol generating article 16. The disabling element 20 is provided in the aerosol generating article 16 during manufacture

of the aerosol generating article 16.

[0050] Referring to Figures 2a and 2b, there is shown diagrammatically an example of a disabling element 20 in first and second conditions, respectively. In the first condition illustrated in Figure 2a the disabling element 20 is in a first shape configuration 22. In the second condition illustrated in Figure 2b the disabling element 20 is in a second shape configuration 24.

[0051] The disabling element 20 is configured such that a single use of the aerosol generating article 16 causes a temperature induced change of shape of the disabling element 20 from the first shape configuration 22 as illustrated in Figure 2a to the second shape configuration 24 as illustrated in Figure 2b. The controller 14 is configured to detect the shape of the disabling element 20 and to render the aerosol generating device 12 inoperable before initiation of a vaping session if the second shape configuration 24 is detected. This process is automatic, and thus requires no user action.

[0052] A single use of an aerosol generating article 16 is defined as heating an aerosol generating substrate of an un-used, i.e., never used, aerosol generating article 16 above a threshold temperature. The threshold temperature corresponds to the temperature at which the disabling element 20 changes shape from the first shape configuration 22 to the second shape configuration 24, i.e., the transition temperature of the material of the disabling element 20.

[0053] The threshold temperature is between the maximum storage temperature of the aerosol generating article 16 and the starting temperature of a vaping session. The starting temperature of a vaping session is typically more than about 150°C. In some examples, the threshold temperature may be between about 50°C to about 150°C. Accordingly, in such examples the transition temperature of the material of the disabling element 20 is between about 50°C to about 150°C. In other examples, the threshold temperature may be between about 70°C to about 150°C. Accordingly, in such examples the transition temperature of the material of the disabling element 20 is between about 70°C to about 150°C.

[0054] A single use of an aerosol generating article 16 may occur independently of use of the aerosol generating article 16 during a vaping session, provided the aerosol generating substrate of the aerosol generating article 16 has been heated above the threshold temperature. Accordingly, all that is required for a single use of an aerosol generating article 16 is for the aerosol generating substrate to be heated above the threshold temperature.

[0055] Examples of the disclosure therefore permit only a single use of an aerosol generating article 16 based on the detection by the controller 14 of the first shape configuration 22. Detection of the second shape configuration 24 by the controller 14, which indicates that the aerosol generating article 16 has already been used, renders the aerosol generating device 12 inoperable before initiation of a vaping session. Accordingly, examples of the disclosure prevent re-use of a previously used aer-

osol generating article.

[0056] In some examples, detection of the second shape configuration 24 causes the aerosol generating device 12 to be rendered inoperable before commencement of heating of the aerosol generating substrate. The induction coil 30 is not therefore energised to generate an alternating electromagnetic field for inductively heating the induction heatable susceptor 28. In such examples, initiation of a vaping session means commencing heating of the aerosol generating substrate. Accordingly, in such examples the controller 14 is configured to detect the shape of the disabling element 20 and to render the aerosol generating device 12 inoperable before commencing heating of the aerosol generating substrate if the second shape configuration 24 is detected.

[0057] In examples of the disclosure, a user is therefore prevented from using the aerosol generating article 16 partially in one session and re-using the same aerosol generating article 16 in another second session.

[0058] Accordingly, examples of the disclosure prevent re-use of a previously used aerosol generating article 16. Furthermore, the provision of disabling elements 20 in aerosol generating articles 16 can make it more difficult to manufacture counterfeit aerosol generating articles 16.

[0059] In examples of the disclosure, the aerosol generating device 12 is thus rendered operable if the controller 14 detects the first shape configuration 22 when the aerosol generating article 16 is received in the heating compartment 15. This enables initiation of a vaping session. Once a vaping session has been initiated, the aerosol generating device 12 remains operable until termination of the vaping session. Accordingly, the disabling element 20 adopting the second shape configuration 24 during a vaping session does not render the aerosol generating device 12 inoperable. The aerosol generating device 12 is therefore only rendered inoperable if the second shape configuration 24 is detected after a single use of the aerosol generating article 16, which may be after termination of a vaping session.

