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(54) **AN AEROSOL SUBSTRATE CONSUMABLE LOADING MECHANISM**

(57) In one example, there is provided an aerosol substrate consumable loading mechanism (100) for loading an aerosol substrate consumable (106) into an aerosol generating device (108), the loading mechanism (100) comprising: an actuator (102) configured to load a partially inserted aerosol substrate consumable (106) further into said aerosol generating device (108), in use; and an insertion sensor (104) configured to detect an activation input, wherein the actuator (102) is configured to load said aerosol substrate consumable (106) further into said aerosol generating device (108) upon detection of the activation input.

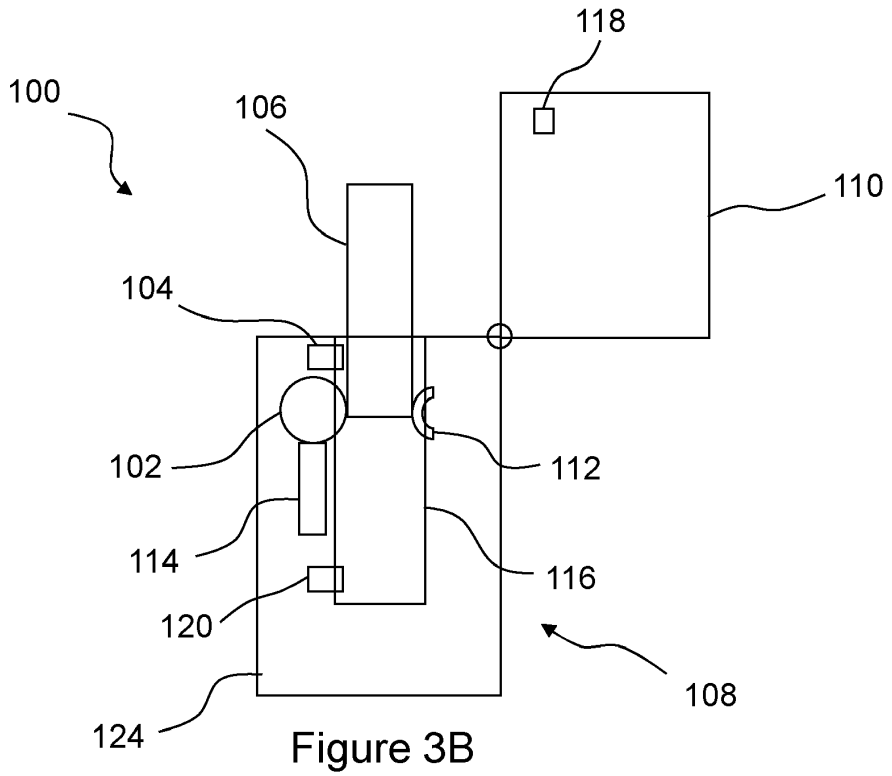

Figure 3B

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Description

[0001] The present disclosure relates to an aerosol substrate consumable loading mechanism, a loading heating system for an aerosol generating device, an aerosol generating device and a method of inserting a consumable into an aerosol generating device.

Background

[0002] Various devices and systems are available that heat aerosol substrates to release aerosol/vapour for inhalation, rather than relying on burning the aerosol substrate. For example, e-cigarettes vaporize an e-liquid from a consumable to an inhalable vapour. However, e-cigarettes are vulnerable to leakage of the e-liquid but benefit from fast volatilisation times. Alternative devices with solid consumables are available. However, such devices require a heater to be part of the device and hence the device requires adequate insulation to prevent a user from being exposed to the high heater temperatures, which leads to additional complexity and cost in the device.

[0003] With both e-cigarettes and alternative devices for heating solid consumables, users may experience difficulties with loading and extracting the consumable. For example, the user may be exposed to high temperatures from the heater within the device. Further, incorrect loading of the consumable can lead to damage to the consumable, poor performance of the device, or a negative user experience.

[0004] It is the object of the invention to avoid or overcome at least some of the above referenced problems, or to provide an alternative solution.

Summary

[0005] According to the present disclosure there is provided an aerosol substrate consumable loading mechanism for loading an aerosol substrate consumable into an aerosol generating device including the features as set out in the claims.

[0006] In one example, there is provided an aerosol substrate consumable loading mechanism for loading an aerosol substrate consumable into an aerosol generating device, the loading mechanism comprising: an actuator configured to load a partially inserted aerosol substrate consumable further into said aerosol generating device, in use; and an insertion sensor configured to detect an activation input, wherein the actuator is configured to load said aerosol substrate consumable further into said aerosol generating device upon detection of the activation input.

[0007] The provision of the loading mechanism means that the aerosol substrate consumable is inserted into the correct position within the aerosol generating device. This means that potential errors or difficulties associated with the loading stage of the consumable are avoided. Further it significantly increases the ease of use of an aerosol generating device. The user merely needs to partially load the consumable into the device and the loading mechanism then automatically loads the consumable to the correct position. It also reduces the risk of a user injuring themselves due to contact with a heater as the user only needs to partially insert the consumable into the device so they can maintain a distance to the heater when inserting a consumable into the device.

[0008] The actuator may comprise a roller. A roller is a non-intrusive way of inserting and ejecting the aerosol substrate consumable into the aerosol generating device.

[0009] In one example, the actuator comprises a roller and a guide, wherein the roller and the guide define a region between them for receiving said consumable. The roller and the guide work to position the consumable into the correct position during the insertion.

[0010] In one example, the insertion sensor comprises one or more light sensors and wherein the activation input comprises the detection by the one or more light sensors that said consumable has been partially inserted into said aerosol generating device. Light sensors can project light into the aerosol generating device and so can accurately detect the position of the aerosol substrate consumable within the aerosol generating device in use.

[0011] In other examples, the insertion sensor comprises an insertion switch configured to be depressed and the activation input comprises the depression of the insertion switch by said consumable during the partial insertion into said aerosol generating device. The provision of the switch is a relatively cheap and efficient way of detecting insertion.

[0012] In one example, the insertion sensor comprises a magnetic sensor (or Hall effect sensor) and wherein the activation input comprises the detection by the magnetic sensor of movement of the roller due to the insertion of said consumable into said aerosol generating device. The use of a magnetic sensor means that only a simple motor can be used as part of the actuator. Further, the orientation of the roller can be detected using the magnetic sensor and so the insertion mechanism can have greater control over the relative positioning of the aerosol substrate consumable during insertion.

[0013] In one example, the insertion sensor comprises a button or touchpad and the activation input comprises a user input on the button or touchpad. This makes it relatively easy for a user operating the insertion mechanism.

[0014] In one example, there is provided a stop sensor configured to detect a stop input, wherein the actuator is configured to deactivate and stop further insertion of said consumable when the stop sensor has detected the stop input. The stop sensor can be used to switch off the actuator at a desired point and so prevent unnecessary energy usage.

[0015] The stop sensor may comprise one or more of: one or more light sensors; and a stop switch configured

to be depressed by said consumable when the consumable reaches the predetermined threshold. The one or more light sensors can be used to accurately determine the position of the aerosol substrate consumable within the aerosol generating device. The stop switch is an inexpensive way of switching off the actuator at a desired time.

[0016] In the example of the actuator comprising a roller, wherein the roller is configured to stop rotation after a predetermined number of insertion rotations.

