



(12)

EUROPEAN PATENT APPLICATION

- (43)

Date of publication:  
06.11.2024 Bulletin 2024/45
- (51)

International Patent Classification (IPC):  
A24F 40/40<sup>(2020.01)</sup> A24F 40/60<sup>(2020.01)</sup>  
A24F 40/90<sup>(2020.01)</sup>
- (21)

Application number: 23171265.4
- (52)

Cooperative Patent Classification (CPC):  
A24F 40/60; A24F 40/40; A24F 40/90
- (22)

Date of filing: 03.05.2023

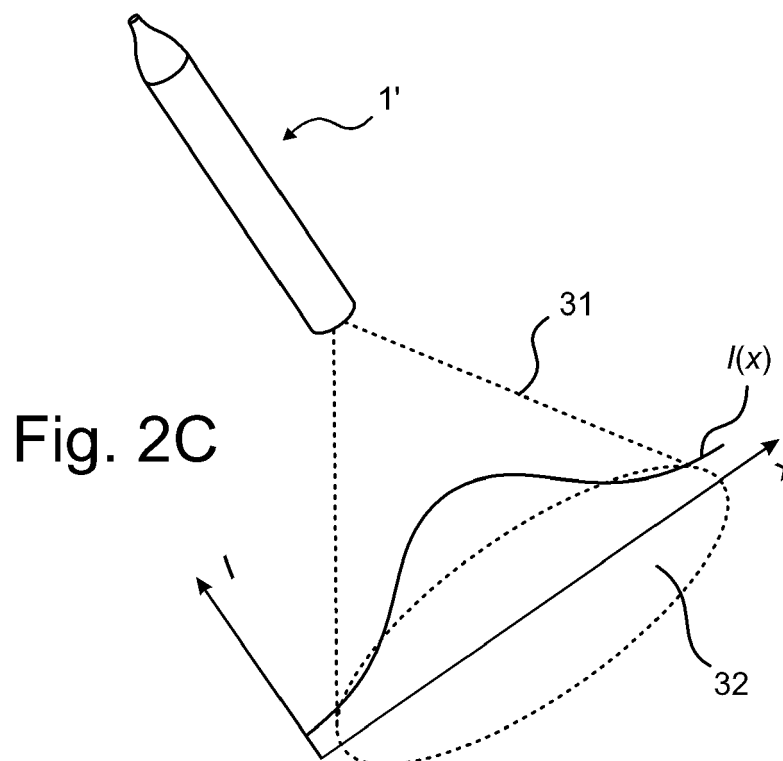
- |  |   |
|--|---|
| <div>(84)</div> <div>Designated Contracting States:<br/>AL AT BE BG CH CY CZ DE DK EE ES FI FR GB<br/>GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL<br/>NO PL PT RO RS SE SI SK SM TR<br/>Designated Extension States:<br/>BA<br/>Designated Validation States:<br/>KH MA MD TN</div> | <div>(71)</div> <div>Applicant: JT International SA<br/>1202 Geneva (CH)</div> <div>(72)</div> <div>Inventor: LEHOCKY, Juraj<br/>83102 Bratislava (SK)</div> <div>(74)</div> <div>Representative: Hoffmann Eitle<br/>Patent- und Rechtsanwälte PartmbB<br/>Arabellastraße 30<br/>81925 München (DE)</div> |
|--|---|

(54)

HANDHELD AEROSOL GENERATING DEVICE

- (57)

There is provided a handheld aerosol generating device (1') comprising an aerosol forming assembly (12) arranged to generate an aerosol by vaporizing a release medium; an electric power storage (13) arranged to provide power to the aerosol forming assembly; a controller (14) arranged to drive said aerosol forming assembly for atomizing a release medium; and a focussed light source (20) arranged to emit light to the outside of the handheld aerosol generating device, wherein the controller is further arranged to drive said light source.



**Description**Technical field

5 **[0001]** The present invention relates to handheld aerosol generating devices. More particularly, the present invention relates to aerosol inhalation devices in the form of electronic cigarettes, cigalikes, e-cigarettes, vapour inhalers and related devices in the specific context of enhancing functionality as well as user benefit and comfort.

Background

10 **[0002]** In the arts there are several types and concepts for inhalation devices that serve a broad range of purposes including also leisure and pleasure devices such as electronic cigarettes. Existing inhalation devices either change the phase of a fluid before inhalation with for example a wick and a coil so as to increase the vapor temperature above human body temperature or deliver drops a room temperature by, for example, employing an ultrasonic mesh. In the  
15 above wick and coil system the vapor can be perceived as 'warm' by a user in the mouth, whereas in the ultrasonic mesh systems, the vapor is usually perceived as 'cold'. Further techniques are known and include liquid jet elements to form droplets.