[0060] A vaping session may terminate by discontinuation of heating to stop vapour generation, which may occur after exhaustion of the aerosol generating substrate (which may be automatically determined). Alternatively, a vaping session may also terminate by discontinuation of heating to stop vapour generation before exhaustion of the aerosol generating substrate (i.e., partial use), for instance according to a user command.

[0061] In some examples, the controller 14 is configured to render the aerosol generating device 12 inoperable by disabling heating of the aerosol generating substrate. In such examples, the controller 14 is configured to enable heating of aerosol generating substrate to initiate a vaping session only if the first shape configuration 22 is detected. Accordingly, the controller 14 is configured to detect the shape of the disabling element 20 when the aerosol generating article 16 is received in the heating compartment 15 of the aerosol generating device 12 and

only enable heating of the aerosol generating substrate to initiate a vaping session if the first shape configuration 22 is detected.

[0062] Referring to Figures 3a and 3b, there is shown diagrammatically an example of another aerosol generating system 10 comprising an aerosol generating article 16 having a disabling element 20 in first and second conditions, respectively. In the first condition illustrated in Figure 3a the disabling element 20 is in the first shape configuration 22. In the second condition illustrated in Figure 3b the disabling element 20 is in the second shape configuration 24. The illustrations of Figures 3a and 3b only show selected details of the aerosol generating system 10.

[0063] The aerosol generating device 12 comprises a sensing coil 26. The sensing coil 26 is configured to inductively couple with the disabling element 20. The inductive coupling between the sensing coil 26 and the disabling element 20 is different for the first and second shape configurations 22, 24. For example, in the illustrated example the inductive coupling between sensing coil 26 and disabling element 20 is greater when the disabling element 20 has the second shape configuration 24, as illustrated in Figure 3b, than when the disabling element 20 has the first shape configuration 22, as illustrated in Figure 3a. A change of shape of the disabling element 20 from the first shape configuration 22 to the second shape configuration 24 therefore changes the inductive coupling with the sensing coil 26.

[0064] The controller 14 is configured to render the aerosol generating device 12 inoperable based on detection of an inductive coupling corresponding to the second shape configuration 24.

[0065] Accordingly, the difference between the respective inductive couplings permits the controller 14 to distinguish between the first and second shape configurations 22, 24.

[0066] In examples where the heating assembly 13 is an induction heating assembly 18 comprising an induction coil 30, the induction coil 30 may provide the sensing coil 22. In such examples, the disabling element 20 may comprise an inductively heatable susceptor 28. The disabling element 20 and the inductively heatable susceptor 28 may be one and the same. As described above, the inductively heatable susceptor 28 is inductively heatable in use by the induction coil 30 to heat the aerosol generating substrate.

[0067] Referring to Figures 4a and 4b, there is shown diagrammatically an example of an aerosol generating article 16 according to the present disclosure having a disabling element 20 in first and second conditions, respectively.

[0068] In the first condition illustrated in Figure 4a the disabling element 20 is in the first shape configuration 22. In the second condition illustrated in Figure 4b the disabling element 20 is in the second shape configuration 24. In the example illustrated in Figures 4a and 4b, the aerosol generating article 16 is configured such that the

disabling element 20 is in direct contact with the aerosol generating substrate. In such examples, the heating assembly 13 may be an induction heating assembly 18 comprising an induction coil 30, wherein the induction coil 30 provides the sensing coil 22. The disabling element 20 may comprise an inductively heatable susceptor 28 which in use is heated by the induction coil 30 to heat the aerosol generating substrate.

