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(71) Applicant: **Riot Labs Ltd**

Milton Keynes Buckinghamshire MK1 1QU (GB)

(72) Inventor: **JOHNSON, Benjamin**

Buckinghamshire, MK1 1QU (GB)

(74) Representative: **Murgitroyd & Company**

165-169 Scotland Street

Glasgow G5 8PL (GB)

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(54) **A MODULAR ELECTRONIC CIGARETTE**

(57) The is disclosed a modular electronic cigarette (1) which assists in increasing air flow over an atomiser (12) to increase vaporisation and improve user experience.

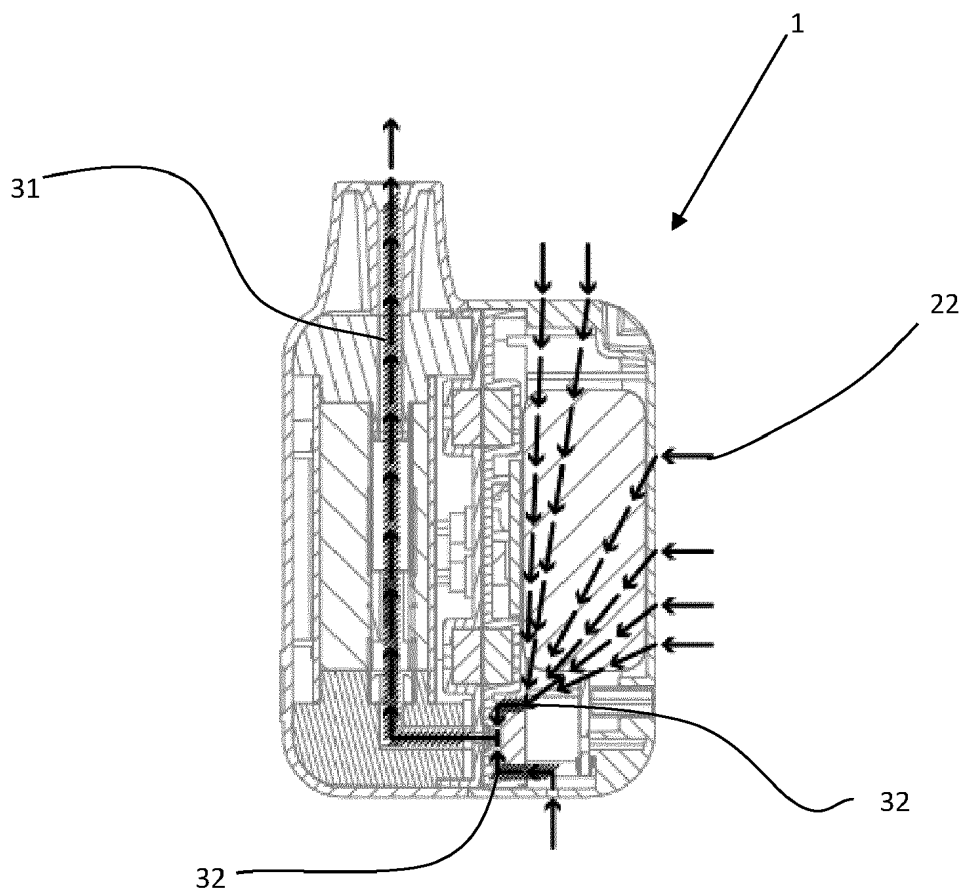


Fig. 2

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Description

[0001] The present invention relates to the field of electronic cigarettes or vaporiser devices, and more particularly relates to a modular electronic cigarette device.

[0002] Vaporiser devices present an alternative to smoking and work by vaporising a consumable vaporisable product for example an oil, liquid, concentrate, or extract, sometimes referred to as vape juice or an e-liquid. Vaporiser devices work by heating a vaporisable product at a lower temperature than should cause combustion so that a user can inhale the vaporisable product in vapour form, rather than smoke. Such devices work by turning a liquid that may contain nicotine into a vapour that can be inhaled. Composition of such liquids are known and will not be detailed here, although many include PG (Propylene Glycol) and VG (Vegetable glycerine), and then may have flavourings and/or nicotine added.