**[0003]** In any way, such devices generate an aerosol and usually employ an atomization assembly arranged to generate the aerosol by atomise a release medium along one - but not limited to - one of the mentioned techniques. Such inhalation  
20 devices are oftentimes portable and pocket-size devices that can easily fit in the user's hand or can be handled by the user's fingers alone. In this way, the devices can be convenient for use and can be carried by a user for regular use.

**[0004]** In order to operate the device, and also ultimately any atomization assembly, there is usually provided an electric power storage in the form of, for example, a rechargeable battery, which can be charged by means of supplying power to the handheld aerosol generating device from the outside. In any way, the conventional arts already provide for  
25 compact handheld devices that can be, and actually are carried along by most users. Such devices at the same time provide a compact electric power source and electronic circuit capability. The use and employment of such resources being available for the users almost anytime and anywhere are, however, only insufficiently exploited by the available devices. There is therefore a need for improved handheld aerosol generating device that address any related drawbacks.

Summary

**[0005]** The mentioned drawbacks are remedied by the subject-matter of the independent claims. Further preferred embodiments of the present invention are defined in the dependent claims.

**[0006]** According to one embodiment of the present invention there is provided a handheld aerosol generating device  
35 comprising an aerosol forming assembly arranged to generate an aerosol by vaporizing a release medium; an electric power storage arranged to provide power to the aerosol forming assembly; a controller arranged to drive said aerosol forming assembly for atomizing a release medium; and a focussed light source arranged to emit light to the outside of the handheld aerosol generating device, wherein the controller is further arranged to drive said light source.

Brief description of the drawings

**[0007]** Embodiments of the present invention, which are presented for better understanding the inventive concepts and which are not to be seen as limiting the invention, will now be described with reference to the Figures in which:

- 45 Figure 1 shows a schematic view of a handheld aerosol generating device and its main functional components in a conventional arrangement;
- Figures 2A to 2C show some aspects of a handheld aerosol generating device according to an embodiment of the present invention;
- 50 Figures 3A and 3B show schematic views of further details handheld aerosol generating devices according to embodiments of the present invention; and
- 55 Figures 4A and 4B show schematic views of focussed light sources applicable for handheld aerosol generating devices according to at least some embodiments of the present invention.

Detailed description

**[0008]** Figure 1 shows a schematic view of a handheld aerosol generating device and its main functional components in a conventional arrangement. As generally shown a handheld aerosol generating device 1 is provided, for example in the form of an electronic cigarette, a portable inhaler, a cigalike or of other applicable type. The handheld aerosol generating device 1 comprises an atomization assembly 12 arranged to generate an aerosol by atomising a release medium. In general, said aerosol should be suitable for inhalation and may comprise any one of flavour components, active components, support components, etc. It may be generated by means of heat, evaporation, ultrasonic atomization, liquid jet atomization and the like from any suitable release medium, including but not limited to liquids, solutions, tobacco, tobacco material, processed tobacco, and the like. The handheld aerosol generating device 1 may further provide a mouthpiece 11 which allows for convenient inhalation of the generated aerosol, possibly in combination with ambient air.

**[0009]** The handheld aerosol generating device 1 comprises an electric power storage 13 arranged to provide power to the atomization assembly 12. The electric power storage 13 can be a rechargeable electric power storage, such as a rechargeable battery, a Lithium-ion secondary battery, a super capacitor or of any other suitable type. In this way, the electric power storage 13 which can be charged by means of supplying power to the handheld aerosol generating device 1 from the outside. For example, a charging device may be electrically coupled or connected to the handheld aerosol generating device 1 for charging the electric power storage 13 as is as such known from the arts. Further details are provided in conjunction with the description of the embodiments.

**[0010]** The handheld aerosol generating device 1 comprises further a controller 14 for controlling one or more functionalities, such as device operation, user interaction, charging, powering and/or driving the atomization assembly 12, and the like. The device control can be provided by means of one single controller or a plurality of controllers, each then providing a controlling resource and/or functionality. The controller(s) can be provided by means of microcontrollers as an integrated circuit (IC), one or more ICs, one or more passive and/or active components, switches, indicators, sensors, connectors, printed circuit board(s), PCB(s), and the like. The controller 14, electric power storage 13 and optionally also the atomization assembly 12 may be accommodated by a device housing 15. The mentioned mouthpiece 11 may be provided toward a proximal end of that housing 15, or generally of the device 1, whereas a distal end 16 can be located at the opposing end. Although shown and described in conjunction with a device of the conventional arts, some or all elements may be present in embodiments of the present invention.