[0069] Referring to Figures 5a and 5b, there is shown diagrammatically another example of an aerosol generating article 16 according to the present disclosure having a disabling element 20 in first and second conditions, respectively. In the first condition illustrated in Figure 5a the disabling element 20 is in the first shape configuration 22. In the second condition illustrated in Figure 5b the disabling element 20 is in the second shape configuration 24. In the example illustrated in Figures 5a and 5b, the aerosol generating article 16 is configured such that the disabling element 20 is spaced apart from the aerosol generating substrate. In such examples, the disabling element 20 may be disposed in a channel 32 separating the aerosol generating substrate from a mouthpiece 34 of the aerosol generating article 16. The channel 32 may be a hollow open-ended tube.

[0070] In some examples, the disabling element 20 comprises a shape-memory alloy. The shape-memory alloy has a one-way memory effect such that upon cooling after a single use of the aerosol generating article 16 the disabling element 20 retains the second shape configuration 24.

[0071] In some examples, the first shape configuration 22 is substantially straight as illustrated in Figure 2a, 3a, 4a and 5a, for example substantially rod shaped. The second shape configuration 24 may comprise curved portions as illustrated in Figure 2b, 3b, 4b and 5b, for example substantially spiral shaped such as a spring. The second shape configuration 24 may have a bent or multiply bent configuration. The first shape configuration 22 represents a deformed state of the disabling element 20. The second shape configuration 24 represents a pre-deformed state of the disabling element 20. Accordingly, the disabling element 20 undergoes an irreversible temperature induced change of shape from a deformed state to a pre-deformed state during a single use of the aerosol generating article 16.

[0072] The inductive coupling between the sensing coil 26 and the disabling element 20 in the first shape configuration 22 is most different from the inductive coupling between the sensing coil 26 and the disabling element 20 in the second shape configuration 24 when the first shape configuration 22 is straight, for example substantially rod shaped, and the second shape configuration 24 comprises curved portions, for example spiral shaped such as a spring. Such first and second shape configurations 22, 24 therefore best enable the first and second shape configurations 22, 24 to be distinguished from one another.

[0073] Examples of the disclosure also provide an aer-

osol generating article 16. The aerosol generating article 16 comprises an aerosol generating substrate and a disabling element 20. The disabling element 20 is configured such that a single use of the aerosol generating article 16 causes a temperature induced change of shape of the disabling element 20 from a first shape configuration 22 to a second shape configuration 24. In use, when the aerosol generating article 16 is received in a heating compartment 14 of the aerosol generating device 12, detection of the second shape configuration 24 by a controller 14 of the aerosol generating device 12 renders the aerosol generating device 12 inoperable before initiation of a vaping session. Accordingly, aerosol generating articles 16 according to the present disclosure are configured for only a single use, i.e., to be used only once, with an aerosol generating device 12 according to examples of the disclosure.

[0074] Examples of the disclosure also provide an aerosol generating device 12. The aerosol generating device 12 comprises a heating assembly 13 including a heating compartment 15 for receiving an aerosol generating article 16. The aerosol generating article 16 comprises an aerosol generating substrate and a disabling element 20. The disabling element 20 is configured such that a single use of the aerosol generating article 16 causes a temperature induced change of shape of the disabling element 20 from a first shape configuration 22 to a second shape configuration 24. The aerosol generating device 12 further comprises a controller 14. The controller 14 is configured to detect the shape of the disabling element 20 and to render the aerosol generating device 12 inoperable before initiation of a vaping session if the second shape configuration 24 is detected. Accordingly, the aerosol generating device 12 prevents re-use of a previously used aerosol generating article 16 according to examples of the disclosure.

[0075] The Figures also illustrate a method of manufacturing an aerosol generating device 12 and an aerosol generating article 16 according to examples of the disclosure. The Figures also illustrate a method of providing an aerosol generating system 10 according to examples of the disclosure.

[0076] Although exemplary embodiments have been described in the preceding paragraphs, it should be understood that various modifications may be made to those embodiments without departing from the scope of the appended claims. Thus, the breadth and scope of the claims should not be limited to the above-described exemplary embodiments.