[0017] In one example, the actuator is configured to stop operation when the load required to drive the actuator is increased beyond a predetermined load threshold. In this example, a further "stop sensor" is not required to stop the operation of the actuator.

[0018] In one example, the loading mechanism includes an ejection sensor, wherein the ejection sensor is configured to detect an ejection input; and wherein the actuator is configured to eject said consumable from said aerosol generating device upon detection of the ejection input at the ejection sensor. As such, the aerosol substrate can be automatically ejected from the device as required. The automatic ejection reduces the chances of a user burning themselves as there is not a requirement to reach into the vicinity of a heater to extract the consumable. It also significantly increases ease of use for a user. The ejection of the consumable may be done automatically by the device to avoid a user needing to manually extract the consumable.

[0019] In one example, there is provided a loading heating system for an aerosol generating device, the loading heating system comprising: a loading mechanism as described above; and a heating chamber into which the actuator is configured to load the consumable, in use. The loading heating mechanism is able to receive said consumable and heat it to the desired temperature. In one example, the heater is configured to activate once the aerosol substrate consumable has been inserted into the loading heating system.

[0020] In one example, there is provided an aerosol generating device comprising the loading heating system as described above and an outer housing to substantially surround the heating chamber, the outer housing comprising an opening for receiving said consumable into the heating chamber; and a power source for providing power to the loading heating system.

[0021] The aerosol generating device may comprise a movable lid configured to move between: an open configuration in which the consumable is insertable into the aerosol generating device; and a closed configuration in which the lid prevents access for the consumable to the aerosol generating device, wherein the insertion sensor is configured to detect that the lid is in an open configuration and the actuator is configured to load said partially inserted consumable further into the aerosol generating device upon detection that the lid has been moved to the open configuration.

[0022] In one example, there is provided a method of loading an aerosol substrate consumable into an aerosol generating device, the method comprising: detecting an activation input at an insertion sensor; and operating an actuator, in response to the detected activation input, to move a partially inserted consumable further into the aerosol generating device.

[0023] Various combinations of the above-mentioned features are envisaged.

Brief Description of the Drawings

[0024] Examples of the present disclosure will now be described with reference to the accompanying drawings.

Figure 1A shows a schematic of a cross section of an aerosol substrate consumable loading mechanism in which the aerosol substrate consumable is in a first position;

Figure 1B shows a schematic of a cross section of an aerosol substrate consumable loading mechanism in which the aerosol substrate consumable is in a second position;

Figure 2A shows a schematic of a cross section of an aerosol substrate consumable loading mechanism within an aerosol generating device with a lid in a closed position;

Figure 2B shows a schematic of a cross section of an aerosol substrate consumable loading mechanism within an aerosol generating device with a lid in an open position;

Figure 3A shows a schematic of a cross section of an aerosol substrate consumable loading mechanism within an aerosol generating device;

Figure 3B shows a schematic of a cross section of an aerosol substrate consumable loading mechanism within an aerosol generating device;

Figure 4A shows an example of an insertion sensor and a roller in a first orientation;

Figure 4B shows an example of an insertion sensor and a roller in a second orientation;

Figure 5 shows a flow chart of steps of a method of inserting an aerosol substrate consumable into an aerosol generating device;

Figure 6 shows a flow chart of further steps of a method of inserting an aerosol substrate consumable into an aerosol generating device; and

Figure 7 shows an example of an aerosol substrate consumable comprising one or more indicators.

Detailed Description

[0025] As used herein, the term aerosol substrate is a label used to mean a medium that generates an aerosol or vapour when heated. It may be synonymous with smokable material and aerosol generating medium. Aerosol substrate includes liquid or solid materials that provide volatilized components upon heating, typically in the form of vapor or an aerosol. Aerosol substrate may be a

non-tobacco-containing material or a tobacco-containing material. Aerosol substrate may, for example, include one or more of tobacco per se, tobacco derivatives, expanded tobacco, reconstituted tobacco, tobacco extract, homogenized tobacco or tobacco substitutes. Aerosol substrate also may include other, non-tobacco, products, which, depending on the product, may or may not contain nicotine. Aerosol substrate may comprise one or more humectants, such as glycerol or propylene glycol.

[0026] Figure 1A shows a schematic cross section of an aerosol substrate consumable loading mechanism 100. The mechanism 100 includes an actuator 102 and an insertion sensor 104. In Figure 1A, as aerosol substrate consumable 106 is partially inserted into a corresponding consumable cavity, chamber or seat 116 of an aerosol heating device 108.

[0027] The actuator 102 is configured to load the partially inserted aerosol substrate consumable 106 into the aerosol heating device 108. In other words, the actuator 102 is configured to move the aerosol substrate consumable 106 from a first position to a second position. In the first position, as for example shown in Fig. 1A, the aerosol substrate consumable 106 is partially received within the aerosol generating device 108 and in the second position, the aerosol substrate consumable 106 is further inserted into the aerosol generating device 108. Figure 1B shows a schematic cross section of an aerosol substrate consumable loading mechanism 100 in which the aerosol substrate consumable 106 has been further inserted into the aerosol generating device 108 (e.g., the aerosol substrate consumable 106 is in the second position).

[0028] In some examples, in the second position, the aerosol substrate consumable 106 is fully inserted into the aerosol generating device 108. In the first position, a sufficient amount of the aerosol substrate consumable 106 must be inserted into the aerosol generating device 108 such that the actuator 102 may impart a force on the aerosol substrate consumable 106 to guide the aerosol substrate consumable 106 further into the device 108. The actuator 102 itself may move within the aerosol generating device 108 in use. That is to say that the actuator 102 may move from an active position in which it is configured to move the aerosol substrate consumable 106 and an inactive position in which it may be withdrawn.

[0029] In some examples, the actuator 102 comprises a roller. The roller is configured to contact or abut the aerosol substrate consumable 106 and rotate about its rotational axis in use and impart a movement force on the aerosol substrate consumable 106 to move it from a partially inserted position (the first position) to be further inserted into the aerosol generating device 108 (the second position).

[0030] The insertion sensor 104 is configured to detect an activation input. The activation input may take the form of an active mechanical input (e.g., a button push by a user) or a passive mechanical input. The passive mechanical input may happen automatically during the use of the aerosol generating device 108 (e.g., the aerosol substrate consumable 106 being partially inserted into the aerosol generating device 108). The activation inputs will be described in more detail below.

[0031] Figure 2A shows a schematic cross section of an aerosol substrate consumable loading mechanism 100 within an aerosol generating device 108. In Figure 2A a lid 110 of the aerosol generating device 108 is shown in a closed position.

[0032] In some examples, the actuator 102 comprises a guide 112 configured to work in combination with the roller to guide the aerosol substrate consumable 106, in use. The guide 112 may take the form of a guide arm or a passive roller configured to abut the aerosol substrate consumable 106 during the insertion. The guide arm may be resiliently deformable such it is deforms as the aerosol substrate consumable 106 is being inserted into the aerosol generating device 108. The passive roller may be a nondriven component such that it moves due to the movement of the aerosol substrate consumable 106.

[0033] The roller and guide 112 may be arranged to face each other in use and define a gap therebetween for receiving the aerosol substrate consumable 106. A thickness of the aerosol substrate consumable 106 may substantially match the distance of the gap between the roller and the guide 112.