**[0011]** Figures 2A to 2C show some aspects of a handheld aerosol generating device according to an embodiment of the present invention. As shown in Figures 2A and 2B, the handheld aerosol generating device 1' comprises an aerosol forming assembly arranged to generate an aerosol by vaporizing a release medium, an electric power storage arranged to provide power to the aerosol forming assembly, and a controller arranged to at least drive the aerosol forming assembly for atomizing a release medium. These elements can be practically identical as, similar to or respectively adapted from the aerosol forming assembly 12, electric power storage 13, and controller 14 as already mentioned and described in conjunction with Figure 1.

**[0012]** The handheld aerosol generating device 1' according to the present embodiment of the invention comprises further a focussed light source 20 arranged to emit light to the outside of the handheld aerosol generating device 1'. The controller 14 of the device 1' is further arranged to drive the light source 14, which as such comprises switching the light source 14 on, switching the light source 14 off, providing a specific driving current to the light source 14, and/or providing a pulse-width-modulated, PWM, switched current to the light source 14. Especially the latter PWM control can be provided by the controller 14, for example in the form of a microcontroller, for providing a specific and well defined effective current through the light source 14. In this way, the functional element of the focussed light source 14, e.g. one or more light emitting diode(s), LED, can be driven at the appropriate voltage and/or current so as to provide the desired illumination output satisfying the specifications of the used LED(s).

**[0013]** Generally, the focussed light source may comprise thus an LED, preferably a white-light light emitting diode and/or preferably with a luminous flux capability of at least 100 Lumen. The voltage of this LED can for example be comprised between 3 V and 4 V, and be substantially equal to 3,7 V. Further, the controller may be arranged to drive the focussed light source according to a plurality of emission patterns, preferably by means of said PWM. The emission patterns may correspond to a flash of high illumination intensity, an emergency flash, a Morse SOS pattern (... - - - ...), a stroboscope pattern, and the like.

**[0014]** In an embodiment the focussed light source can be arranged to emit to the outside of the handheld aerosol generating device 1' light of a spatial illumination profile with an area of maximum illumination intensity. By means of employing a focussed light source such a well-defined spatial illumination profile can be provided which profile also features an area of maximum illumination intensity. In this way, the focussed light source provides an illumination functionality as opposed to, for example, indicator lights, diffuse light sources and the like.

**[0015]** Preferably, the spatial illumination profile with the area of maximum illumination intensity can be as shown in Figure 2C and such to provide a light cone 31 with an effective illumination area 32. The virtually superimposed illumination intensity profile I(x) in Figure 2A indicated the spatial distribution of the illumination intensity over space x. This profile

can be provided with an axial symmetry or other profile in any direction normal to the x-direction. As further shown in Figures 2A and 2C, the handheld aerosol generating device 1' comprising an elongated housing 15 and a mouthpiece 11 toward a proximal end of said elongated housing 15, wherein the focussed light source 20 is arranged to emit light from a distal end 16 of said elongated housing 15. The emitting angle of the focused light source 20 can be comprised between 60 and 120 degrees. In other words, the aperture of the light cone 31 shown in Figure 2C can be comprised between 60 and 120 degrees.

**[0016]** In some embodiments and as shown at least in Figure 2A, the handheld aerosol generating device 1' further comprises an operation member 21, e. g. a switch or touch sensor, being electrically coupled to the controller 14, wherein the controller 14 is arranged to drive the focussed light source 20 in response to an operation of the operation member 21. The operation member 21 can for example be arranged closer to the proximal end of the device so as the user can operate it while handling normally the device, during for example a vaping session. Generally, the handheld aerosol generating device 1' can comprise one or more further operation member(s) 18, e. g. again a switch or a touch sensor, for allowing the user operation of other device functionalities, such as general operation, on-off, heat settings, and the like. In further embodiments, the operation member 21 that is provided for driving the focussed light source 20 may have a different size, shape, haptic as compared to the one or more further operation member(s) 18 provided for allowing the user operation of the other device functionalities. In one embodiment, the operation member 21 may have a substantially circular shape or appearance, whereas the one or more further operation member(s) 18 have a substantially oval shape or appearance, or vice versa.