[0003] A vaporiser device may have a reservoir for storing the e-liquid. The reservoir may have a wick, made of for example cotton, capable of soaking up the vaporisable product from the reservoir. A coil, in contact with the wick, may be heated by passing a current through the coil and vaporising the e-liquid.

[0004] The invention is defined in the independent claims. Optional embodiments are set out in the dependent claims.

[0005] Embodiments of the invention will now be described, by way of example only, with reference to the figures in which:

Figure 1a shows a side-on view of the front face of a modular electronic cigarette device according to a first example;

Figure 1b shows a side-on view of the back face of the device according to the example;

Figure 1c shows a top view of the device according to the example;

Figure 1d shows a bottom view of the device according to the example;

Figure 1e shows a left-side view of the device according to the example;

Figure 1f shows a right-side view of the device according to the example;

Figure 2 shows an example of air flow through a device in accordance with an example;

Figure 3a shows a side-on view of the front face of a first part of the device according to an example;

Figure 3b shows a side-on view of the back face of

the first part of the device according to the example;

Figure 3c shows a top view of the first part of the device according to the example;

Figure 3d shows a bottom view of the first part of the device according to the example;

Figure 3e shows a left side view of the first part of the device according to the example;

Figure 4a shows a side-on view of the front face of a second part of the device according to an example;

Figure 4b shows a side-on view of the back face of the second part of the device according to the example;

Figure 4c shows a top view of the second part of the device according to the example;

Figure 4d shows a bottom view of the second part of the device according to the example; and

Figure 4e shows a left side view of the second part of the device according to the example.

[0006] Figure 1a shows an example of a modular electronic cigarette 1 or modular electronic cigarette device 1. The modular electronic cigarette 1 may comprise a first part 10. The modular electronic cigarette 1 may further comprise a second part 20. The second part 20 may be detachably connectable to the first part 10. That is to say, the first part 10 may be temporarily attachable to the second part 20.

[0007] Figure 1b shows a cut-away view of the internal features of the modular electronic cigarette 1, shown in a side-on view of the back face. The first part 10 may comprise an e-liquid reservoir 11, an atomiser 12 and a mouthpiece 13. The second part 20 may comprise a rechargeable battery 21 and a plurality of air intakes 22. The first part 10 and the second part 20 may define a channel 31 from the plurality of air intakes 22, past the atomiser 12, to the mouthpiece 13. The channel 31 may define one or more corners 32 in the channel 31. The one or more (at least one) corners 32 may cause turbulent airflow within the channel 31 when the user inhales.

[0008] In some examples, the channel 31 may comprise a number of branches leading from each air intake 22. In some examples, the channel 31 may include two sharp corners.

[0009] The detachable connection between the first part 10 and the second part 20 may be realised by magnets 15, 25 arranged to temporarily hold the first part 10 and the second part 20 together. By application of separating force, a user may separate the first part 10 from the second part 20.

[0010] The first part 10 may be seen as the disposable

part of the device, with the second part 20 being reusable.

[0011] The atomiser 12 may be located in a vaporising chamber. The atomiser 12 may for example comprise a coil, mesh or other metal heating element, that may be heated so that the vaporisable liquid becomes vapour for the user to inhale. The atomiser 12 may be any suitable shape, such as a coiled wire, or a small sheet of metal mesh, that heats up when an electric current passes through it.

[0012] The mouthpiece 13 may protrude from the main body of the first part 10. The mouthpiece 13 may include a chimney 14 through which the vapour passes after vaporisation and before inhalation.

[0013] The second part 20 may include multiple air intakes 22. These may be holes or vents in the casing of the second part 20 and may be positioned in several different locations around the second part 20.