[0034] In some examples, the actuator 102 comprises one or more motors 114 that are configured to drive the roller, in use. For example, the motor 114 may comprise one or more of a stepper motor, a motor and encoder and/or a simple motor.

[0035] In other examples, the actuator 102 comprises a linear actuator configured to grip the aerosol substrate consumable 106 and move it, in use.

[0036] In one example, the aerosol generating device 108 includes a heating chamber 116 in which the aerosol substrate consumable 106 is configured to be received and heated. That is to say that the actuator 102 may be configured to insert the aerosol substrate consumable 106 further into the heating chamber 116 from a partially inserted position. As stated above, the actuator 102 is configured to move an aerosol substrate consumable 106 from a first position to a second position. In the first position, the aerosol substrate consumable 106 may be partially received in the heating chamber 116 and in the second position the aerosol substrate consumable 106 is further inserted into the heating chamber 116. In one example, in the second position the aerosol substrate consumable 106 is fully inserted into in the heating chamber 116 in use.

[0037] The heating chamber 116 may be shaped to receive a correspondingly shaped aerosol substrate consumable 106, in use. In one example, the heating chamber 116 comprises one or more heaters arranged to raise the temperature of the heating chamber 116. In one example, the one or more heaters are configured to begin heating when the aerosol substrate consumable 106 is in the second position. In another example, the one or more heaters are configured to begin heating when the

activation input has been triggered. For example, the one or more heaters may begin heating when the aerosol substrate consumable 106 is in the first, partially inserted position. Activating the one or more heaters at this time will reduce the time taken to generate sufficient aerosol for a user to take a first inhalation action.

[0038] In the schematic shown in Figure 1A, there is a small gap shown between the aerosol substrate consumable 106 and the heating chamber 116, but in practice, the aerosol substrate consumable 106 may be sized to match the size of the heating chamber 116.

[0039] The heating chamber 116 and the loading mechanism 100 taken together are considered to be a loading heating system.

[0040] In one example, the aerosol generating device 108 includes an outer housing 124 that substantially surround the heating chamber 116. The outer housing 124 comprises an opening for receiving said consumable 106 into the heating chamber 116. The aerosol generating device 108 may also include a power source, such as a battery, (not shown) for providing power to the aerosol generating device 108. The aerosol generating device 108 may also include a controller (not shown) for receiving signals from the insertion sensor 104 and controlling the actuator 102, in use.

[0041] The aerosol generating device 108 may also include the lid 110. The lid 110 may be movable between an open position in which the aerosol substrate consumable 106 is insertable into the aerosol generating device 108 and a closed position in which the aerosol substrate consumable 106 is not insertable into the aerosol generating device 108. In Figure 2A, the lid 110 is shown in the closed position. In Figure 2B, the lid 110 has been moved to an open position and an aerosol substrate consumable 106 has been partially inserted into the aerosol generating device 108. The insertion sensor 104 may be configured to detect that the lid 110 has been moved to an open configuration and the actuator 102 may be configured to load the partially inserted aerosol substrate consumable 106 further into the aerosol generating device 108 upon detection that the lid 110 has moved to the open configuration.

[0042] In one example, the lid 110 is configured to cover the heating chamber 116 when it is in the closed position. For the avoidance of doubt, the lid 110 may be pivotably or slidably arranged about the aerosol generating device 108, for example about a hinge or rails at or close an outer wall of the aerosol generating device 108. It may also of course be removably arranged about the aerosol generating device 108. In such cases, the lid 110 and aerosol generating device 108 may be fitted with corresponding complementary fastening means (not shown on the drawings).

[0043] In one example, the lid 110 is in the form of a mouthpiece. That is to say that a channel (not shown) may be formed in the lid such that aerosol generated from the aerosol substrate consumable 106 may flow to a user through the lid in the form of a mouthpiece.

[0044] In one example, the insertion sensor 104 is an insertion switch in the form of a mechanical switch or button (or a lid switch). The insertion switch may be configured to be operated by the lid 110. In this example, the activation input may comprise the opening of the lid 110 from the closed position, as shown in Figure 2A, in which the lid is in contact with the insertion sensor 104 to the open position, as shown in Figure 2B, in which the lid 110 is not in contact with the insertion sensor 104.

[0045] In another example, the insertion sensor 104 comprises a magnetic sensor (also known as a Hall effect sensor). The lid 110 may comprise a magnet. The Hall effect sensor is configured to detect a magnetic field emitted by the magnet 118 located on the lid 110. In the closed position, as shown in Figure 2A, the magnet 118 may be arranged in the vicinity of the Hall effect sensor and so the Hall effect sensor may detect a first magnetic field level. As the lid 110 is opened, as shown in Figure 2B, the magnet 118 is moved away from the Hall effect sensor so the magnetic field level detected by the Hall effect sensor is reduced to a second magnetic field level. The activation input may comprise a reduction in the magnetic field level detected by the Hall effect sensor to below a magnetic threshold level.

[0046] In both of these examples, upon the lid 110 being opened, the actuator 102 begins to operate and so once the aerosol generating substrate 106 has been partially inserted into the aerosol generating device 108, the actuator 102 will further insert the aerosol generating substrate 106 into the device 108.

[0047] In other examples, as shown in Figure 3A, the insertion sensor 104 in the form of the insertion switch that is configured to be operated or depressed during the action of partially inserting the aerosol substrate consumable 106 into the aerosol generating device 108. That is to say that the aerosol substrate consumable 106 itself may contact the insertion switch to operate (or depress) it. In this example, the activation input is the contact between the aerosol substrate consumable 106 and the insertion switch. In some examples, the guide 112 acts as the insertion switch. That is to say that the activation input may comprise the contact between the aerosol substrate consumable 106 and the guide 112.

[0048] Alternatively, the insertion sensor 104 may be integrated with the roller (or may be the roller itself). In this case, the roller may be configured to rotate due to the contact with the aerosol substrate consumable 106 as the aerosol substrate consumable 106 is inserted into the aerosol generating device 108. The insertion sensor 104 may comprise a rotation sensor or orientation sensor configured to sense if the roller has been rotated. In this case, the activation input is the rotation of the roller due to contact with the aerosol substrate consumable 106 as it is partially inserted into the aerosol generating device 108. In one example, the activation input comprises a rotation of between 60 to 84 degrees of the roller due to the insertion of the aerosol substrate consumable 106. This range of rotation provides an indication that an aer-

osol substrate consumable 106 has been partially inserted into the aerosol generating device 108. More preferably the activation input comprises a rotation of 72 degrees of the roller due to the insertion of the aerosol substrate consumable 106.

[0049] In this example, the actuator 102 may comprise a motor and encoder (or motor encoder). The motor and encoder are designed such that the rotation position and/or number of rotations of the roller can be detected.

[0050] Figure 3B shows an alternative arrangement in which the insertion sensor 104 comprises one or more light sensors configured to detect the presence of an aerosol substrate consumable. The light sensor may be positioned towards the opening of the aerosol generating device 108 such that it detects if an aerosol substrate consumable 106 has been inserted into the opening. In this case, the activation input can be considered to be the insertion of the aerosol substrate consumable 106 into the aerosol generating device 108 such that the insertion sensor 104 can detect it.