**[0017]** In one further embodiment the operation member 21 is arranged closer to the distal end 16 as compared to the proximal end of the elongated housing 15, preferably in the vicinity of the distal end 15. This alternative or additional provision of the operation member is indicated by putting the reference numeral (21) in brackets. This distal end 16 may further be the preferred location for other elements of the device 1'. Specifically, the handheld aerosol generating device 1' as shown in Figure 2B may further comprise an electric connector 17 arranged to couple electric power to the handheld aerosol generating device 1' for charging the electric power storage 13, wherein an insertion direction of the electric connector 17 is arranged parallel to a principal emission direction of the focussed light source 20.

**[0018]** This embodiment may provide a handy solution for integrating all the functionalities in a small, compact and hand-held device. Preferably, the handheld aerosol generating device 1' may comprise a planar housing end 16, wherein an opening of the electric connector 17 and an opening for said focussed light source are arranged in said planar housing end 16 next to each other. Particularly, as shown in Figure 2B, the connector 17 may be arranged at the centre of the planar housing end 16 whereas the opening for the focused light source may be arranged on a side of the connector 17. This may allow an easy interaction with a charging station while accommodating the functionality of the focussed light source without restrictions or design interference with a charging station, cradle, etui, or other supplemental elements. The opening can comprise for example a transparent acrylic glass cover helping to protect any light source.

**[0019]** Figures 3A and 3B show schematic views of further details handheld aerosol generating devices according to embodiments of the present invention. In this embodiment the handheld aerosol generating device further comprising a printed circuit board, PCB, 19, wherein the controller comprises at least one processing unit 194 being mounted on said printed circuit board 19, and wherein the focussed light source 20 is mounted printed circuit board 19. Specifically, the controller's at least one processing unit 194 is mounted on the same printed circuit board 19 as the focussed light source 20. In a further preferred embodiment and as shown in Figure 3A, the focussed light source 20 is mounted to a side face 195 of said printed circuit board 19. In this way, the longitudinal extension of the device 1' can be exploited to provide a sufficient mounting area on the main surface of the PCB 19, whereas the focussed light source 20 can be directly mounted and connected to the PCB with its primary emission direction along said longitudinal extension.

**[0020]** In a further embodiment, the aerosol generating device comprises a motion sensor being coupled to the controller, wherein the controller is arranged to drive the focussed light source in response to a measurement output of the motion sensor. In this way, the device controller may automatically drive the focussed light source when the motion sensor measures a specific motion, gesture, and/or direction relative to the line of gravity. In this way, the focussed light source may be deactivated when the aerosol generating device 1' is held with a gesture or at an orientation that is typical for the user inhaling an aerosol from the aerosol generating device.

**[0021]** In further embodiments, the handheld aerosol generating device 1' may comprise a second light source 22 surrounding for example an outlet for said generated aerosol. In such embodiments, the handheld aerosol generating device may comprise a lock mechanism 224 arranged to engage with a mouthpiece 11, said lock mechanism being preferably arranged concentric with an arrangement of said second light source 22 and said outlet. The second light source 22 can be arranged on the device body to emit light in the interior part of the mouthpiece. The mouthpiece can be rendered at least partially transparent. It can for example be made of glass. In this way, the light emitted by the second light source 22 can be visible to the user.

**[0022]** The second light source 22 can comprise a plurality of LEDs, for example 8, arranged circumferentially around a hole, which is shown in the inset to Figure 3B when a top piece is removed. As shown, eight LEDs 221 may be mounted on a circular printed circuit board 222, for example in the form of surface mounted devices (SMD). The printed circuit

board 222 may provide the hole 223 in its centre. In some embodiments, the hole 223 can be adapted to receive at least a part of a consumable article inside the device body and/or the housing 15 may comprise a locking mechanism 224 for making an upper part detachable. The luminous flux capability of each LED 221 can be comprised between 4 and 10 lumens. In a general case, the luminous flux capability of each LED is adapted to not disturb the user. Further, the controller may be arranged to drive the second light source 22 according to a plurality of emission patterns, preferably patterns of different and/or varying light colours.

