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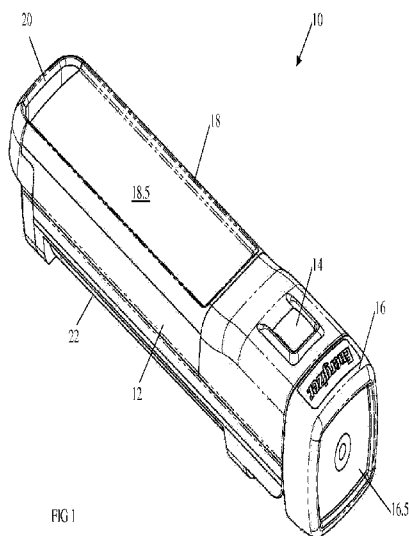
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(54) Title: A LIGHTING DEVICE CONSTRUCTION

(57) Abstract: A lighting device (10) includes a body (12) including a battery housing to receive one or more batteries (50) to power the lighting device. The body includes at one end a light source housing (16) for emitting light from the device in a manner of a flashlight, wherein the light source (16.2) is configured to emit light out the one end of the body. The body further includes a lighting panel (18) coupled to the body, wherein the lighting panel is illuminated along an edge of the lighting panel and arranged on the body so as to emit light in the manner of an area light.



A Lighting Device Construction

Field of the invention

[001] The present invention relates to the construction of lighting devices such as flashlights and the like.

Background of the invention

[002] Lighting devices such as flashlights and the like are available in many shapes and sizes.

[003] Recently there has been a shift away from the use of incandescent light bulbs in portable lighting devices to light emitting diodes (LEDs). One reason for this shift is due to the low power drawing qualities and characteristics of such LEDs. There is a need to provide to the marketplace a choice of flashlights and lighting devices that utilize such LEDs.

[004] Any reference herein to known prior art does not, unless the contrary indication appears, constitute an admission that such prior art is commonly known by those skilled in the art to which the invention relates, at the priority date of this application.

Summary of the Invention

[005] A lighting device including a body including a battery housing to receive one or more batteries to power the lighting device, the body including at one end a light source housing for emitting light from the device in a manner of a flashlight, wherein the light source is configured to emit light out the one end and a lighting panel coupled to the body, wherein the lighting panel is illuminated along an edge of the lighting panel and arranged on the body so as to emit light in the manner of an area light.

[006] The lighting panel can extend across a substantial distance of the width of the body.

[007] The lighting panel can extend in a forward to rearward direction with respect to the body.

[008] The lighting panel can extend more than half the length of the body.

- [009] The body can include a body portion having an overlapping skirt to seal against a surface of the lighting panel.
- [010] The lighting panel can be assembled to a surface of the body.
- [011] The lighting panel can include at least one locator on a surface or side thereof to interact with the body to assist in the locating of the lighting panel onto the body.
- [012] The lighting panel can include, on an under surface thereof, a coated surface.
- [013] The coated surface can be a painted surface.
- [014] The coated surface can be of a white colour or other appropriate colour depending upon the lighting effect required.
- [015] An upper surface of the lighting panel can include an array of etched markings.
- [016] The markings can be created by a laser etching.
- [017] The etched markings can be of a depth of approximately 0.3mm in depth.
- [018] The lighting panel can include at least one flange or ridge extending laterally away from the panel along a free edge of the panel.
- [019] An underside of the device can include a pair of pivoted legs, so that the legs and the body of the device can form a tripod to stand the device.
- [020] The light source housing can be pivotally connected to the body.
- [021] The legs can allow the lighting panel to be angled whereby it can act as an area light.
- [022] Light emitted from the lighting panel is output in a first axis and light emitted from the one end is output in a second axis.
- [023] The first axis and the second axis are normal.

Brief description of the drawings

- [024] Figure 1 is an upper perspective view of a lighting device;

[025] Figure 2 illustrates an underneath perspective view of the lighting device of Figure 1;

[026] Figure 3 illustrates an underneath view of the lighting device of Figure 1 and Figure 4;

[027] Figure 4 illustrates the lighting device of Figure 1 in a tripod arrangement showing extension of the legs and rotation of the light housing;

[028] Figure 5 is a forward perspective view of the lighting device of Figure 4;

[029] Figure 6 is a rearward perspective view of the lower lighting device of Figure 5;

[030] Figure 7 is a perspective view of a transparent lighting panel for use with the lighting device of Figures 1 to 5;

[031] Figure 8 is an exploded view of the lighting device of Figure 1 from a forward side view;

[032] Figure 9 is an exploded perspective view from a rear side view;

[033] Figure 10 illustrates a further lighting device in perspective view;

[034] Figure 11 illustrates the lighting panel of the lighting device of Figure 10 in perspective view;

[035] Figure 12 illustrates a rearward exploded view of the lighting device of Figure 10;

[036] Figure 13 illustrates an exploded perspective view of the components in the opposite direction to that of Figure 12;

[037] Figure 14 illustrates the pattern of etching applied to the light panel; and

[038] Figure 15 illustrates a schematic detail of the pattern of etching applied to the light panel.

Detailed Description of the Invention

[039] Illustrated in Figures 1 and 2 is a lighting device 10 that has both an area light mode and a flashlight mode. As described in detail below, in the flashlight mode, light is emitted from light source directing light out of an end of the lighting device 10. In

the area light mode, light is emitted light source directing light out a side of the lighting device 10. Switch 14 is configured to selectively activate each operative mode of the lighting device.

[040] The lighting device 10 has a body 12 that extends along a generally longitudinal axis and at a forward end has a light source housing 16. The light source housing enables the lighting device 10 to function in a flashlight mode. On another surface of the body 12 (e.g., an upper side of the body 12) is a lighting panel 18 that acts as a lens and is manufactured from a transparent or translucent acrylic material. Light is emitted through the lighting panel 18 to allow the lighting device 10 to operate in an area light mode.

[041] In one embodiment, the lighting panel extends across a substantial distance of the width of the body 12. As used herein, a substantial distance of the width of the body means more than 70% of the width of the body. Preferably, the lighting panel extends about 90% or more of the width of the body. The lighting panel also extends across a portion of the length of the lighting device. In one embodiment, the lighting panel extends across more than 50% of the length of the lighting device. Preferably, the lighting panel extends across a length of the lighting device between 50-100% of the length of the body.

[042] At an end of the body 12 opposite the light source housing 16 is an end cap 20, which is readily removable by a screw 20.1 by a user as is best illustrated in Figures 6, 8 and 9. The end cap 20 provides an aperture to connect the cap 20 to a lanyard. The end cap 20 may also be slidably mounted to the body 12.

[043] An underside of the lighting device 10 as illustrated in Figures 2 and 3. The underside of the housing has two deployable legs 22 and 24 which are pivotally attached to a forward end of the body 12. Referring to Figure 3, the leg 24 is pivoted at pivot mount 34. The pivot mount 34 engages with the matching pivot construction on leg 24 to allow rotation about axis 34.1, which is at an angle to the longitudinal axis 10.1 as is illustrated in Figure 3. Likewise, leg 22 is pivoted at pivot mount 32. The pivot mount 32 engages with the matching pivot construction on the leg 22 to allow rotation of the leg 22 about axis 32.1, which is also at an angle to the longitudinal axis 10.1. Preferably, the axes of rotation 32.1 and 34.1 intersect at the longitudinal axis 10.1, for example. For example, if the axis of rotation 32.1 is +75 degrees then the axis of rotation 34.1 is -75 degrees. The axes of rotation 32.1 and 34.1 provide the respective

legs 22 and 24 with the ability to rotate away from the body 12 and each other, so as to ensure that the feet 22.1 and 24.1 on the legs will rotate when viewed in the direction of Figure 3 away from the longitudinal axis 10.1. This will splay the legs away from the longitudinal axis so as to provide a tripod configuration together with the end cap 20 and body 12, as best illustrated in Figures 5 and 6.

[044] The pivot mounts 32 and 34, as is best illustrated in Figures 8 and 9, can be formed from a single component or mounting and provide a cavity that provides the axes of rotations 32.1 and 34.1, for example. These cavities respectively capture the pivots 22.2 and 24.2 on the forward end of the legs 24 and 22. Alternatively, the pivot mounts 32, 34 can be formed from separate mountings, which are secured to the housing at a prescribed angle.

[045] As illustrated in Figure 9, the body 12 comprises a number of components that make up the body assembly. The body 12 includes a body component 12.1 that has a cavity formed therein. When the body component is secured to the other body portion 12.2, to which the legs 22 and 24 are subsequently attached, a battery housing is formed therein so as to receive the dry cells, batteries 50 or other energy source.

[046] The light housing 16, as illustrated in Figures 4-6, is pivotally mounted to the forward end of the body 12 by means of a yoke 12.3 (Figure 9) formed by recesses 12.4 at the upper end or forward end of the body portion 12.2. The recesses 12.4 capture cylindrical formations 16.1 and 16.2 so as to pivotally mount the light housing 16 to the body 12 when the pivot closing portion 12.8 is secured to the body portion 12.2. This structure pivotally mounts the light housing 16 relative to the body 12 and permits the light housing 16 to be rotated, as desired, to provide the user with a relatively stable light source on a tripod arrangement and allows the light to be directed in any appropriate direction for use by the operator or user.