[0051] In some examples, the light sensor is configured to detect an indicator (such as a barcode/QR code or the like) on the aerosol substrate consumable 106. This information can be used to determine if the aerosol substrate consumable 106 is genuine or not. The activation input in this case may be considered to be the confirmation that the aerosol substrate consumable 106 is genuine. In one example, the aerosol generating device 108 is configured to eject the aerosol substrate consumable 106 if it is determined that it is not genuine or has already been used.

[0052] The light sensor may comprise an optical sensor, infrared sensor, or the like. The infrared sensor may be configured to transmit an infrared light and detect the amount of infrared light that is deflected back towards the sensor.

[0053] In one example, the insertion sensor 104 comprises a button or pad configured to detect a user input, such as a button press, swipe or tap. In this case, the activation input could be considered to be the user input. The actuator 102 would be configured to insert the aerosol substrate consumable 106 further into the aerosol generating device 108 upon detection of the user input.

[0054] In one example, the roller comprises a magnet and the insertion sensor 104 comprises a Hall effect sensor adjacent to the roller configured to detect a rotation in the magnetic field as the roller is rotated due to the contact with the aerosol substrate consumable 106 as the aerosol substrate consumable 106 is inserted into the aerosol generating device 108. A schematic example of this arrangement is shown in Figures 4A and 4B. In Figure 4A, a magnet is located on the roller such that the North pole and South pole are positioned in a first orientation. In Figure 4B, the roller has been rotated due to a tobacco substrate consumable 106 being inserted into the aerosol generating device 108 in the direction of the arrow shown in Figure 4B. As such, the North pole and the South pole of the magnet located on the roller have also rotated such that they are in a second orientation, different to the first orientation. The insertion sensor 104 in the form of a Hall effect sensor is configured to be located adjacent to the roller such that the change in magnetic field due to the rotation of the roller can be detected. In this case, the activation input can be considered to be the rotation of the roller due to the insertion of the aerosol substrate consumable 106. In one example, the activation input comprises a rotation of between 60 to 84 degrees of the roller due to the insertion of the aerosol substrate consumable 106. This range of rotation provides an indication that an aerosol substrate consumable 106 has been partially inserted into the aerosol generating device 108. More preferably the activation input comprises a rotation of 72 degrees of the roller due to the insertion of the aerosol substrate consumable 106.

[0055] In some examples, the loading mechanism 100 comprises a stop sensor 120 configured to detect a stop input. The actuator 102 is configured to deactivate and stop further insertion of the aerosol substrate consumable 106 when the stop sensor has detected the stop input. In other words, following the detection of the stop input by the stop sensor 120, the actuator 102 is configured to switch off. In other words, in operation, upon detection of the insertion input the actuator 102 will operate to further insert the aerosol substrate consumable 106 into the aerosol generating device 108 until a stop input is detected, at which time the actuator stops operating.

[0056] In some examples, the stop sensor 120 may be configured to detect that the aerosol substrate consumable 106 has been inserted to a predetermined threshold in said aerosol generating device 108. The predetermined threshold may be that the aerosol substrate consumable 106 has been inserted sufficiently within the aerosol generating device 108 such that it will generate a desired amount of aerosol upon heating. In some examples, the predetermined threshold may mean that the aerosol substrate consumable 106 has been inserted into the desired location within the aerosol generating device 108.

[0057] In one example, as shown in Figure 3A, the stop sensor 120 comprises a stop switch that is configured to be operated (or depressed) as the aerosol substrate consumable 106 reaches the desired point (or predetermined threshold) within the aerosol substrate consumable 106. The stop switch may comprise a mechanical switch or the like that is configured to be contacted by the aerosol substrate consumable 106 itself. In one example, the stop switch is located at the distal end of the heating chamber 116 such that it will be operated when the aerosol substrate consumable 106 has been fully inserted into the aerosol generating device 108.

[0058] In this case, the stop input is the operation (or depression) of the stop switch by the aerosol substrate consumable 106. That is to say that the actuator 102 may be configured to be deactivated to stop further insertion of the aerosol substrate consumable 106 once the aerosol substrate consumable has reached the predeter-

mined threshold.

[0059] In one example, the stop sensor 120 comprises one or more light sensors. Figure 3B shows an example of this arrangement. The stop sensor 120 in the form of one or more light sensors may be arranged within the aerosol generating device 108 at the predetermined threshold within the aerosol generating device 108. In this case, the stop input is the detection of the aerosol substrate consumable 106 by the stop sensor 120 in the form of the one or more light sensors.

[0060] As shown in Figure 3B, the stop sensor 120 may be arranged towards a distal end of the heating chamber 116 (i.e., the end of the heating chamber 116 that is furthest within the aerosol generating device 108), such that the stop input is detected when the aerosol substrate consumable 106 has been fully inserted into the heating chamber 116.

[0061] The one or more light sensors forming the stop sensor 120 may be substantially identical in form to the one or more light sensors forming the insertion sensor 104 and so the relevant features have not been repeated here.

[0062] Further, the one or more light sensors forming the stop sensor 120 may be same as those forming the insertion sensor 104. In such configuration, the one or more light sensors 104, 120 and the aerosol generating device controller 126 are configured to detect at least a first marker 128 and a second marker 130 provided on the inserted aerosol substrate consumable 106 at a distance L from each other corresponding to the optimal insertion distance for the consumable 106 into the heating chamber 116, as shown in Figure 7. In practice, the detection of the first marker 128 on the aerosol substrate consumable by the one or more light sensors 104, 120 would trigger insertion of the aerosol substrate consumable 106 as previously described. Then, the detection of the second marker 130 by the same one or more light sensors 104, 120 would prompt the stopping of insertion. In this example, the detection of the first marker 128 by the one or more light sensors 104, 120 is the activation input and the detection of the second marker 130 by the same one or more light sensors 104, 120 is the stop input. The first marker 128 and the second marker 130 may be identical or different, e.g., the first marker 128 may be a single band around the consumable 106 and the second marker 130 may be two bands around the consumable. Other markers, such as QR codes, shaped lines etc. are also envisaged.

[0063] In the example of the actuator 102 comprising a roller, the roller may be configured to stop rotation after a predetermined number of insertion rotations. The number of insertion rotations does not need to be complete rotations but may only include part of a rotation. For example, following the detection of the activation input by the insertion sensor 104, the roller is configured to begin rotation and stop rotation after a predetermined number of insertion rotations (complete and/or partial turns). The number of rotations may be sufficient to further insert the aerosol substrate consumable 106 from a partially inserted position to the desired position within the aerosol generating device 108.

[0064] In this example, the actuator 102 may comprise a motor and encoder (or motor encoder). The motor and encoder are designed such that the rotation position and/or number of rotations of the roller can be detected. Alternatively, the insertion sensor 104 may comprise a Hall effect sensor with orientation detection (as shown in Figures 4A and 4B) such that the orientation of the roller can be detected. Therefore, the actuator 102 may be configured to stop operation after motor and encoder (or Hall effect sensor) has detected that the roller has turned a predetermined number of insertion rotations (complete and/or partial turns).

[0065] In these examples, the orientation of the roller can be determined. As such, the stop input may comprise the detection by the motor and encoder or a stop sensor 120 in the form of a Hall effect sensor that the roller is no longer rotating. That is, when the aerosol substrate consumable 106 has been fully inserted, there will be increased resistance to the rotation of the roller, which may prevent further rotation of the roller. This detection of increased resistance may be taken as the stop signal to switch the actuator 102 off.