**[0023]** Figures 4A and 4B show schematic views of focussed light sources applicable for handheld aerosol generating devices according to at least some embodiments of the present invention. In Figure 4A, a focussed light source 20-1 comprises an element housing 201 with a recess 205 which may accommodate an edge of a PCB for lateral mounting. Respective contact pads 204 may still engage with mating contact pads on the main PCB surface and soldered thereto following a surface mounted device, SMD, procedure. The focussed light source 20-1 may further comprise one or more LED chips 202 on a housing substrate and a reflector 203 with a reflective surface so as to provide the focussing of the light. In Figure 4B, the focussed light source 20-2 comprises a lens arranged to focus the light emitted from the light source, such as lens 206 for providing the focussing or additional focussing in the case of a combination of both a lens as well as a reflector, indicated by the dashed line and reference numeral (203) in Figure 4B.

**[0024]** Although detailed embodiments have been described, these only serve to provide a better understanding of the invention defined by the independent claims and are not to be seen as limiting.

## Claims

1. A handheld aerosol generating device comprising:

- an aerosol forming assembly arranged to generate an aerosol by vaporizing a release medium;
- an electric power storage arranged to provide power to the aerosol forming assembly;
- a controller arranged to drive said aerosol forming assembly for atomizing a release medium; and
- a focussed light source arranged to emit light to the outside of the handheld aerosol generating device, wherein the controller is further arranged to drive said light source.

2. The handheld aerosol generating device of claim 1, wherein the focussed light source is arranged to emit to the outside of the handheld aerosol generating device light of a spatial illumination profile with an area of maximum illumination intensity.

3. The handheld aerosol generating device of claim 1 or 2, comprising an elongated housing and a mouthpiece toward a proximal end of said elongated housing, wherein the focussed light source is arranged to emit light toward the distal end of said elongated housing.

4. The handheld aerosol generating device of any one of claims 1 to 3, further comprising an operation member being electrically coupled to the controller, wherein the controller is arranged to drive the focussed light source in response to an operation of the operation member.

5. The handheld aerosol generating device of claim 4 when dependent on claim 3, wherein the operation member is arranged closer to the distal end as compared to the proximal end of the elongated housing, preferably in the vicinity of the distal end.

6. The handheld aerosol generating device of any one of claims 1 to 5, further comprising a printed circuit board, wherein the controller comprises at least a processing unit being mounted on said printed circuit board, and wherein the focussed light source is mounted printed circuit board.

7. The handheld aerosol generating device of claim 6, wherein the light source is mounted to a side face of said printed circuit board.

8. The handheld aerosol generating device of any one of claims 1 to 7, further comprising an electric connector arranged to couple electric power to the handheld aerosol generating device for charging the electric power storage, wherein an insertion direction of the electric connector is arranged parallel to a principal emission direction of the focussed light source.

9. The handheld aerosol generating device of claim 8, further comprising a planar housing end, wherein an opening

of the electric connector and an opening for said focussed light source are arranged in said planar housing end next to each other.

5 10. The handheld aerosol generating device of any one of claims 1 to 9, further comprising a motion sensor being coupled to the controller, wherein the controller is arranged to drive the focussed light source in response to a measurement output of the motion sensor.

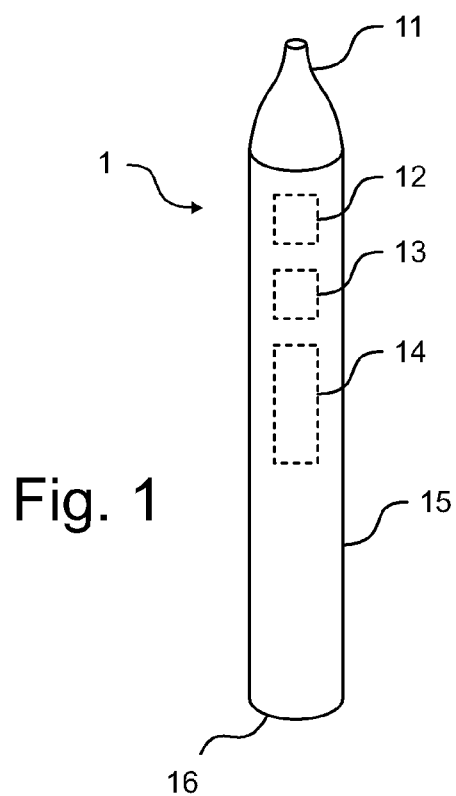
10 11. The handheld aerosol generating device of any one of claims 1 to 10, wherein the controller is arranged to drive the focussed light source according to a plurality of emission patterns.

12. The handheld aerosol generating device of any one of claims 1 to 11, further comprising a lens arranged to focus the light emitted from the light source.