[0014] Figure 1c shows a top view of the modular electronic cigarette 1 according to an example. As shown, the modular electronic cigarette 1 may include a key ring or similar attachment 26. Figure 1d shows a bottom view of the modular electronic cigarette 1 according to an example.

[0015] Figure 1e shows a left-hand side view, relative to figure 1a, of the modular electronic cigarette 1. As shown, the key ring attachment 26 may be positioned in the top left corner of the device 1 (as viewed in figure 1a). Further, as shown the second part 20 may include a charging port 27, which may be a USB type-C charger port or similar. In some examples, the charging port 27 may be positioned in a different location to that shown in figure 1e. Figure 1f shows a right-hand side view, relative to figure 1a, of the modular electronic cigarette 1.

[0016] Figure 2 shows an example of air flow through a device 1 in accordance with an example. As shown in figure 2, air may be drawn into the device 1 via multiple air intakes 22 positioned around the exterior of the second part 20. The air, drawn in through the air intakes 22, may be directed along a channel 31 which extends around the device one, from the air intakes 22 to the mouthpiece 13. The channel 31 may extend along substantially the full length (the longest dimension) of the second part 20, from air intakes 22 at the top of the device 1 (as well as potentially from air intakes 22 on the sides and bottom of the device 1) down to a first hole 28 which is positioned, when the first part 10 is connected to the second part 20, to allow air flow through to a second hole 18 in the first part 10, so that the channel 31 extends from the second part 20 to the first part 10. The channel 31 then extends from the second hole 18 to the chimney 14 and on to the mouthpiece 13. The overall shape of the channel 31 may be simplified as a "U" shape.

[0017] Within the channel 31, there may be included one or more (at least one) corners 32. The corners 32 may be sharp corners, so as to disrupt the laminar flow of air through the channel 31. In some examples, a sharp corner 32 of the one or more sharp corners may be positioned near the atomiser 12 to cause vortices in the air

flowing through the channel 31 to form near the atomiser 12. For example, the corner 32 may be positioned just ahead of the atomiser 12, so that the turbulent air passes over the heating coil of the atomiser 12. Introducing turbulent air over the heating element within the atomiser 12 increases the air flow rate over the heating element and thus contributes to enhanced vaporisation efficiency/more complete vaporisation, resulting in a superior vaping experience for the user.

[0018] In some examples, a sharp corner 32 of the one or more sharp corners 32 is positioned adjacent the rechargeable battery 21 to cause vortices to form near the battery 21. Increasing air flow over the battery 21 aids temperature regulation of the battery 21 and, in particular, cooling, increasing longevity/battery life.

[0019] In some examples, the first part 10 and the second part 20 are connectable along a length of the first part 10 and second part 20. That is to say, a face of the first part 10 on the longest side of the first part 10 faces a face of the second part 20 on the longest side of the second part 20. The device 1 may thereby be separated along a vertical line and, in particular, its vertical centreline. This will be explained further below in relation to figures 3a to 3e and 4a to 4e.

[0020] In some examples, the channel 31 is of a size small enough to introduce additional turbulence. The size may be based on the air flow rate caused by normal inhalation of a user. The heating element of the atomiser 12 may be controlled by a control unit. The control unit may for example include a sensor, such as an acoustic sensor, to detect when a user is inhaling through the device 1, to start the vaporisation. In another example, the control unit may be a button or another type of sensor.

[0021] In some examples, the plurality of air intakes 22 includes air intakes 22 on at least two different sides of the modular electronic cigarette 1. In some examples, the air intakes 22 will be located on three different sides of the second part 20 of the modular electronic cigarette 1, in order to achieve improved airflow. In some examples, six or more air intakes 22 may be included, and may be distributed along the periphery of the device 1, as shown in figure 2.