[0066] In one example, the actuator 102 is configured to stop operation when the load required to drive the actuator 102 is increased beyond a predetermined load threshold. The actuator 102 may draw an electric power (or electric current) from a power supply and the required electric power to drive the actuator 102 may increase as the actuator 102 encounters resistance. In this example, the actuator will require a first load to insert the aerosol substrate consumable 106 during a first phase of operation (i.e., a first load is required as the actuator 102 moves the aerosol substrate consumable 106 from the first position to the second position). When the aerosol substrate consumable 106 has been fully inserted such that it abuts an internal wall/barrier within the aerosol generating device 108 (such as the distal end of the heating chamber 116) then there will be an increased resistance and the load required to drive the actuator 102 will increase. If the load (or electric power/current) is increased above a threshold load level, then the actuator 102 is configured to stop further insertion of the aerosol substrate consumable 106 into the aerosol generating device 108.

[0067] In each of the examples described above, the aerosol generating device 108 may be configured to initiate heating of the aerosol substrate consumable 106 upon detection of the stop input. That is to say that the aerosol generating device 108 will begin heating the aerosol substrate consumable 108 once it has been inserted into the desired location (the second position) within the aerosol generating device 108. As described above, in other examples the aerosol generating device 108 may be configured to initiate heating of the aerosol substrate consumable 106 upon detection of the activation input.

[0068] In one example, the loading mechanism 100 is configured to detect an ejection input and the actuator 102 is configured to eject the aerosol substrate consumable 106 upon detection of the ejection input. In some examples, loading mechanism comprises an ejection sensor 122 configured to detect the ejection input, as shown in Figures 2A and 2B. In some examples, the ejection sensor 122 is the same as the insertion sensor 104, that is to say that one sensor may perform both function of the insertion sensor 104 and the ejection sensor 122. In other examples, the insertion sensor 104 and the ejection sensor 122 are distinct components.

[0069] Upon detection of the ejection input, the actuator 102 may operate in an opposite direction compared with the direction in which it moves to insert the aerosol substrate consumable 106. For example, if the actuator 102 is a roller, the roller may rotate in a first direction to insert the aerosol substrate consumable 106 and a second direction to eject the aerosol substrate consumable 106.

[0070] In one example, the ejection input may comprise the opening of the lid 110 at the end of the inhalation session. As described above in relation to the insertion sensor 104, the ejection sensor 122 may comprise a switch configured to be operated due to the movement action of the lid 110 so that when the lid 110 is opened, the switch is no longer depressed and the actuator 102 begins ejecting the aerosol substrate consumable 106.

[0071] In other examples, the ejection sensor 122 may comprise a Hall effect sensor and the lid 110 comprises a magnet 118. As described above in relation to the insertion, the Hall effect sensor may detect that the magnetic field level is reduced below a magnetic threshold level to indicate that the lid 110 has been opened. In both of these examples, the ejection input comprises the opening of the lid 110.

[0072] In some examples, the ejection sensor 122 may comprise a button or pad configured to detect a user input, such as a button press, swipe or tap. In this case, the ejection input could be considered to be the user input. The actuator 102 would be configured to eject the aerosol substrate consumable 106 out of the aerosol generating device 108 upon detection of the user input.

[0073] In one example, the ejection input may comprise a detection that the inhalation session has stopped. For example, a user may enter an input on a button or pad to indicate that the session is finished. Alternatively, the device 108 may detect that the level of aerosol being generated has reduced below an aerosol generation threshold, for example by the use of an infrared sensor. In this example, there may be one or more infrared sensors located in or adjacent to the mouthpiece to detect the level of aerosol being generated that flows through the mouthpiece.

[0074] In one example, the loading mechanism 100 will only eject the aerosol substrate consumable 106 if a detected temperature of the aerosol substrate consumable is sufficiently low.

[0075] In some examples, the actuator 102 is configured to stop the ejection operation once the aerosol substrate consumable 106 has been ejected from the aerosol generating device 108.

[0076] For example, the actuator 102 in the form of a roller may be configured to stop operation after a predetermined number (complete or partial) of ejection rotations. The predetermined number of ejection rotations may match the predetermined number of insertion rotations.

[0077] Referring to the example shown in Figure 3A in which the insertion sensor 104 comprises a switch configured to be pressed by the aerosol substrate consumable 106 as the aerosol substrate consumable 106 is inserted into the device 108. During the ejection stage, the actuator 104 may be configured to operate to eject the aerosol substrate consumable 106 until the aerosol substrate consumable 106 is no longer in contact with the insertion switch 104 (e.g., the insertion switch 104 is no longer being depressed by the consumable).

[0078] Referring to the example shown in Figure 3B in which the insertion sensor 104 comprises a light sensor (or optical sensor), the actuator 102 may be configured to operate to eject the aerosol substrate consumable 106 until the aerosol substrate consumable 106 is no longer detected by the one or more light sensors of the insertion sensor.

[0079] In one example, the loading mechanism 100 may be retrofitted to an existing aerosol generating device 108.

[0080] Figure 5 shows a flow chart of steps of a method of inserting an aerosol substrate consumable 106 into an aerosol generating device 108. At step 202, the method includes the step of detecting an activation input at an insertion sensor 104. At step 204, the method includes the step of operating an actuator 102, in response to the detected activation input, to move a partially inserted consumable 106 further into the aerosol generating device 108.

[0081] Figure 6 shows a flow chart of potentially further steps of the method. These steps follow on from step 204 shown in Figure 5.

[0082] The method may also comprise a step 206 of detecting a stop input at a stop sensor 120 and then the step 208 of deactivating (or stopping operation of) the actuator 102 to stop further insertion of said consumable 106 into the aerosol generating device 108.

[0083] The method may also comprise a step 210 of detecting an ejection input at an ejection sensor 122 and a step 212 of ejecting the aerosol substrate consumable 106 from the aerosol generating device 108 upon detection of the ejection input.

[0084] It is important to note that the various features described above may be used in various combinations. For example, the insertion sensor 104 may comprise a light sensor, but the stop sensor 120 is not another light sensor, but rather a mechanical switch configured to be depressed by the aerosol substrate consumable 106 or

there is not a stop sensor at all and the actuator in the form of a roller is configured to stop rotating after a predetermined number of rotations. This is just an example, but in practice any type of insertion sensor 102 described above could be used with any type of stop sensor 120 and/or ejection sensor 122.

[0085] Although preferred embodiments have been shown and described, it will be appreciated by those skilled in the art that various changes and modifications might be made without departing from the scope of the invention, as defined in the appended claims and as described above.

Claims

1. An aerosol substrate consumable loading mechanism (100) for loading an aerosol substrate consumable (106) into an aerosol generating device (108), the loading mechanism (100) comprising:

   an actuator (102) configured to load a partially inserted aerosol substrate consumable (106) further into said aerosol generating device (108), in use; and
   an insertion sensor (104) configured to detect an activation input,
   wherein the actuator (102) is configured to load said aerosol substrate consumable (106) further into said aerosol generating device (108) upon detection of the activation input.

2. The loading mechanism (100) according to claim 1, wherein the actuator (102) comprises a roller and a guide (112), wherein the roller and the guide (112) define a region between them for receiving said consumable (106).

3. The loading mechanism (100) according to claims 1 or 2, wherein the insertion sensor (104) comprises one or more light sensors and wherein the activation input comprises the detection by the one or more light sensors that said consumable (106) has been partially inserted into said aerosol generating device (108).