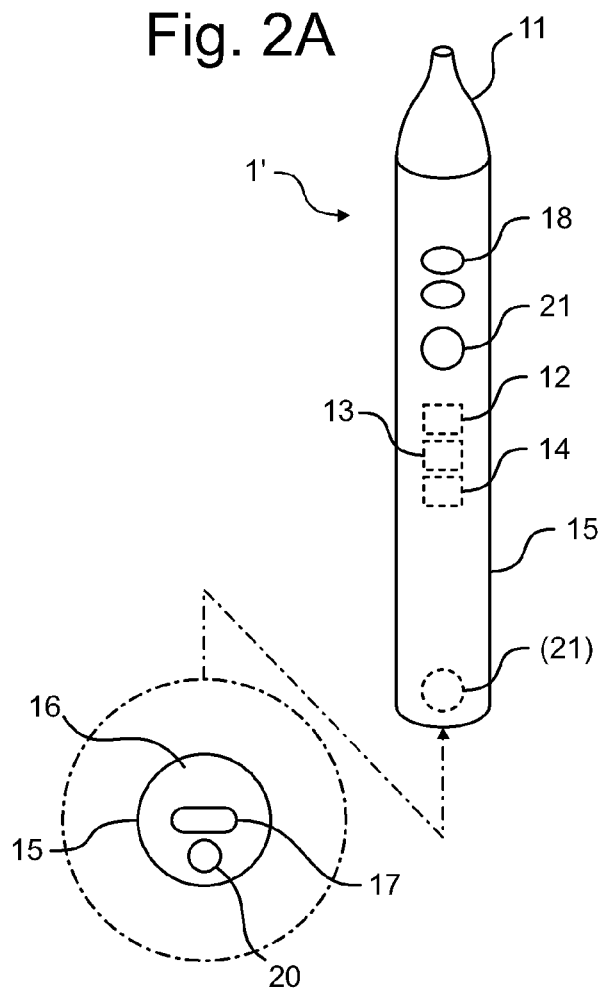
15 13. The handheld aerosol generating device of any one of claims 1 to 12, wherein the focussed light source comprises a light emitting diode, preferably a white-light light emitting diode and/or preferably with a luminous flux capability of at least 100 Lumen.

20 14. The handheld aerosol generating device of any one of claims 1 to 13, further comprising a second light source surrounding an outlet for said generated aerosol, and wherein the controller is arranged to drive the second light source according to a plurality of emission patterns, preferably patterns of different and/or varying light colours.

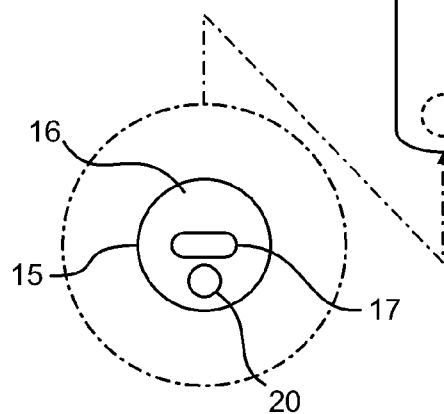
25 15. The handheld aerosol generating device of claim 14, comprising a lock mechanism arranged to engage with a mouthpiece, said lock mechanism being preferably arranged concentric with an arrangement of said second light source and said outlet.