[0077] Any combination of the above-described features in all possible variations thereof is encompassed by the present disclosure unless otherwise indicated herein or otherwise clearly contradicted by context.

[0078] Unless the context clearly requires otherwise, throughout the description and the claims, the words "comprise", "comprising", and the like, are to be construed in an inclusive as opposed to an exclusive or exhaustive sense; that is to say, in the sense of "including,

but not limited to".

Claims

1. An aerosol generating system (10) for generating an aerosol for inhalation by a user, the aerosol generating system (10) comprising:

an aerosol generating device (12), the aerosol generating device (12) comprising:

a heating assembly (13) including a heating compartment (15); and
a controller (14);

the aerosol generating system (10) further comprising:

an aerosol generating article (16) receivable in the heating compartment (13), the aerosol generating article (16) comprising:

an aerosol generating substrate; and
a disabling element (20), wherein the disabling element (20) is configured such that a single use of the aerosol generating article (16) causes a temperature induced change of shape of the disabling element (20) from a first shape configuration (22) to a second shape configuration (24), wherein the controller (14) is configured to detect the shape of the disabling element (20) and to render the aerosol generating device (12) inoperable before initiation of a vaping session if the second shape configuration (24) is detected.

2. An aerosol generating system (10) according to claim 1, wherein the controller (14) is configured to render the aerosol generating device (12) inoperable by disabling heating of the aerosol generating substrate.

3. An aerosol generating system (10) according to claim 2, wherein the controller (14) is configured to enable heating of the aerosol generating substrate to initiate a vaping session only if the first shape configuration (22) is detected.

4. An aerosol generating system (10) according to any of the preceding claims, wherein the aerosol generating device (12) comprises a sensing coil (26) configured to inductively couple with the disabling element (20), wherein the inductive coupling between the sensing coil (26) and the disabling element (20) is different for the first and second shape configurations (22, 24), wherein the controller (14) is configured to render the aerosol generating device (12)

inoperable based on detection of an inductive coupling corresponding to the second shape configuration (24).

5. An aerosol generating system (10) according to claim 4, wherein the heating assembly (13) is an induction heating assembly (18) comprising an induction coil (30), wherein the induction coil (30) provides the sensing coil (22). 5
6. An aerosol generating system (10) according to claim 5, wherein the disabling element (20) comprises an inductively heatable susceptor (28), wherein the inductively heatable susceptor (28) is inductively heatable in use by the induction coil (30) to heat the aerosol generating substrate. 10
7. An aerosol generating system (10) according to any of the preceding claims, wherein the aerosol generating article (16) is configured such that the disabling element (20) is in direct contact with the aerosol generating substrate. 15
8. An aerosol generating system (10) according to any of claims 1 to 6, wherein the aerosol generating article (16) is configured such that the disabling element (20) is spaced apart from the aerosol generating substrate. 20
9. An aerosol generating system (10) according to claim 8, wherein the disabling element (20) is disposed in a channel (32) separating the aerosol generating substrate from a mouthpiece (34) of the aerosol generating article (16). 25
10. An aerosol generating system (10) according to any of the preceding claims, wherein the disabling element (20) comprises a shape-memory alloy. 30
11. An aerosol generating system (10) according to claim 10, wherein the shape-memory alloy has a one-way memory effect such that upon cooling after a single use of the aerosol generating article (16) the disabling element (20) retains the second shape configuration (24). 35
12. An aerosol generating system (10) according to any of the preceding claims, wherein the first shape configuration (22) is substantially straight; and wherein the second shape configuration (24) comprises curved portions. 40
13. An aerosol generating system (10) according to claim 12, wherein the first shape configuration (22) is substantially rod shaped; and wherein the second shape configuration (24) is substantially spiral shaped. 45

14. An aerosol generating article (16), the aerosol generating article (16) comprising an aerosol generating substrate and a disabling element (20), wherein the disabling element (20) is configured such that a single use of the aerosol generating article causes a temperature induced change of shape of the disabling element (20) from a first shape configuration (22) to a second shape configuration (24). 5