4. The loading mechanism (100) according to claims 1 or 2, wherein the insertion sensor (104) comprises an insertion switch configured to be depressed and the activation input comprises the depression of the insertion switch by said consumable (106) during the partial insertion into said aerosol generating device (108).

5. The loading mechanism (100) according to claim 2, wherein the insertion sensor (104) comprises a magnetic sensor and wherein the activation input comprises the detection by the magnetic sensor of movement of the roller due to the insertion of said consumable (106) into said aerosol generating device (108).

6. The loading mechanism (100) according to claims 1 or 2, wherein the insertion sensor (104) comprises a button or touchpad and the activation input comprises a user input on the button or touchpad.

7. The loading mechanism (100) according to any one of the preceding claims, comprising a stop sensor (120) configured to detect a stop input, wherein the actuator (102) is configured to stop further insertion of said consumable (106) when the stop sensor has detected the stop input.

8. The loading mechanism (100) according to claim 7, wherein the stop sensor (120) comprises one or more of:

   one or more light sensors; and
   a stop switch configured to be depressed by said consumable (106) when the consumable (106) reaches the predetermined threshold.

9. The loading mechanism (100) according to claims 1 to 6, wherein the actuator (102) comprises a roller, wherein the roller is configured to stop rotation after a predetermined number of insertion rotations.

10. The loading mechanism (100) according to any one of claims 1 to 6, wherein the actuator (102) is configured to stop operation when the load required to drive the actuator (102) is increased beyond a predetermined load threshold.

11. The loading mechanism (100) according to any one of the preceding claims, comprising an ejection sensor (122), wherein the ejection sensor (122) is configured to detect an ejection input; and
    wherein the actuator (102) is configured to eject said consumable (106) from said aerosol generating device (108) upon detection of the ejection input at the ejection sensor (122).

12. A loading heating system for an aerosol generating device (108), the loading heating system comprising:

    a loading mechanism (100) according to any preceding claim; and
    a heating chamber (116) into which the actuator (102) is configured to load the consumable (106), in use.

13. An aerosol generating device (108) comprising:

    the loading heating system according to claim 12;

outer housing (124) to substantially surround the heating chamber, the outer housing (124) comprising an opening for receiving said consumable (106) into the heating chamber; and
a power source for providing power to the loading heating system.

14. The aerosol generating device (108) according to claim 13 comprising a movable lid (110) configured to move between:

an open configuration in which the consumable (106) is insertable into the aerosol generating device (108); and
a closed configuration in which the lid (110) prevents access for the consumable (106) to the aerosol generating device (108),
wherein the insertion sensor (104) is configured to detect that the lid (110) is in an open configuration and the actuator (102) is configured to load said partially inserted consumable (106) further into the aerosol generating device (108) upon detection that the lid (110) has been moved to the open configuration.

15. A method of loading an aerosol substrate consumable (106) into an aerosol generating device (108), the method comprising:

detecting an activation input at an insertion sensor (104); and
operating an actuator (102), in response to the detected activation input, to move a partially inserted consumable (106) further into the aerosol generating device (108).