[0022] In some examples, at least two of the plurality of air intakes 22 may direct air towards a same point, from different directions, to increase turbulent air flow. As shown in figure 2, air may be drawn in via multiple air intakes 22 and directed into a single channel to flow over the atomiser 12. The point at which multiple air flows are combined may be shaped to encourage the respective air flows towards each other to increase turbulence and the desired vortices to form. This increases air flow rate over the heating element in the atomiser 12, which contributes to more complete vaporisation and an improved experience for the user.

[0023] In some examples, the channel 31 may extend along substantially the length of the second part 20 and along substantially the length of the first part 10, in a substantially U-shape.

[0024] In some examples, at least two of the plurality of air intakes 22 are of different sizes. Air intakes 22 with different dimensions may assist in creating the desired turbulent air flow, but may also allow for air intakes 22 to be positioned where it would otherwise not be possible if the air intakes 22 were all of the same size.

[0025] In some examples, the one or more sharp corners 32 include a 75 - 90 degree turn. In this case, 90 degrees refers to a right-angled turn. If the air flow is redirected by 75 - 90 degrees, by a sharp corner 32, this reduces any remaining laminar flow and achieves the desired generation of vortices in the air flowing through the channel 31.

[0026] In some examples, the device 1 is a handheld modular electronic cigarette, which may be available in different sizes.

[0027] Figure 3a shows a side-on view of the front face of a first part 10 of the device 1 according to an example. Figure 3a also shows the mouthpiece 13. Figure 3b shows a side-on view of the back face of the first part 10 of the device 1 according to the example. Figures 3a and 3b show that the first part 10 includes a protrusion along the connecting face, which when connected to the second part 20, fits into a corresponding indentation, to provide a secure fit. Figure 3c shows a top view of the first part 10 of the device 1 according to the example. Figure 3d shows a bottom view of the first part 10 of the device 1 according to the example. Figure 3e shows a left side view of the first part 10 of the device 1 according to the example. As shown in figure 3e, the first part 10 includes magnets 15. In the example shown, two magnets 15 are included. The second part 20 includes magnets 25 at corresponding points on its connecting face, to provide a detachable connection between the two parts 10, 20.

[0028] Further, the first part 10 may include a second hole 18, as described above, forming part of the channel 31. Further still, the first part 10 may include electrical connectors 19, which, when the first part 10 is connected to the second part 20, contact correspondingly positioned connectors 29 on the connecting face of the second part 20. In this way, power from the rechargeable battery 21 may be supplied to the atomiser 12, and for example the control unit.

[0029] Figure 4a shows a side-on view of the front face of a second part 20 of the device 1 according to an example. Figure 4b shows a side-on view of the back face of the second part 20 of the device 1 according to the example. Figure 4c shows a top view of the second part 20 of the device 1 according to the example. Figure 4d shows a bottom view of the second part 20 of the device 1 according to the example. Figure 4e shows a left side view of the second part 20 of the device 1 according to the example. As shown in figure 4e, the device 1 may include a child safety switch 23, to isolate the battery and prevent use of the device 1 when the child safety switch 23 is in the OFF or safe position. When the child safety switch 23 is moved to the ON or use position, the battery 21 is reconnected. The child safety switch 23 may be

concealed on the connecting face of the second part 20, so that, when connected to the first part 10, the child safety switch 23 is hidden from view.

[0030] According to the above examples, the device 1 features an improved airflow system designed to enhance vaporisation efficiency. The device 1 may comprise a plurality of airflow inlets 22, specifically six or more, strategically positioned to allow for optimal ingress of air. The device 1 also includes elongated airflow channels 31 which incorporate angular corners 32 ranging from 75 to 90 degrees. These angular corners induce a vortex effect, thereby increasing the airflow velocity within the channels 31. The improved airflow system effectively boosts the performance of the heating coil, promoting superior vaporisation of the e-liquid. Consequently, the vaporization process is significantly improved, resulting in a superior vaping experience for the user.