[047] The light panel 18 is illustrated in more detail in Figure 7. The light panel 18 is formed with an upper surface 18.5 which may be surrounded on three sides by flanges or ridges 18.2, 18.4 and 18.3. At the forward end thereof is a flange portion 18.1 which has a front surface 18.11 so as to allow LEDs mounted on printed circuit board 12.9 to direct the light emitted from the LEDs to shine into the lighting panel 18. The flanges or ridges 18.2 and 18.3 allow for light to pass out of the lighting panel 18 in a lateral direction relative to the longitudinal axis of the lighting panel 18. Together with

light emitted from the upper surface 18.5, an area light is produced which provides light in an approximately 180 degree arc from the light panel 18.

[048] The under surface 18.6, as best illustrated in Figure 9, is generally coated with an opaque material and preferably in the colour white, or other colors could be utilized depending upon the lighting effect that is desired to be achieved by the light panel 18. The coating may be applied by any appropriate method, such as applying a coat of an acrylic paint to the under surface, which provides the under surface with an opaque layer. The application of acrylic paint to the under surface ensures that a user or respective purchaser can only see through the transparent light panel 18 to the opaque white surface underneath and not through to the body 12 or its portions which are adjacent the under surface of the light panel 18.

[049] While the under surface 18.6 may include optical elements that can be etched or otherwise formed in the surface, so as to provide light dissipation through the lighting panel 18. As the under surface is coated and such coatings can disrupt the light functionality of the optical elements (also referred to herein as etched formations), by filling in the optical elements. It is preferred that the upper surface 18.5 has an array of etched formations formed by a laser etching process, such as those indicated in Figures 14 and 15, which will be described in more detail below. A person of ordinary skill in the art will readily appreciate that methods other than laser etching may be used to form the optical elements and, unless otherwise claimed, aspects of the present invention are not limited to laser etching.

[050] The laser etching process will create cavities of minute depth in the range of approximately 0.3 millimetres, and by setting out these formations in a pattern as best illustrated in Figure 14 and 15, a reasonably effective area light is produced from a light source of 3 LEDs in respect of the embodiment of Figures 1 to 9, or 2 LEDs for the embodiment of Figures 10 to 13.

[051] Referring to Figure 7, the forward flange 18.1 has an upper surface 18.12 and curved side surfaces 18.13 and 18.14 which will allow these surfaces to be sealed by use of a linear seal located in the inside surface 12.72 (Figure 9) on the switch housing 12.7. Such a linear seal assists in preventing liquid travelling in a forward direction on the lighting panel 18 and prevents the liquid from gaining access to the electronics and the printed circuit board and LEDs located beneath the switch housing 12.7.

[052] To secure the lighting panel 18 to the outer face of the body portion 12.1, in one embodiment it is preferred to adhere the lighting panel 18 via its rear surface 18.6 to the body panel 12.1. This is preferably done by using a double sided tape that securely holds the lighting panel 18 to the body 12. In other embodiments, adhesives in the manner of glues, epoxies and the like could be used in accordance with aspects of the present invention. Further, the forward flange 18.1 is captured under the lower lip 12.72 on the switch housing 12.7 when that switch housing 12.7 is secured to the body portion 12.2 over the pivot closer 12.8, such that the lighting panel is securely mounted to the body 12.

[053] Preferably, the lighting panel 18 is manufactured from an acrylic, and is transparent. In other embodiments, other materials could be selected such as translucent materials depending upon the lighting effect it is desired to achieve. Likewise, the light panel 18 may also be formed from a material that is colored.

[054] Illustrated in Figures 10 to 13 is a lighting device 110 similar to that of Figures 1 to 9. The lighting device 110 of Figures 10 to 13 has many components of a similar construction and function as those illustrated in Figures 1 to 9. For convenience purposes, the like reference numbers are used in describing the like components. The lighting device 110 while including both a flashlight and an area light in a similar manner to the lighting device 10, lighting device 110 does not include a tripod system and is meant to provide its area light function by the light housing 16 being a base on which the lighting device 110 may rest so that the area light panel 18 will be in a substantially vertical condition. For example, the lighting device 110 may be placed with the flashlight component facing a surface and the housing 16 resting on the surface, such that the area light panel 18 will have a longitudinal axis that is normal to the surface and the light output from the light panel will be directed in a direction parallel to the surface.

[055] Another difference between the lighting device 110 and the light device 10 is that the access to the battery housing in lighting device 110 is provided by a closing panel 120, which also acts as the side panel of the flashlight when assembled by means of a screw 120.1 or other securing mechanism. In one embodiment, the screw 120.1 may be a ¼ turn fastener, for example.

[056] As is illustrated in Figure 11, the light panel 18 differs from the light panel of Figure 7 in that the flange portion 18.1 of Figure 11 has a curved upper surface 18.12 and four locating spigots 18.61, which extend downwardly from the under surface 18.6.

If desired, the light panel can dispense with the spigots 18.61, which serve a location positioning function during the assembly process. For example, instead of using spigots 18.61, the rear edge 18.7 may include a locator such as a laterally extending formation to engage a portion of the body 12 so as to assist in locating the panel 18 and body 12. With such laterally extending formation, rotation of the lighting panel 18 around its edge with double sided tape on the under surface 18.6 ensures that the side edges of the lighting panel 18 will be aligned with the side edges of the body housing 12.1.

[057] In lighting device 110, the reflector 16.4 and lens 16.5 are held by a rubber seal 16.6 and trapped in recesses moulded in light housing 16 and switch housing 12.7 on assembly. In contrast, rubber seal 16.6 need not apply to lighting device 10. In lighting device 10, the light source housing 16 and the lens 16.5 may be co-moulded (or integrally formed) to form the lighting device 10.

[058] Another difference between the lighting device 110 and the lighting device 10 is that the light housing 16 is integrally formed as part of the body portion 12.2 and the light housing 16 serves both the function of housing the light source 16.2. Referring to Figure 12, the light source 16.2 may be an LED 16.3 mounted on a printed circuit board, which may have a generally circular construction. The printed circuit board may be made of aluminium or other similar material. The lighting device 110 further includes a reflector 16.4, lens 16.5, and a heat sink 16.21 that may be held in position by means of a rubber seal 16.6, for example. The light housing 16 is the same housing utilized for the switch 14 and the switch components are provided so that either one or both of the flashlight modes or area light modes can be actioned by the user by repeatedly actuating the switch 14. For example, the switch 14 may be configured to cycle activation of the flashlight and area light.

[059] As described above, the front surface 18.5 include a series of optical elements (e.g., etched formations) that preferably in an array such as in Figure 14 and 15. Each of the optical elements is generally shaped in a cylindrical or circular fashion. As can be seen from Figures 14 and 15, these formations are spaced at closer distances to each other in a direction away from the light source. That is, the closer the optical elements are to the light source, the optical elements are smaller and less dense than optical elements farther away from the light source. This provides a graduated effect from top to bottom as illustrated in Figure 10, whereby the upper portions are more dense with optical elements than the lower portions.

[060] Figure 15 illustrates a diagram showing an exemplary arrangement and etching details to produce the optical elements on the light panel as illustrated in Figure 14. The schematic illustration has the smallest cylinders of a minimum diameter of 0.3 mm being formed on the light panel 18 planar surface 18.5, or 18.5 and 18.6, at a location where the surfaces 18.5 and 18.6 are exposed and closest to the LEDs. As illustrated in Figure 6, the whole surface is covered with optical elements, however as the blade extends away from the light source a 2 mm row spacing is observed, and the cylinders are gradually increased in diameter up to the maximum diameter of 0.8mm. Depending upon the length of the light panel 18, this will mean some adjacent rows may have the same diameter.

[061] The optical elements or etchings are referred to as cylinders, because each circle may be laser etched to a depth of approximately 0.3 mm. It will be also noted from Figure 15 that the columns of etched cylinders are offset by a half row spacing, and that the third column of cylinders lies 2 mm away from the first column on the left, with the second column being the one offset by a half row spacing. This array is arranged to cover the whole planar surface 18.5 and 18.6 or, if desired, particular effects can be produced by providing etched cylinders at different intervals or spacing.

[062] Where ever it is used, the word "comprising" is to be understood in its "open" sense, that is, in the sense of "including", and thus not limited to its "closed" sense, that is the sense of "consisting only of". A corresponding meaning is to be attributed to the corresponding words "comprise", "comprised" and "comprises" where they appear.

[063] It will be understood that the invention disclosed and defined herein extends to all alternative combinations of two or more of the individual features mentioned or evident from the text. All of these different combinations constitute various alternative aspects of the invention.

[064] The invention has been described with reference to the preferred embodiments. Of course, modifications and alterations will occur to others upon reading and understanding the preceding description. It is intended that the invention be construed as including all such modifications and alterations insofar as they come with the scope of the appended claims and their equivalents.