- 10 15. An aerosol generating device (12), the aerosol generating device (12) comprising:
a heating assembly (13) including a heating compartment (15) for receiving an aerosol generating article (16), the aerosol generating article (16) comprising an aerosol generating substrate and a disabling element (20), wherein the disabling element (20) is configured such that a single use of the aerosol generating article (16) causes a temperature induced change of shape of the disabling element (20) from a first shape configuration (22) to a second shape configuration (24);
the aerosol generating device (12) further comprising:
a controller (14), wherein the controller (14) is configured to detect the shape of the disabling element (20) and to render the aerosol generating device (12) inoperable before initiation of a vaping session if the second shape configuration (24) is detected. 15

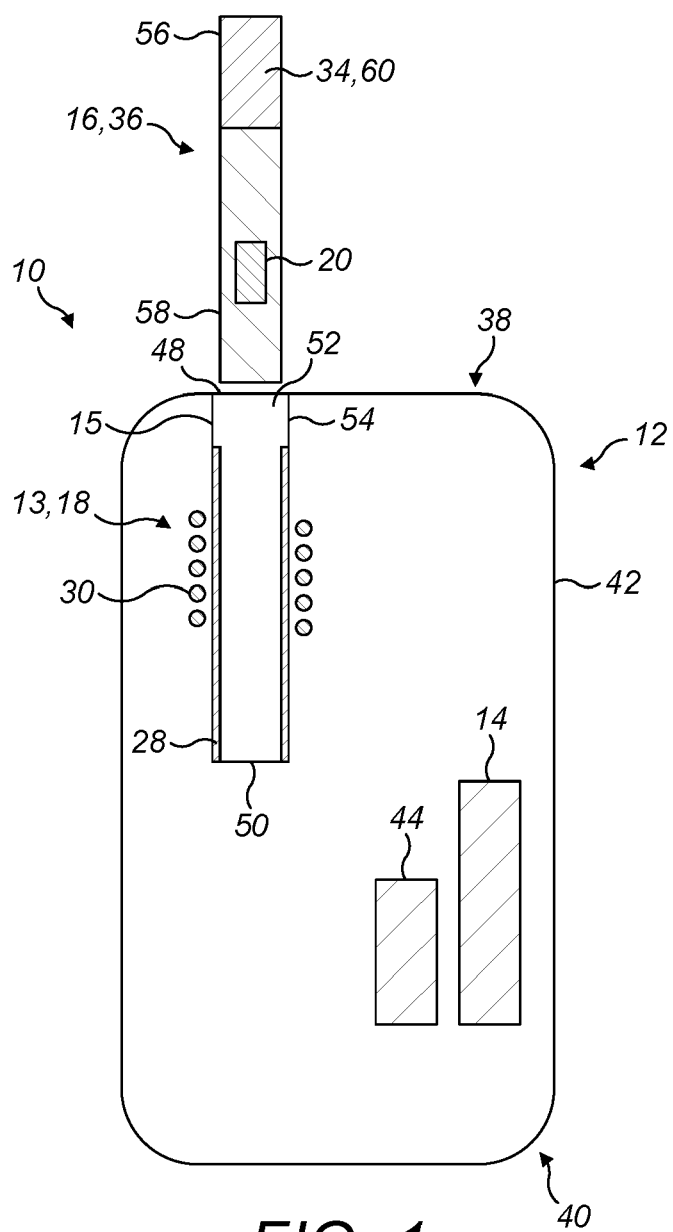


FIG. 1



FIG. 2a