Claims

1. A modular electronic cigarette comprising:

a first part; and
a second part, detachably connectable to the first part, wherein
the first part comprises:

an e-liquid reservoir;
an atomiser; and
a mouthpiece, and

the second part comprises:

a rechargeable battery; and
a plurality of air intakes; wherein

the first part and the second part define a channel from the plurality of air intakes, past the atomiser, to the mouthpiece, and
the channel defines one or more sharp corners causing turbulent airflow.

2. The modular electronic cigarette of claim 1, wherein a sharp corner of the one or more sharp corners is positioned near the atomiser to cause vortices to form near the atomiser.

3. The modular electronic cigarette of claim 1, wherein a sharp corner of the one or more sharp corners is positioned adjacent to the rechargeable battery to cause vortices to form near the battery.

4. The modular electronic cigarette of any preceding claim, wherein
the first part and the second part are connectable along a length of the first part and second part.

5. The modular electronic cigarette of any preceding claim, wherein the channel is of a size small enough to introduce additional turbulence. 5
6. The modular electronic cigarette of any preceding claim, wherein the plurality of air intakes includes air intakes on at least two different sides of the modular electronic cigarette. 10
7. The modular electronic cigarette of any preceding claim, wherein at least two of the plurality of air intakes direct air towards a same point, from different directions, to increase turbulent air flow. 15
8. The modular electronic cigarette of any preceding claim, wherein the channel extends along substantially the length of the second part and along substantially the length of the first part, in a substantially U-shape. 20
9. The modular electronic cigarette of any preceding claim, wherein at least two of the plurality of air intakes are of different sizes. 25
10. The modular electronic cigarette of any preceding claim, wherein the one or more sharp corners include a 75 - 90 degree turn. 30