Claims

What is claimed is:

1. A lighting device comprising:
a body including a battery housing to receive one or more batteries to power the lighting device, the body including at one end a light source housing for emitting light from the device in a manner of a flashlight, wherein the light source is configured to emit light out the one end and a lighting panel coupled to the body, wherein the lighting panel is illuminated along an edge of the lighting panel and arranged on the body so as to emit light in the manner of an area light.
2. A lighting device as claimed in claim 1, wherein the lighting panel extends across a substantial width of the body.
3. A lighting device as claimed in claim 1 or 2, wherein the lighting panel extends in a forward to rearward direction with respect to the body.
4. A lighting device as claimed in any one of claim 1 to 3, wherein the lighting panel extends more than half the length of the body.
5. A lighting device as claimed in any one of claim 1 to 4, wherein the body includes a body portion having an overlapping skirt to seal against a surface of the lighting panel.
6. A lighting device as claimed in any one of claim 1 to 5, wherein the lighting panel is assembled to a surface of the body.
7. A lighting device as claimed in any one of claim 1 to 6, wherein the lighting panel includes at least one locator on a surface or side thereof to interact with the body to assist in the locating of the lighting panel onto the body.
8. A lighting device as claimed in any one of claim 1 to 7, wherein the lighting panel includes, on an under surface thereof, a coated surface.
9. A lighting device as claimed in claim 8, wherein the coated surface is a painted surface.
10. A lighting device as claimed in any one of claims 8 or 9, wherein the coated surface is of a white colour or other appropriate colour depending upon the lighting effect required.

11. A lighting device as claimed in any one of claims 1 to 10, wherein an upper surface of the lighting panel includes an array of etched markings.

12. A lighting device as claimed in claim 11, wherein the markings are created by a laser etching.

13. A lighting device as claimed in any one of claims 11 or 12, wherein the etched markings are of a depth of approximately 0.3mm in depth.

14. A lighting device as claimed in any one of claims 1 to 13, wherein the lighting panel includes at least one flange or ridge extending laterally away from the panel along a free edge of the panel.

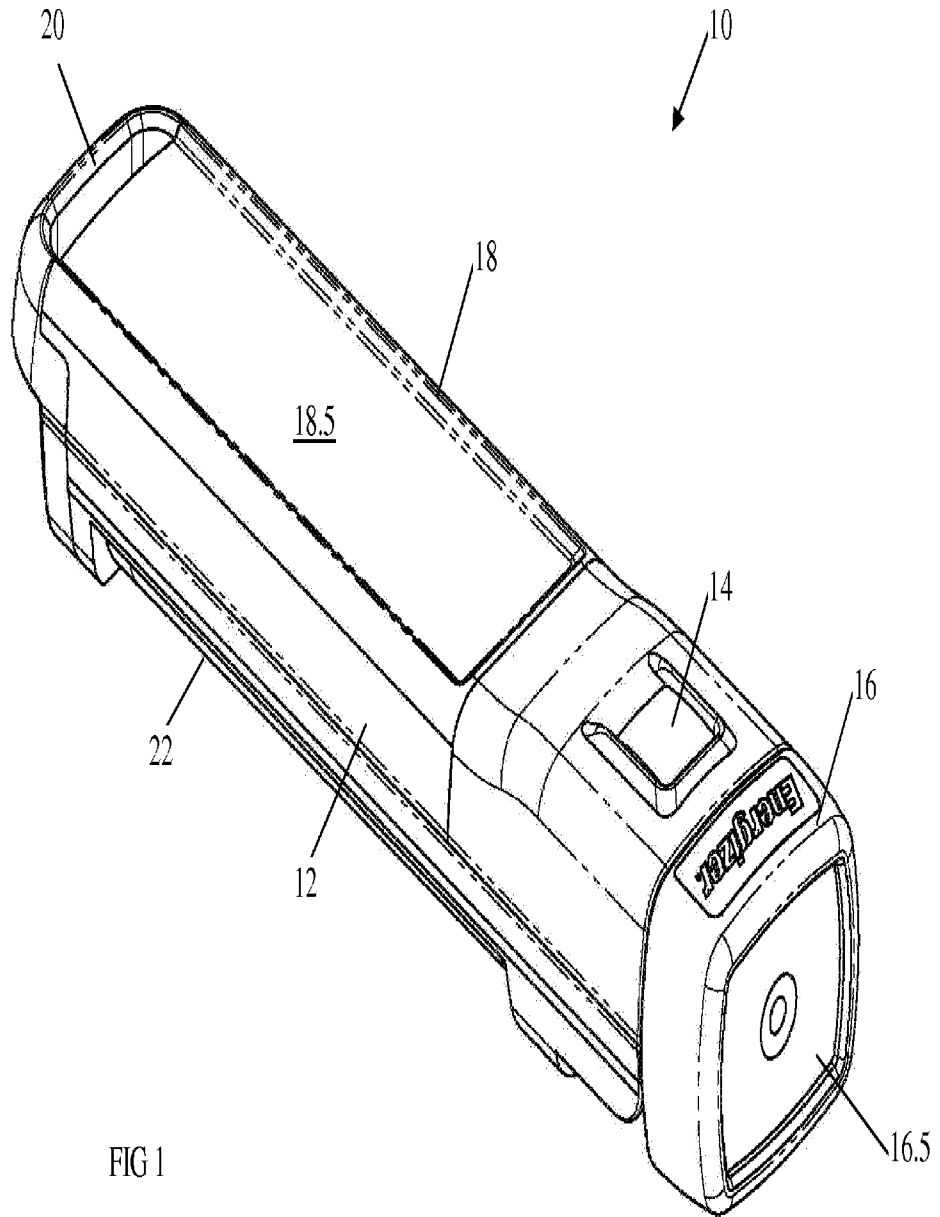
15. A lighting device as claimed in any one of the preceding claims wherein an underside of said device includes a pair of pivoted legs, so that said legs and said body of said device can form a tripod to stand said device.

16. A lighting device as claimed in claim 15 wherein said light source housing is pivotally connected to said body.

17. A lighting device as claimed in claim 15 or 16, wherein said legs allow said lighting panel to be angled whereby it can act as an area light.

18. A lighting device as claimed in any one of the preceding claims wherein light emitted from the lighting panel is output in a first axis and light emitted from the one end is output in a second axis.