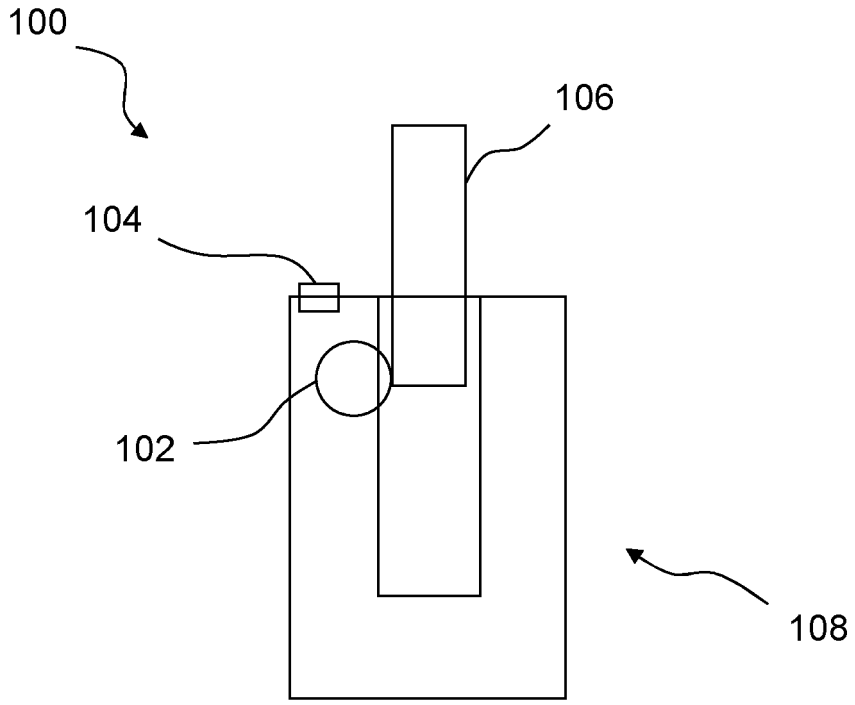

Figure 1A

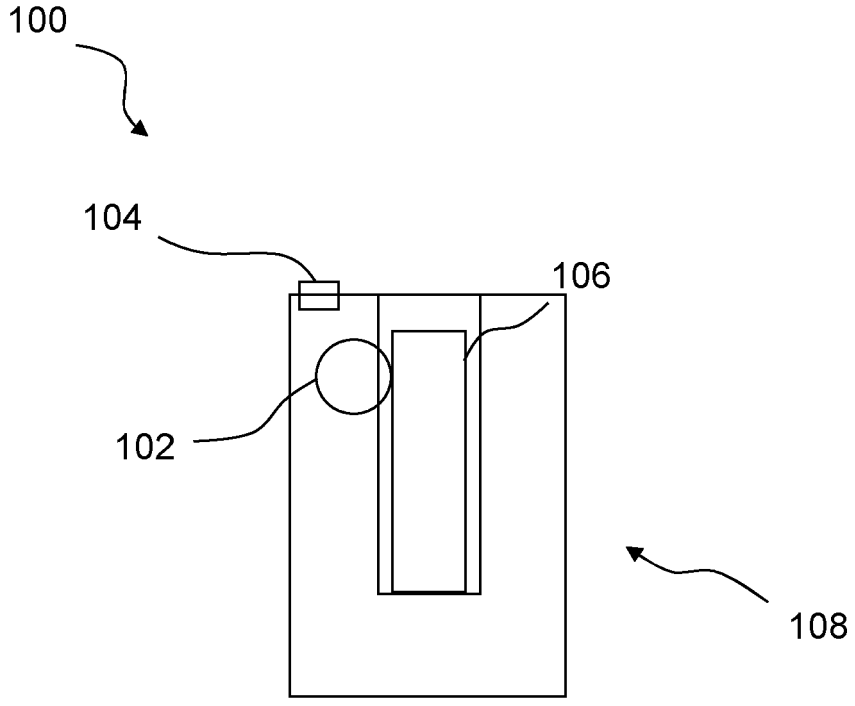

Figure 1B

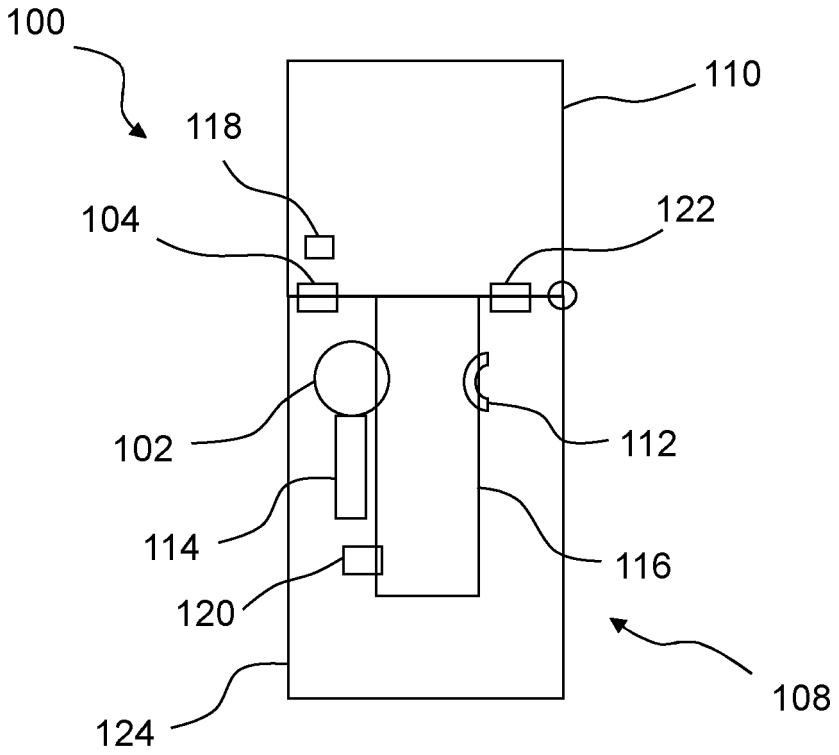

Figure 2A

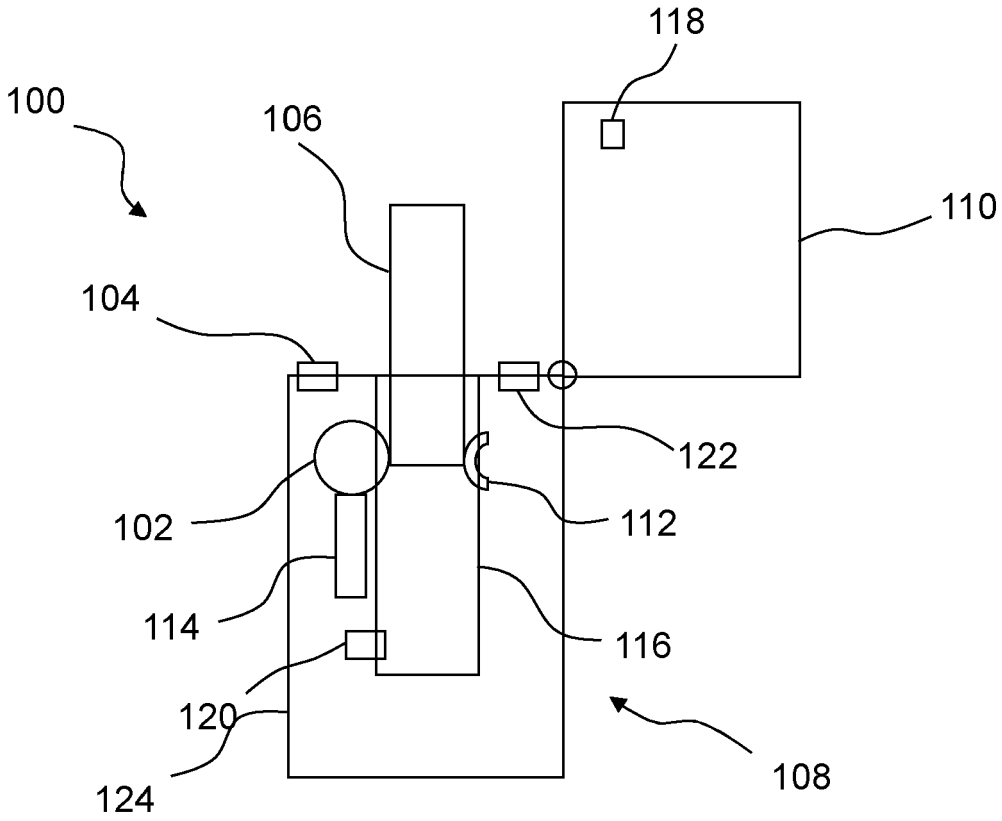

Figure 2B

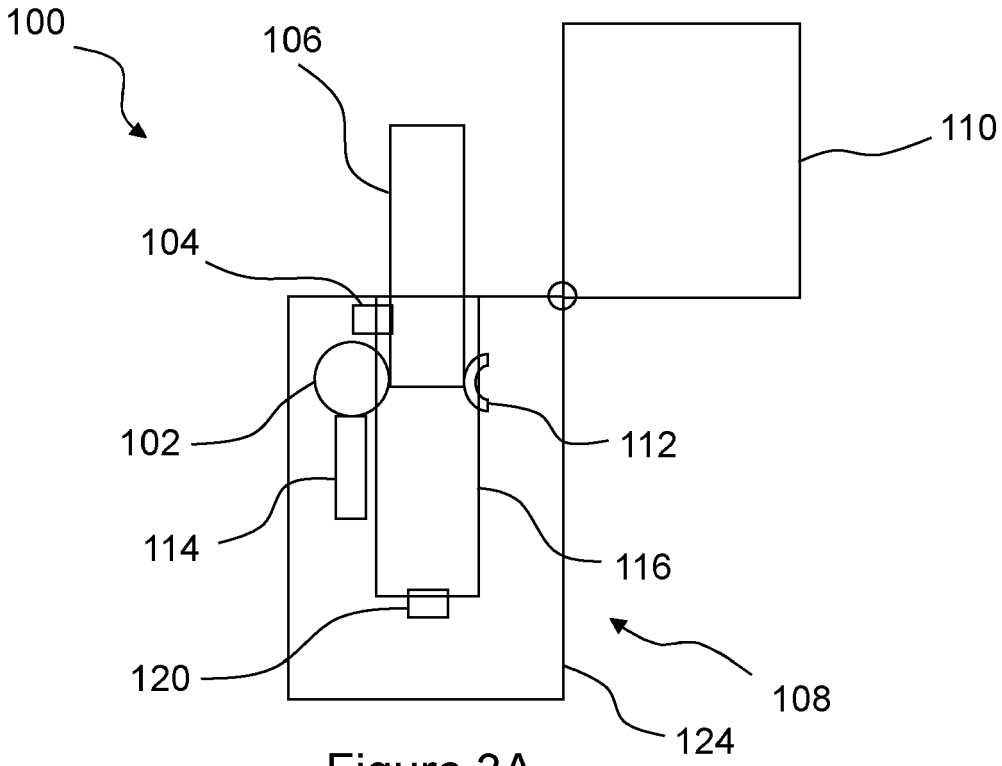

Figure 3A

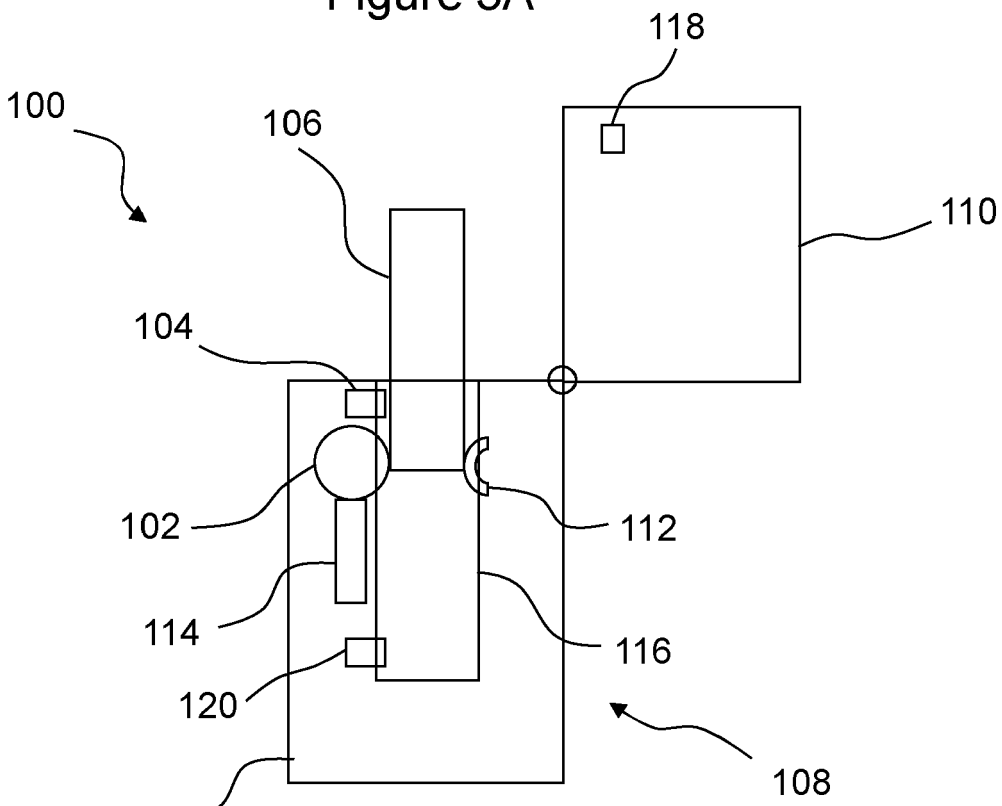

Figure 3B

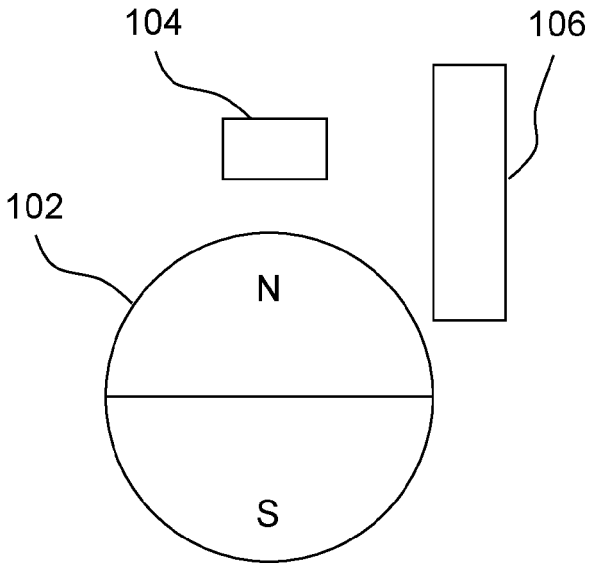

Figure 4A

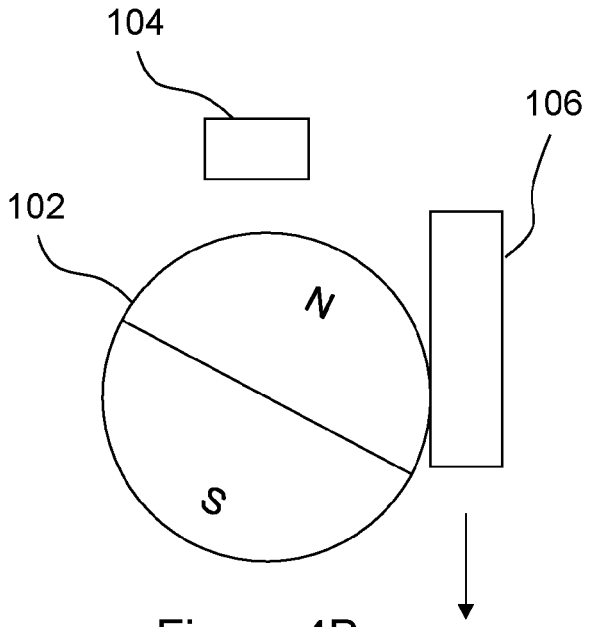

Figure 4B

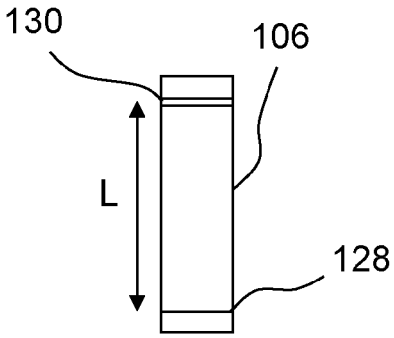

Figure 7

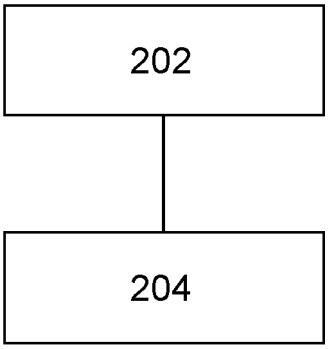

Figure 5

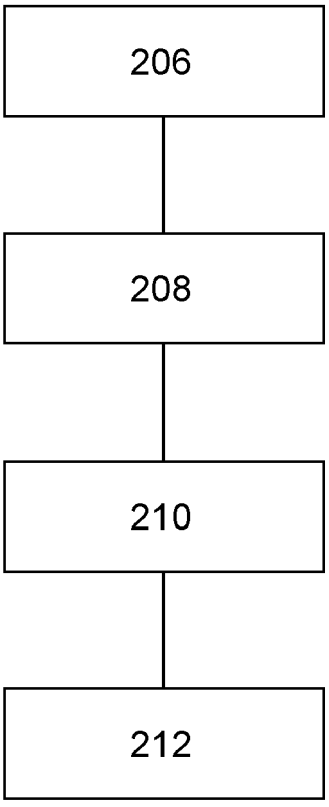

Figure 6

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EUROPEAN SEARCH REPORT

Application Number
EP 22 16 6321

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	WO 2019/185744 A1 (NICOVENTURES TRADING LTD [GB]) 3 October 2019 (2019-10-03) * page 17, line 30 - page 18, line 13; claims; figures * * page 9, line 18 - line 28 *	1-15	INV. A24F40/40 A24F40/51
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A	WO 2022/029191 A1 (NICOVENTURES TRADING LTD [GB]) 10 February 2022 (2022-02-10) * page 16, line 31 - page 17, line 14; claims; figures *	1-15	
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			A24F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	6 October 2022	Marzano Monterosso

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06-10-2022

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