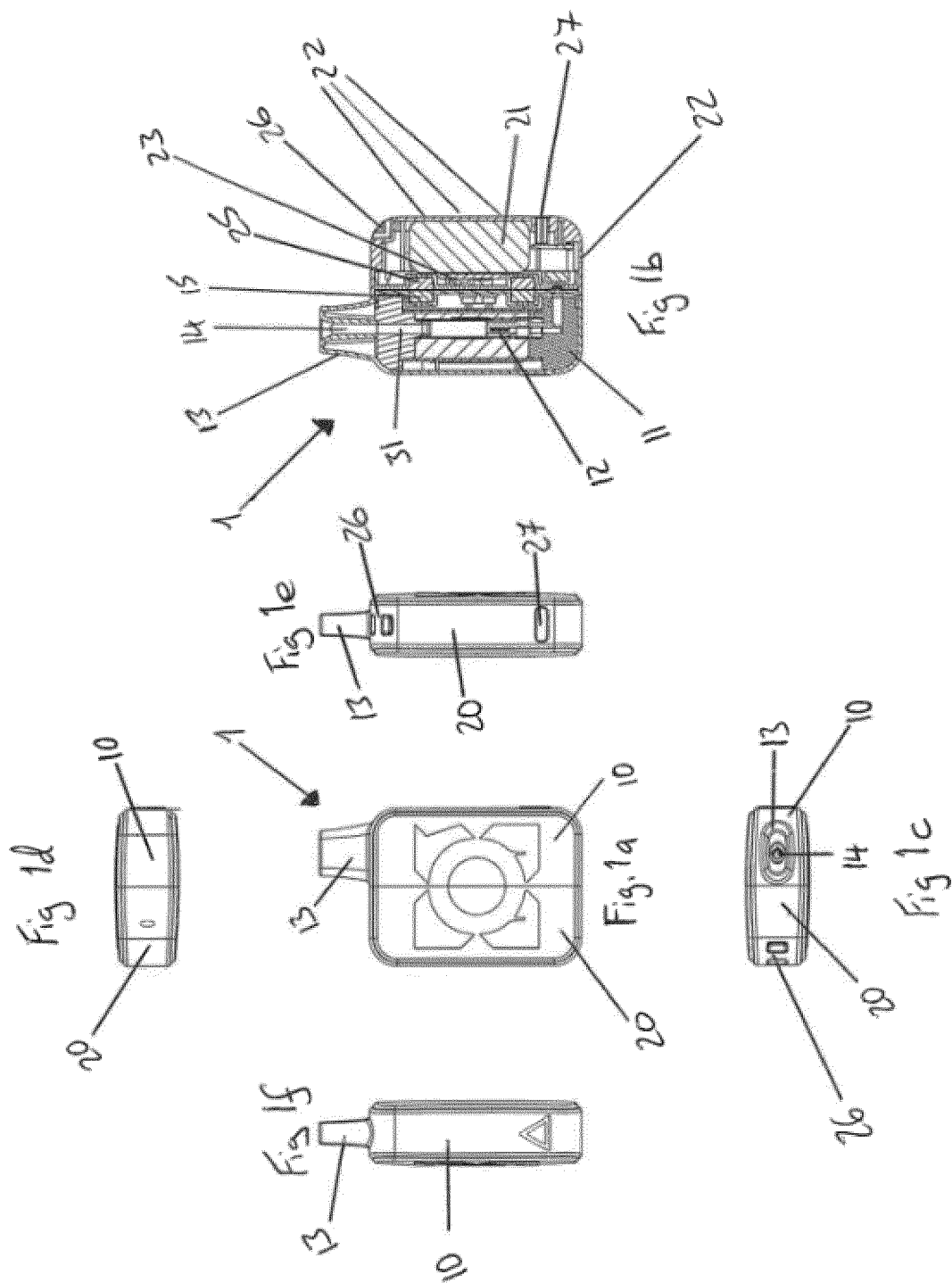
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