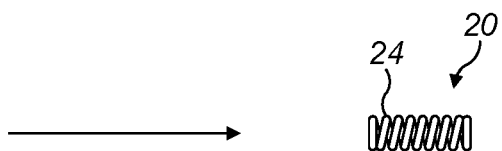


FIG. 2b

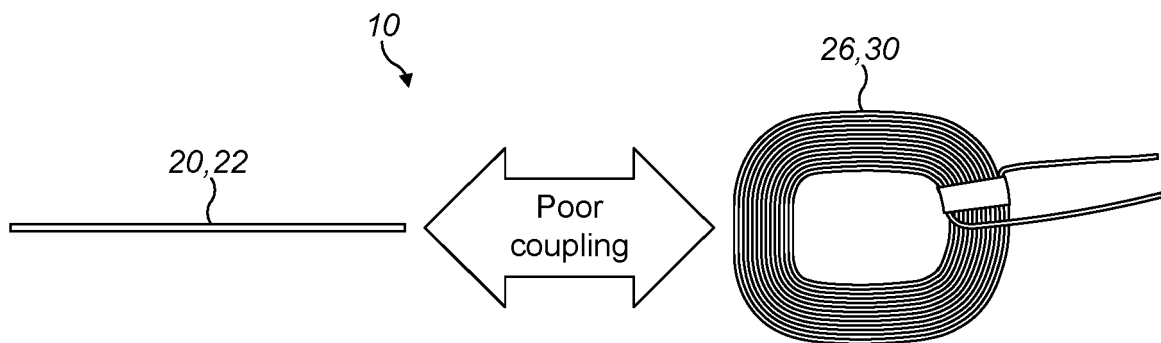


FIG. 3a

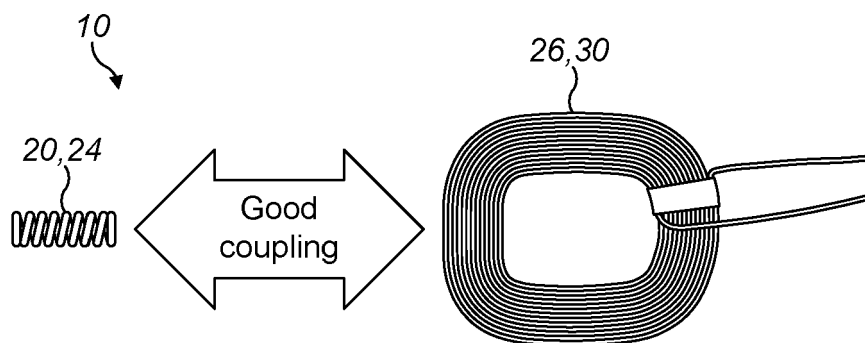


FIG. 3b

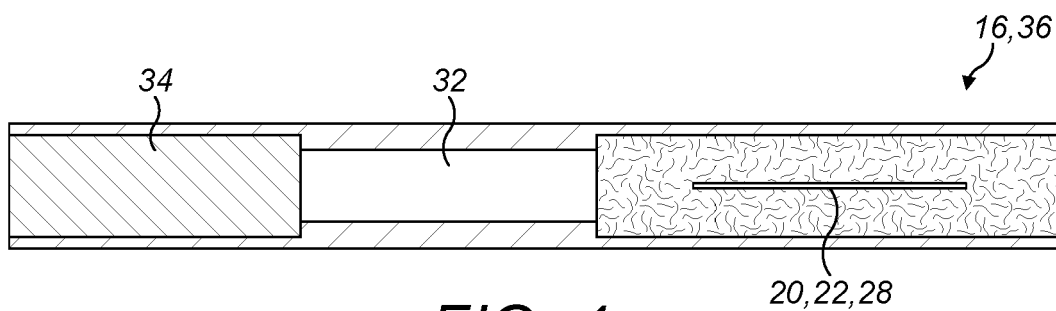


FIG. 4a

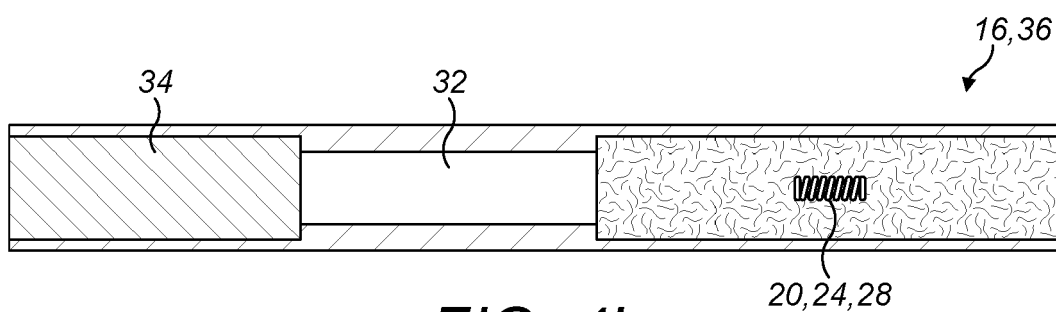


FIG. 4b

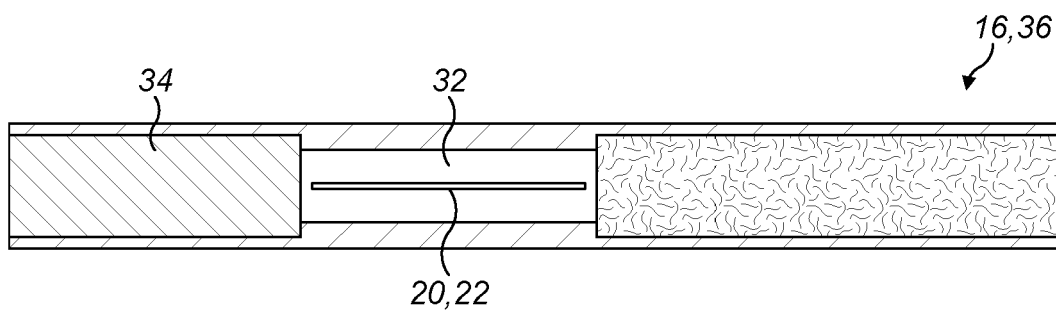


FIG. 5a

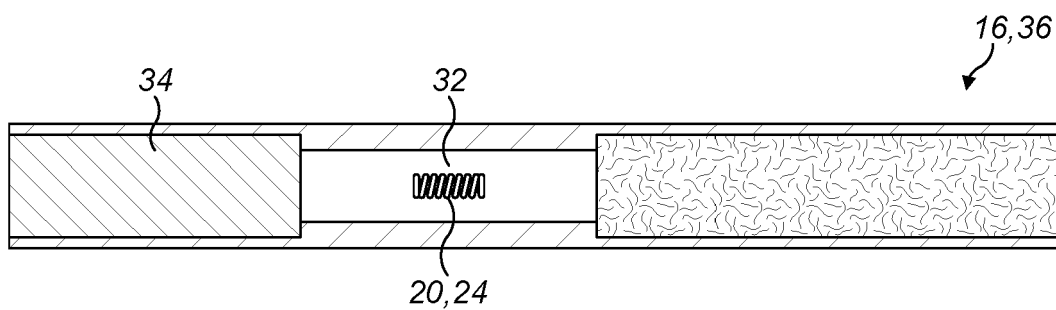


FIG. 5b



EUROPEAN SEARCH REPORT

Application Number

EP 22 16 1595

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EPO FORM 1503 03.82 (P04C01)