19. The lighting device of claim 18, wherein the first axis and the second axis are normal.



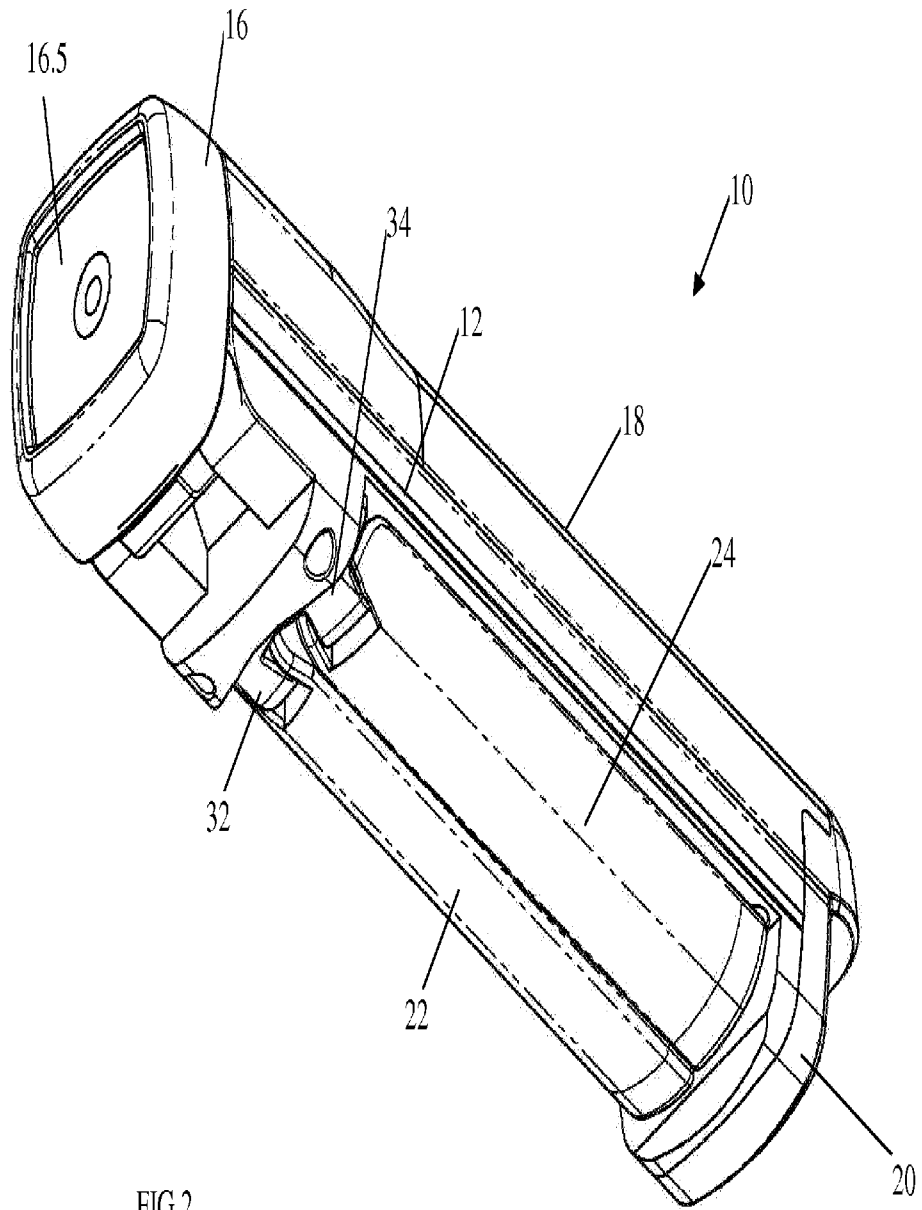


FIG 2

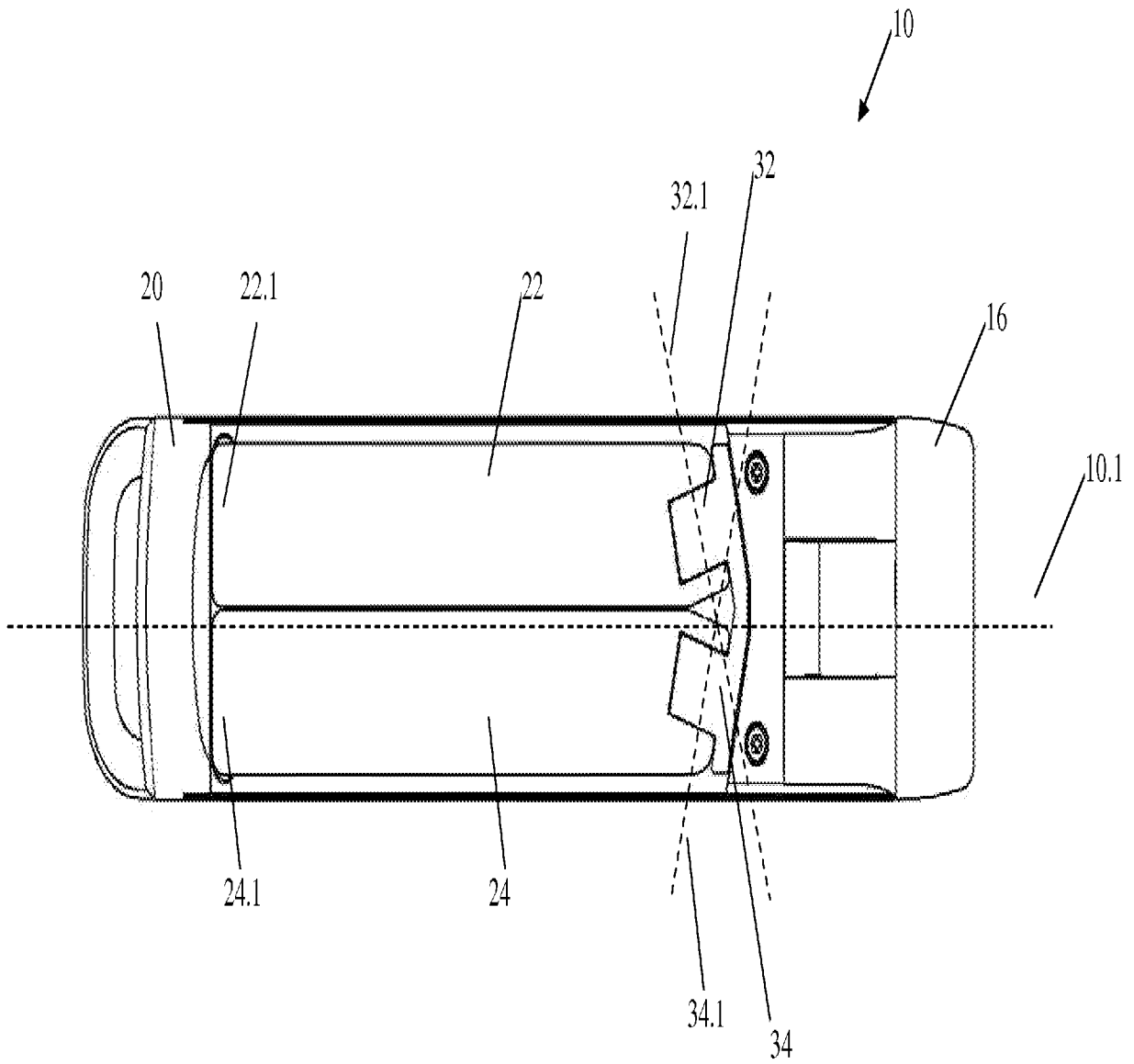