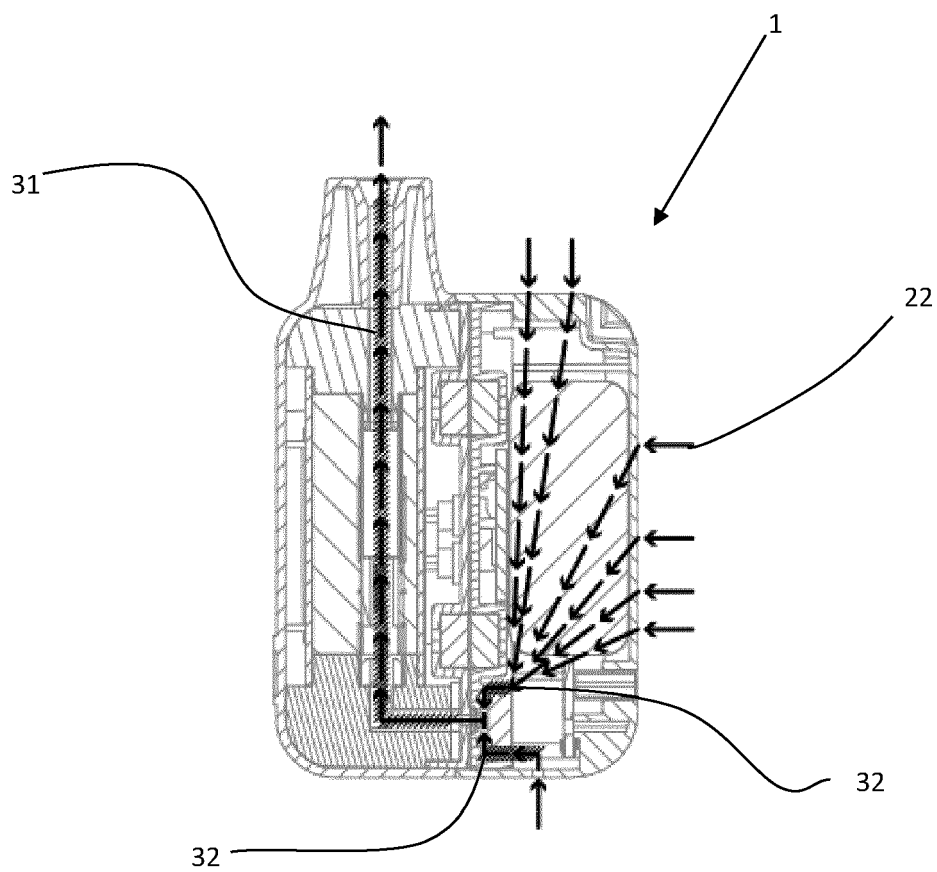
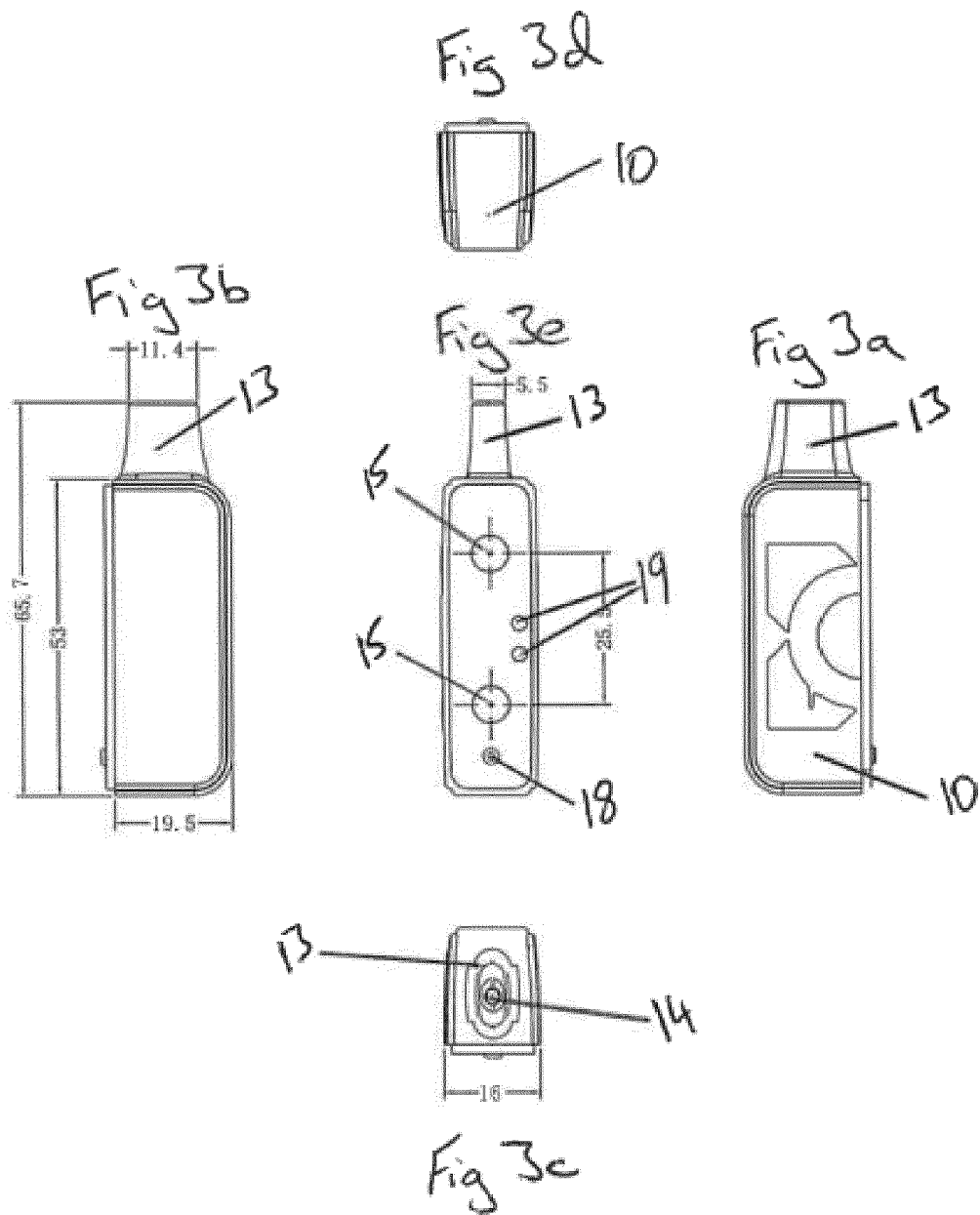