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 2021/053184 A1 (NICOVENTURES TRADING LTD.) 25 March 2021 (2021-03-25)	1-6, 8, 9, 14, 15	INV. A24F40/465
Y	* figures 1a, 1b, 2, 3a, 3b * * page 10, line 26 - page 11, line 13 * * page 14, line 1 - page 15, line 26 * * page 12, line 8 - page 13, line 28 * -----	7, 10-13	A24F40/53 A24F40/51 A24D1/20
X	EP 2 870 888 A1 (PHILIP MORRIS PRODUCTS S.A.) 13 May 2015 (2015-05-13) * figures 1, 2 * * paragraph [0049] - paragraph [0051] * * claims 1-3, 5, 10, 11 * -----	1, 3, 8, 14, 15	
Y	WO 2021/064124 A1 (PHILIP MORRIS PRODUCTS S.A.) 8 April 2021 (2021-04-08) * figures 1-3 * * page 12, line 2 - page 13, line 11 * -----	7, 10-13	
A	US 2015/096293 A1 (SHOME ET AL.) 9 April 2015 (2015-04-09) * figures 1, 3, 4 * * paragraph [0024] - paragraph [0028] * -----	1-15	TECHNICAL FIELDS SEARCHED (IPC) A24F A24D H05B F03G
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 29 July 2022	Examiner Mier Abascal, Ana
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.

EP 22 16 1595

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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29-07-2022

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2021053184 A1	25-03-2021	CA 3151540 A1	25-03-2021
		EP 4030943 A1	27-07-2022
		KR 20220050923 A	25-04-2022
		WO 2021053184 A1	25-03-2021
EP 2870888 A1	13-05-2015	AU 2011347187 A1	18-07-2013
		AU 2017203152 A1	01-06-2017
		BR 112013018328 A2	18-09-2018
		CA 2822726 A1	28-06-2012
		CN 103338663 A	02-10-2013
		CN 105361250 A	02-03-2016
		CO 6761318 A2	30-09-2013
		DK 2654471 T3	20-10-2014
		DK 2870888 T3	08-07-2019
		EA 201390953 A1	29-11-2013
		EA 201891569 A2	30-11-2018
		EP 2468118 A1	27-06-2012
		EP 2654471 A1	30-10-2013
		EP 2870888 A1	13-05-2015
		EP 3549463 A1	09-10-2019
		ES 2511690 T3	23-10-2014
		ES 2733070 T3	27-11-2019
		HK 1186933 A1	28-03-2014
		HK 1204235 A1	13-11-2015
		HU E045039 T2	30-12-2019
		IL 227002 A	28-02-2017
		JP 6440939 B2	19-12-2018
		JP 6698723 B2	27-05-2020
		JP 7062717 B2	06-05-2022
		JP 2014501106 A	20-01-2014
		JP 2018134076 A	30-08-2018
		JP 2020120680 A	13-08-2020
		KR 20130130763 A	02-12-2013
		KR 20200003230 A	08-01-2020
		KR 20200044148 A	28-04-2020
		LT 2870888 T	25-06-2019
		MY 159441 A	13-01-2017
		NZ 612097 A	29-05-2015
		PL 2654471 T3	31-12-2014
		PL 2870888 T3	29-11-2019
		PT 2654471 E	26-09-2014
		PT 2870888 T	17-09-2019
		SG 191277 A1	31-07-2013
		SI 2870888 T1	30-08-2019
		TR 201909754 T4	22-07-2019
		UA 109922 C2	26-10-2015

EPO FORM P0459

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ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.

EP 22 16 1595

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

29-07-2022

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		US 2013306084 A1	21-11-2013
		US 2018335280 A1	22-11-2018
		US 2020232766 A1	23-07-2020
		WO 2012085205 A1	28-06-2012

WO 2021064124 A1	08-04-2021	BR 112022003863 A2	24-05-2022
		CN 114340426 A	12-04-2022
		EP 4037504 A1	10-08-2022
		IL 291781 A	01-06-2022
		KR 20220047855 A	19-04-2022
		WO 2021064124 A1	08-04-2021

US 2015096293 A1	09-04-2015	AU 2014330053 A1	17-12-2015
		CA 2914951 A1	09-04-2015
		CN 105518296 A	20-04-2016
		EP 3052803 A1	10-08-2016
		JP 6407266 B2	17-10-2018
		JP 2016539269 A	15-12-2016
		RU 2015151464 A	10-11-2017
		US 2015096293 A1	09-04-2015
		WO 2015050599 A1	09-04-2015

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82