FIG 3

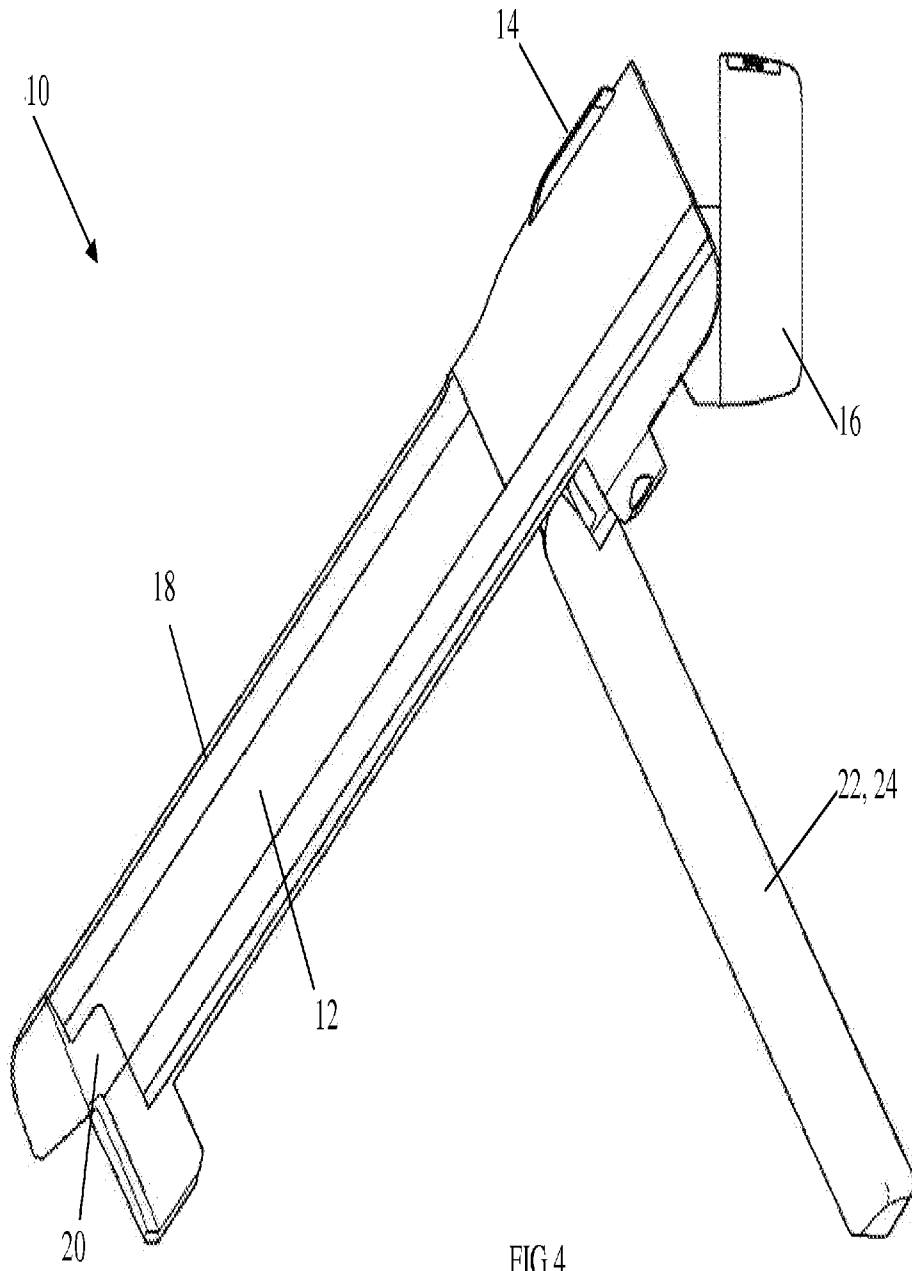
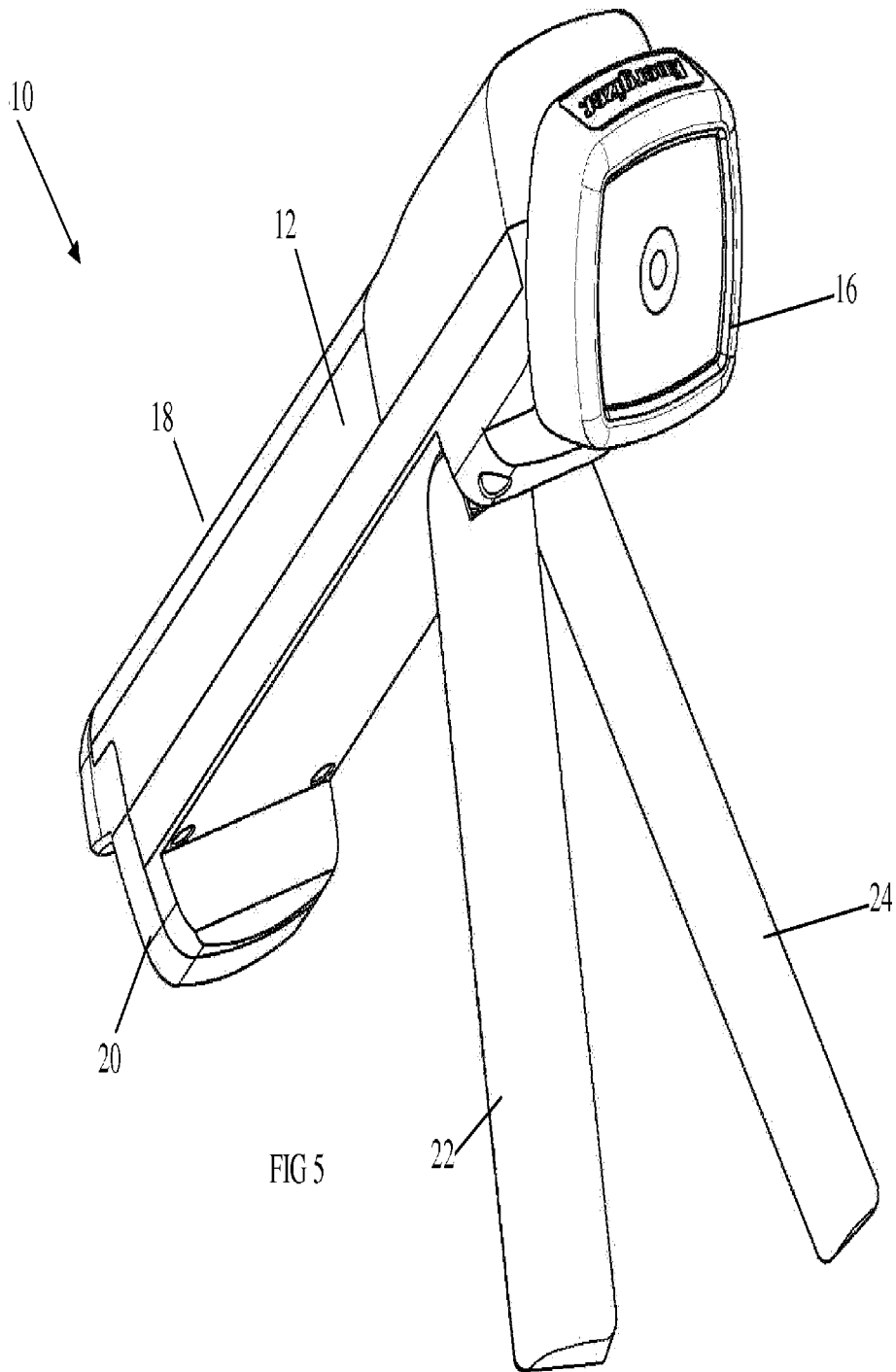
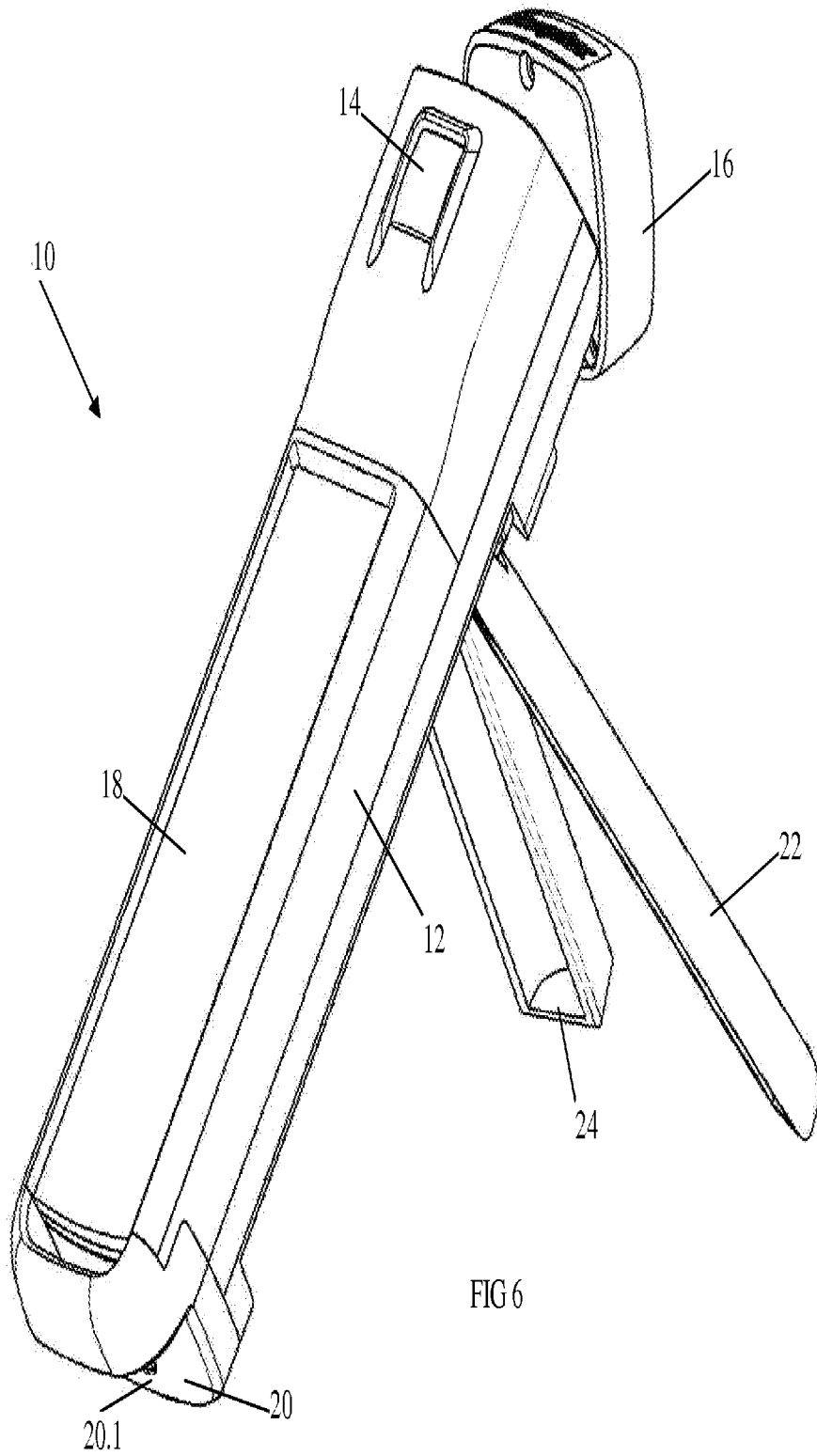
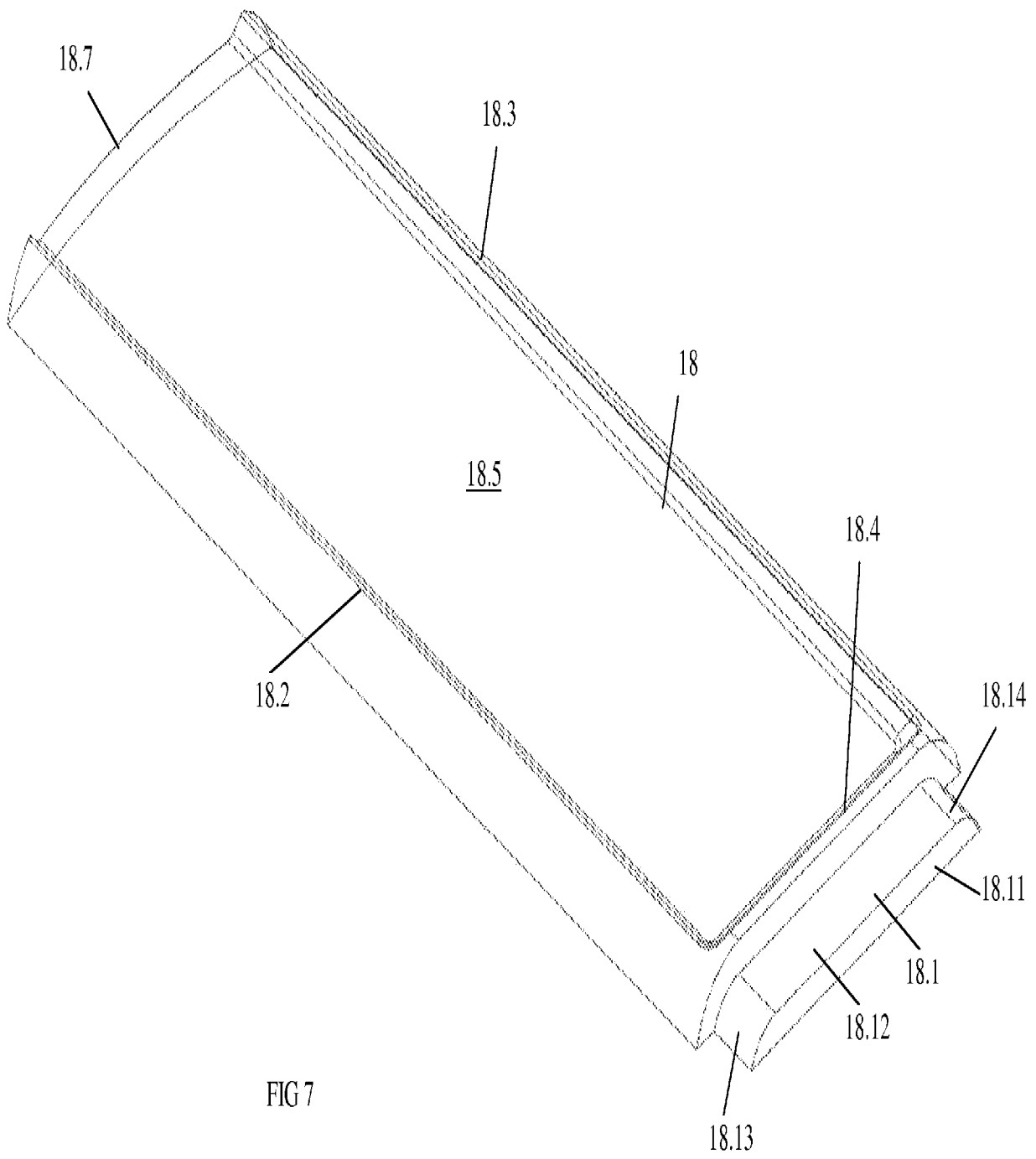