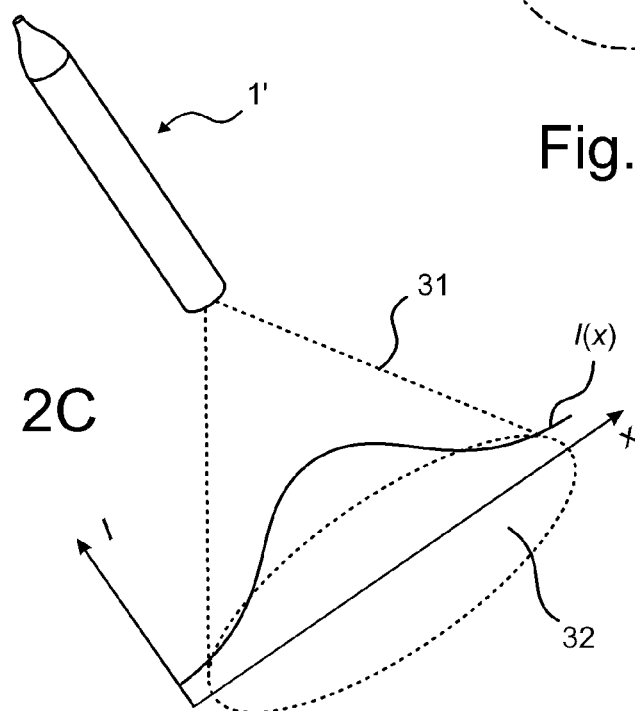
**Fig. 2A**

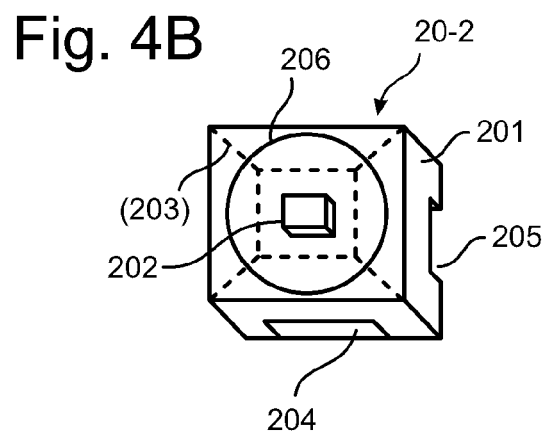
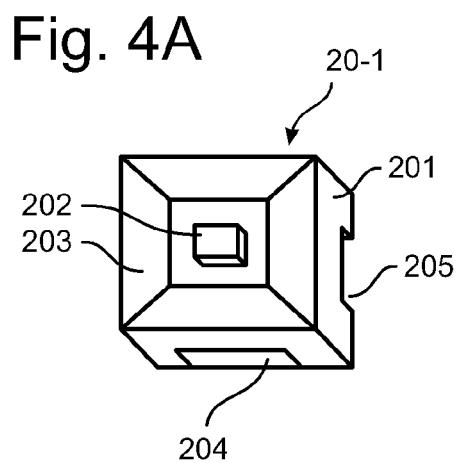
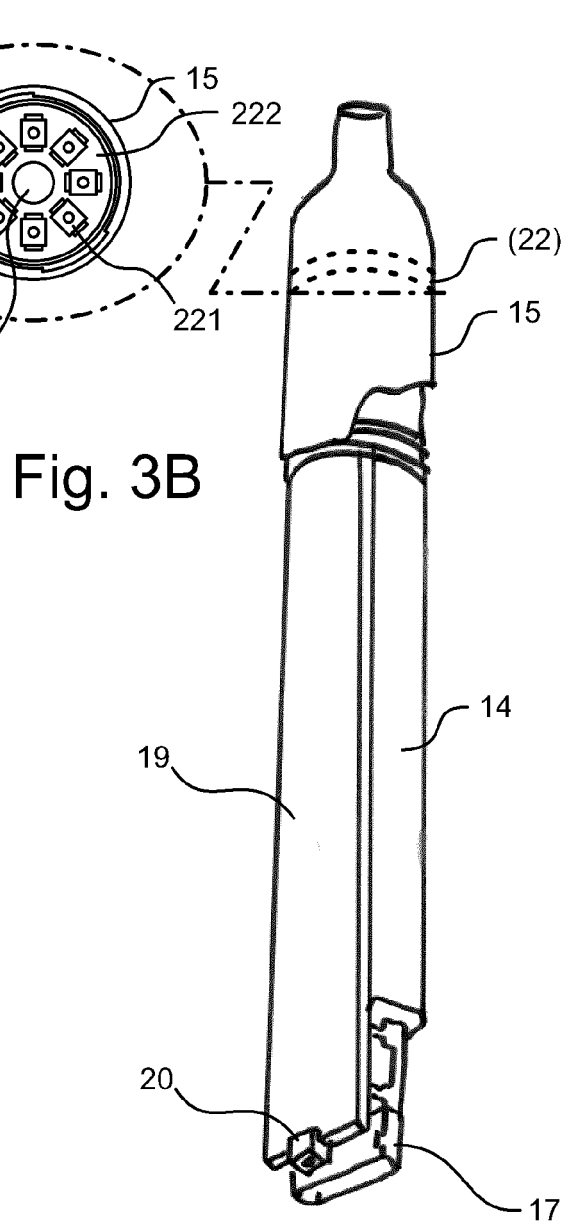
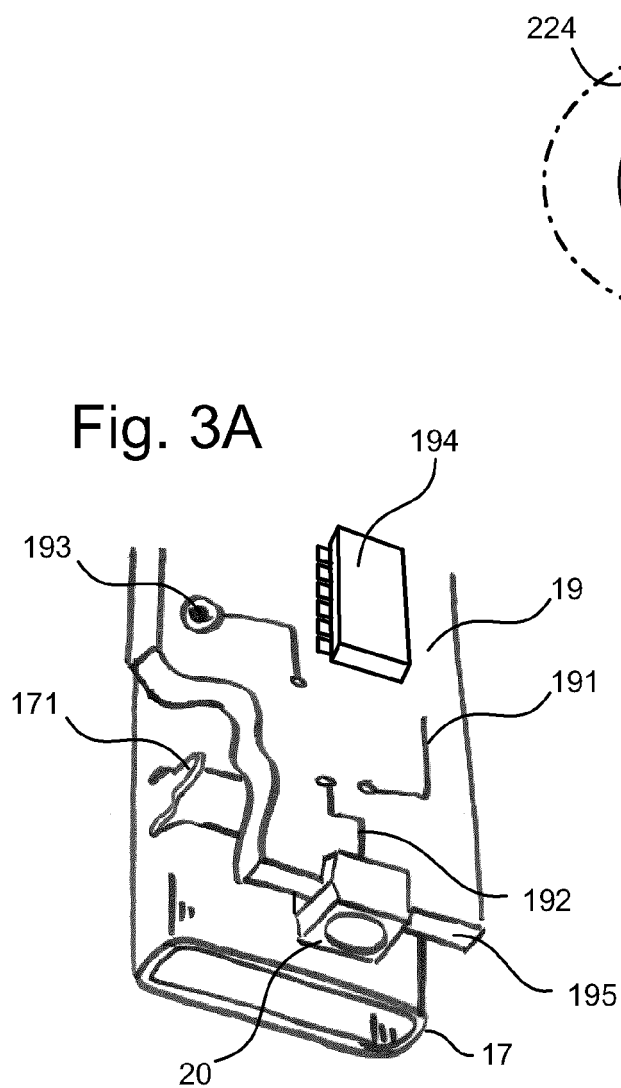