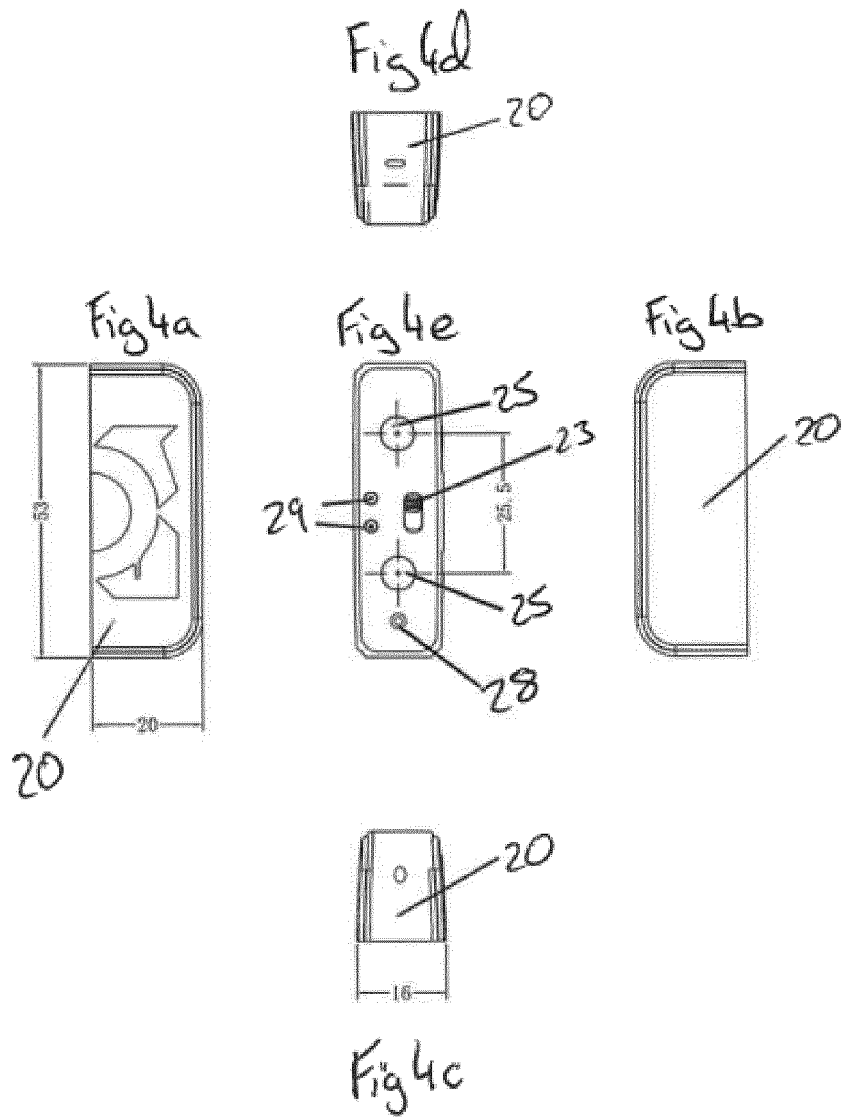


Fig. 2







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