FIG 4







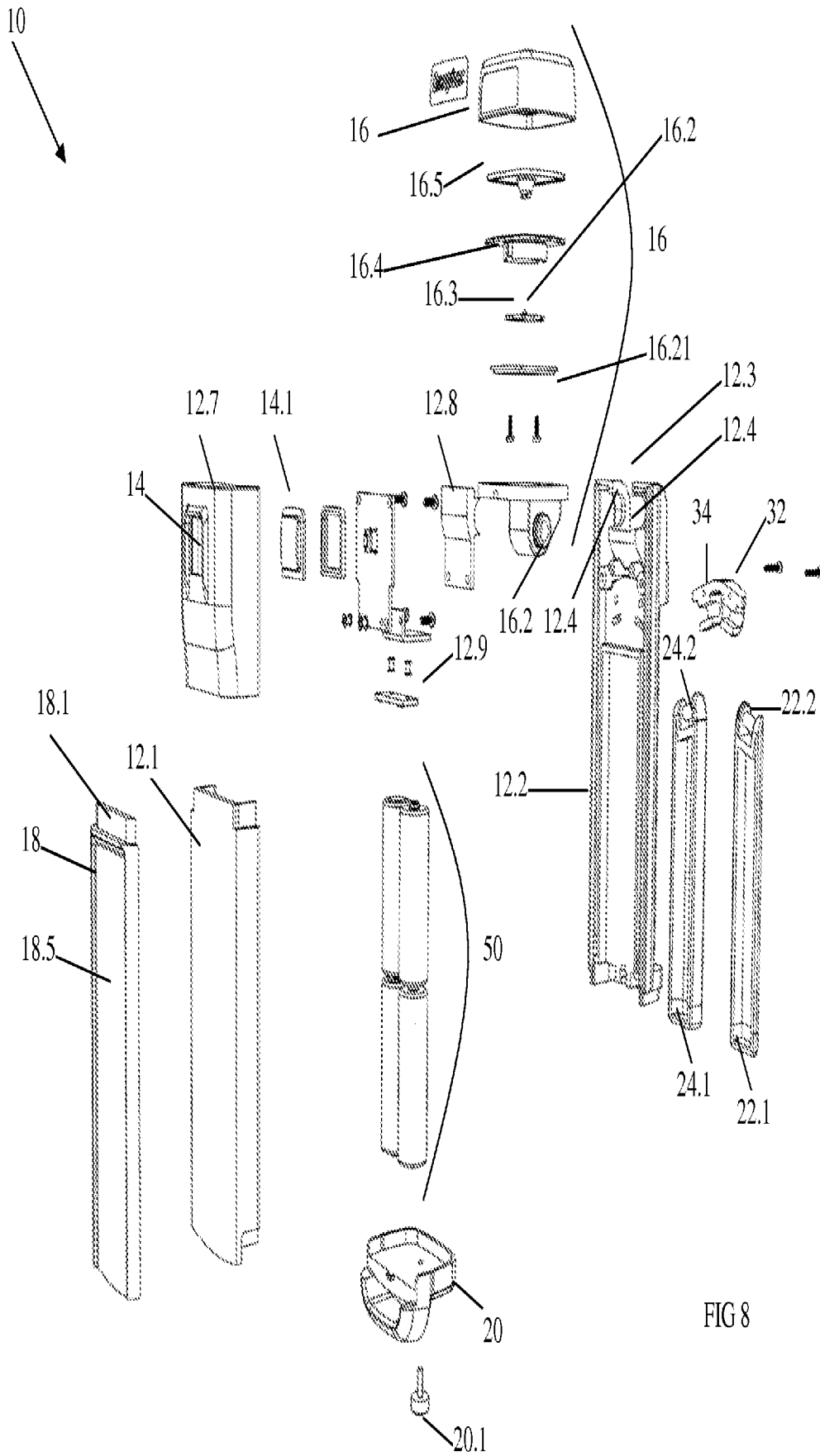


FIG 8

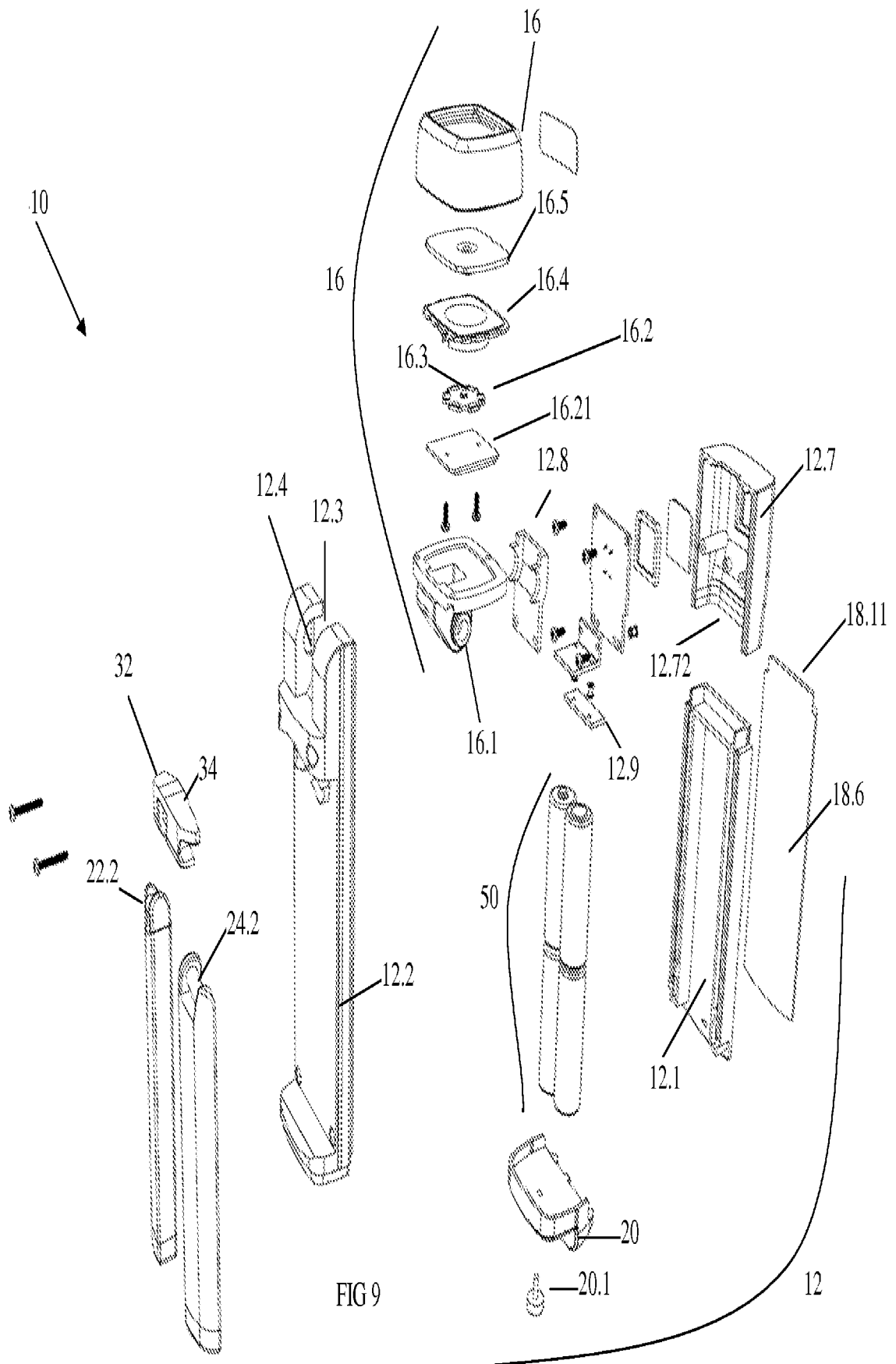


FIG 9

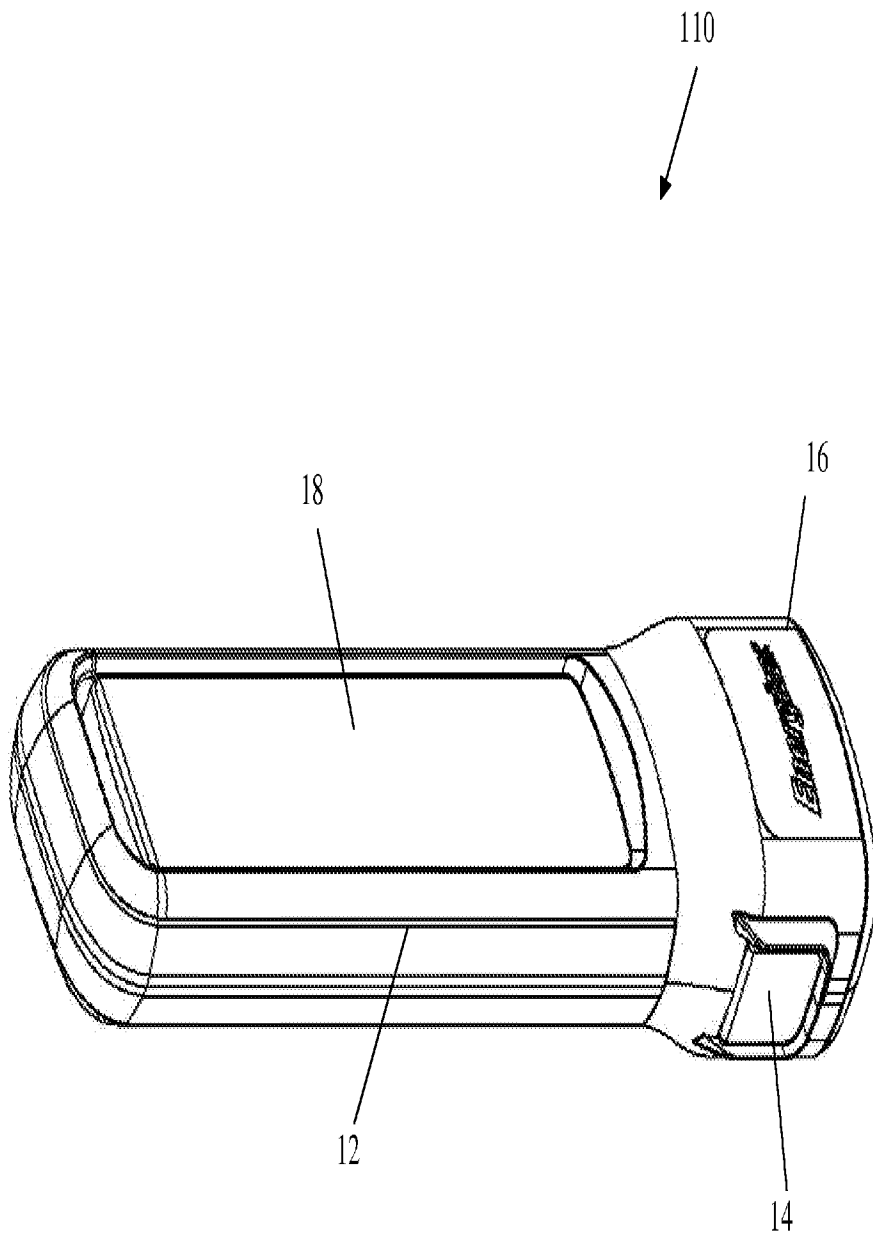


FIG 10

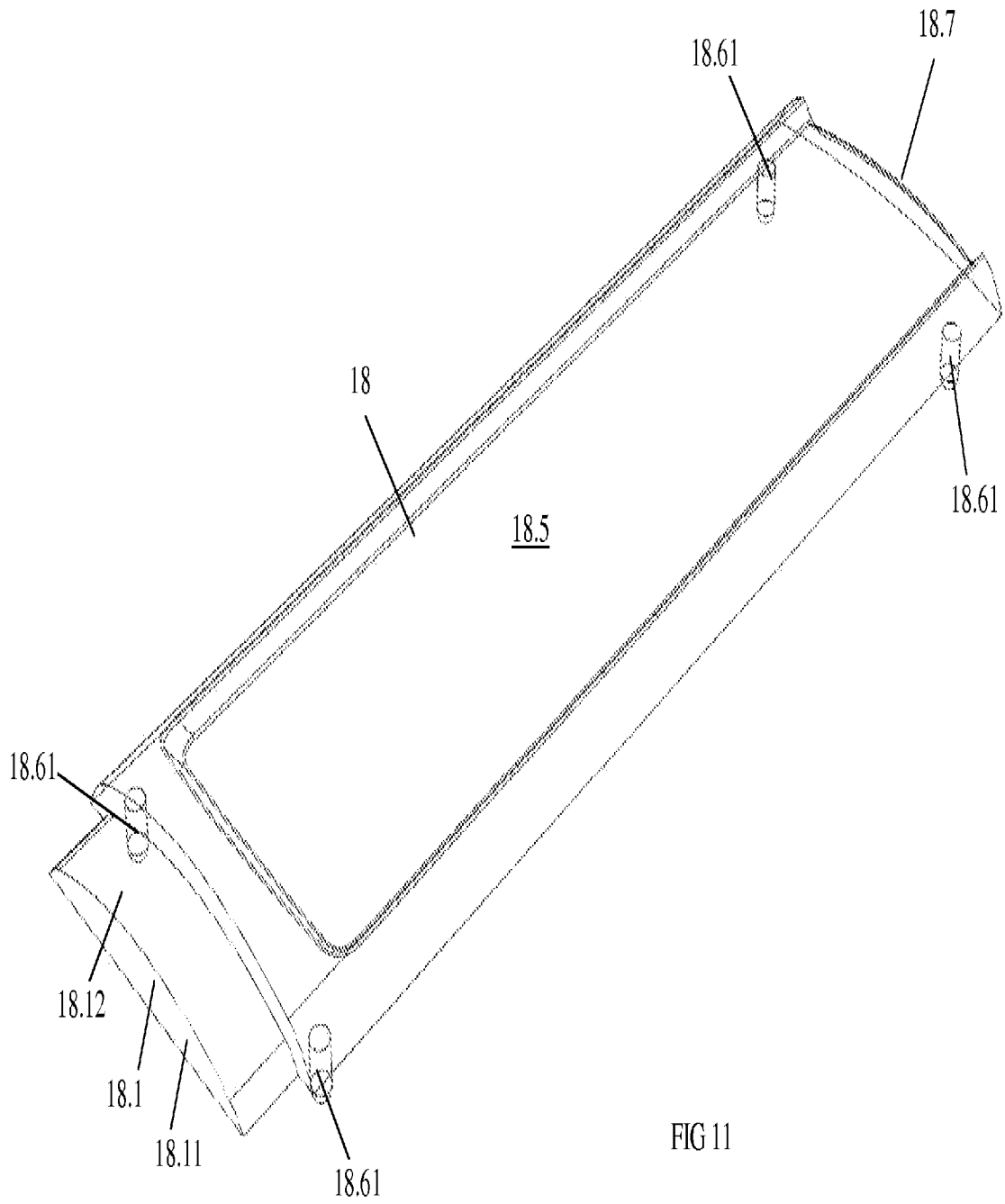


FIG 11

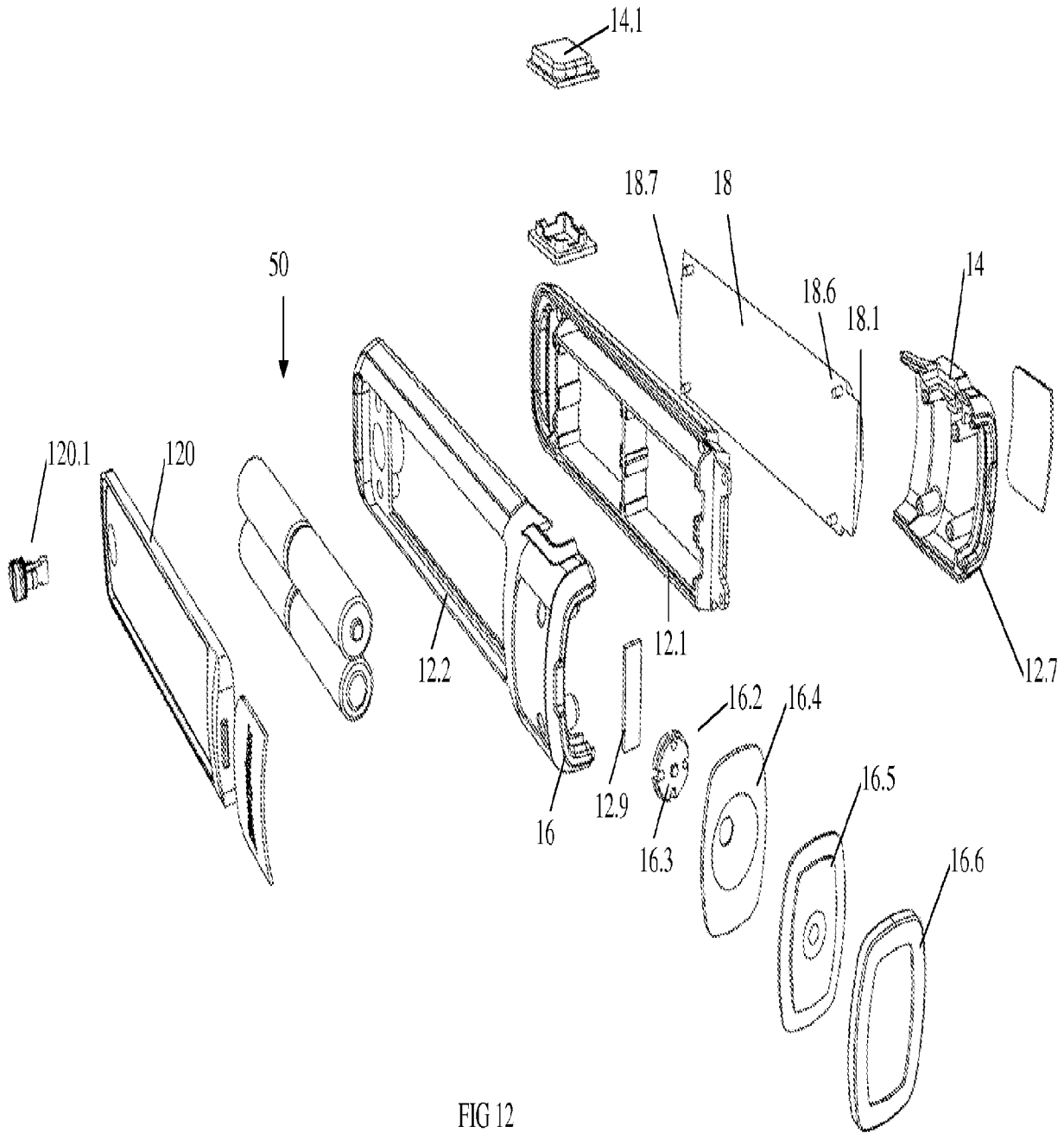


FIG 12

13/14

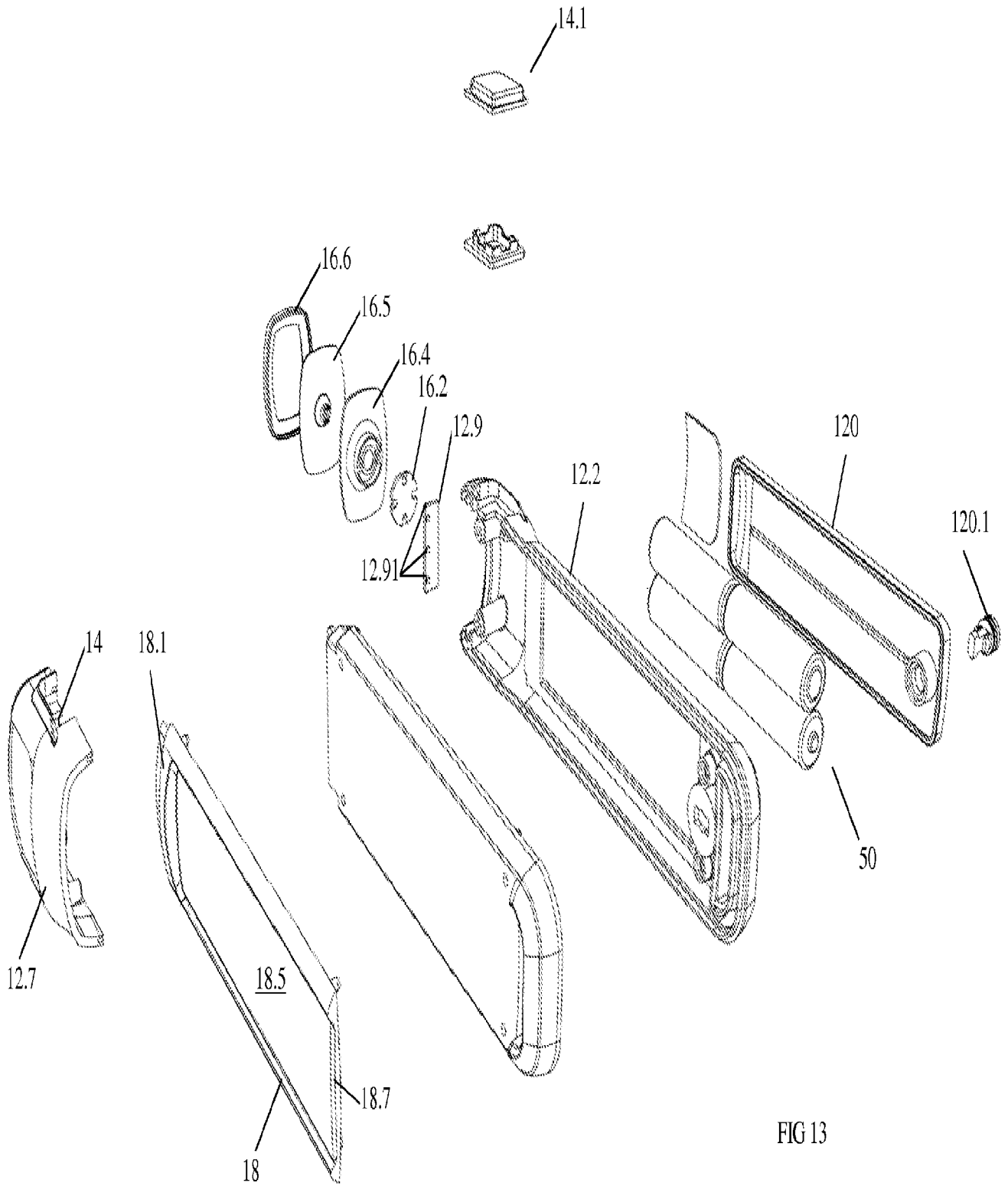


FIG 13

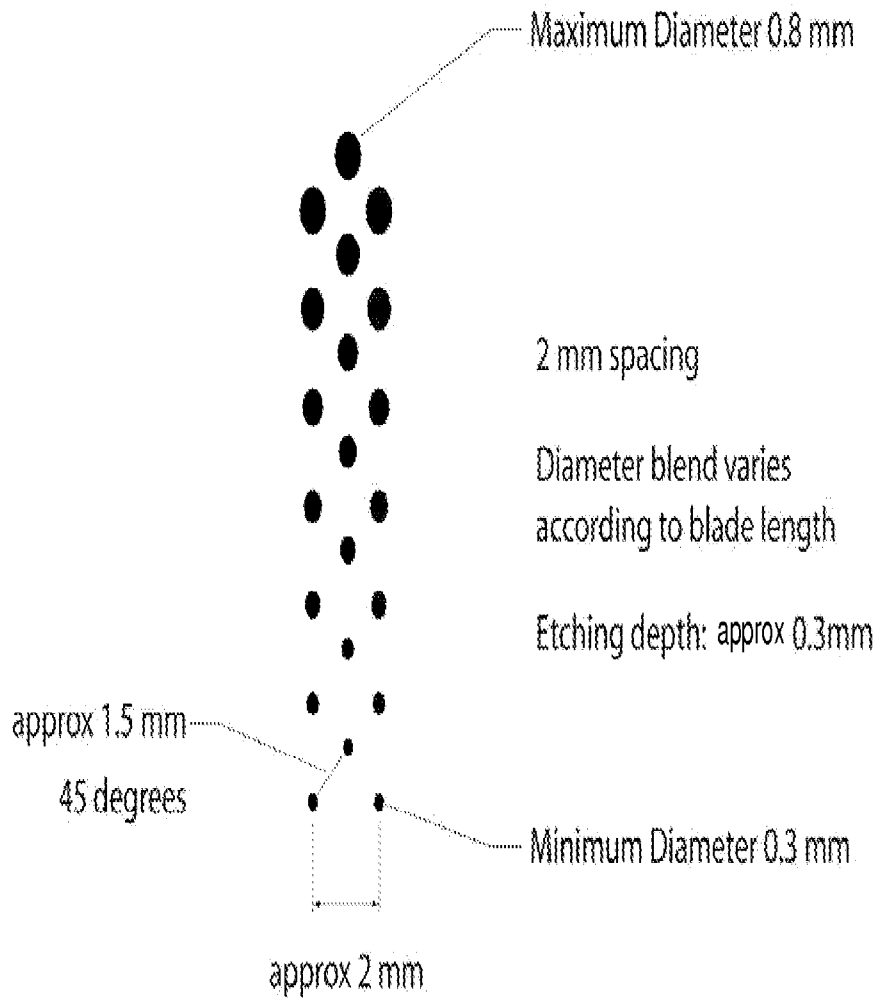
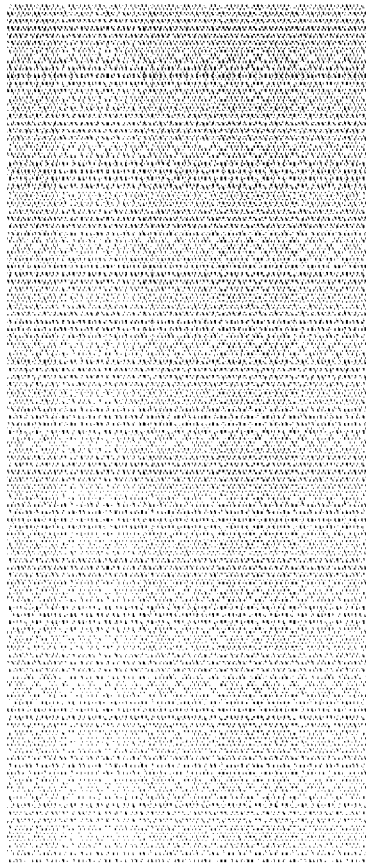


FIG 14

FIG 15

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2013/044940

A. CLASSIFICATION OF SUBJECT MATTER
 INV. F21L4/02 F21V21/14 F21V8/00
 ADD. F21Y101/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED
 Minimum documentation searched (classification system followed by classification symbols)
 F21L F21V G02B F21Y

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
 EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 801 263 A2 (EVEREADY BATTERY INC [US]) 15 October 1997 (1997-10-15)	1-10,14,18,19
Y	column 3, line 54 - column 10, line 28 figure 7	11-13
Y	----- WO 00/50807 A1 (LUMITEX INC [US]; PARKER JEFFERY R [US]; COGHLAN GREGORY A [US]; EZELL) 31 August 2000 (2000-08-31)	11-13
A	page 6, line 19 - page 25, line 5 page 10, line 1 - line 5 figure 38	1
X	----- US 6 206 541 B1 (LANDAMIA ANTONIO [US]) 27 March 2001 (2001-03-27)	1-10,14-19
	column 3, line 14 - column 5, line 26 figures 1-3,6 ----- -/--	

Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents :

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Date of the actual completion of the international search 15 August 2013	Date of mailing of the international search report 23/08/2013
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Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer Blokland, Russell
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