**Fig. 2B**



**Fig. 2C**









## EUROPEAN SEARCH REPORT

Application Number

EP 23 17 1265

5

10

15

20

25

30

35

40

45

50

55

1

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	US 2014/311503 A1 (LIU QIUMING [CN]) 23 October 2014 (2014-10-23) * paragraph [0033] - paragraph [0043]; figures 1-7 *	1-15	INV. A24F40/40 A24F40/60
X	US 2018/020734 A1 (ANGSTEAD RON A [US] ET AL) 25 January 2018 (2018-01-25) * paragraph [0009] - paragraph [0051]; figures 1-9 *	1-15	ADD. A24F40/90
X	KR 2016 0112771 A (KT & G CORP [KR]) 28 September 2016 (2016-09-28) * paragraph [0021] - paragraph [0067]; figures 1-10 *	1-15	
X	US 2012/260926 A1 (TU MARTIN [TW] ET AL) 18 October 2012 (2012-10-18) * paragraph [0004] - paragraph [0016]; figures 1-4 *	1-8, 10-15 9	
A	US 2019/328042 A1 (KRIETZMAN MARK H [US]) 31 October 2019 (2019-10-31) * paragraph [0048] - paragraph [0050]; figures 2A-2D *	9	TECHNICAL FIELDS SEARCHED (IPC)  A24F A61M
The present search report has been drawn up for all claims			
Place of search <b>Munich</b>		Date of completion of the search <b>20 September 2023</b>	Examiner <b>Espla, Alexandre</b>
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 23 17 1265

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.

20-09-2023

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
<b>US 2014311503 A1</b>	<b>23-10-2014</b>	<b>CN 104023572 A</b>	<b>03-09-2014</b>
		<b>EP 2896306 A1</b>	<b>22-07-2015</b>
		<b>US 2014311503 A1</b>	<b>23-10-2014</b>
		<b>WO 2014040217 A1</b>	<b>20-03-2014</b>
-----			
<b>US 2018020734 A1</b>	<b>25-01-2018</b>	<b>NONE</b>	
-----			
<b>KR 20160112771 A</b>	<b>28-09-2016</b>	<b>NONE</b>	
-----			
<b>US 2012260926 A1</b>	<b>18-10-2012</b>	<b>NONE</b>	
-----			
<b>US 2019328042 A1</b>	<b>31-10-2019</b>	<b>US 2019328042 A1</b>	<b>31-10-2019</b>
		<b>US 2021127747 A1</b>	<b>06-05-2021</b>
		<b>US 2023254945 A1</b>	<b>10-08-2023</b>
-----			