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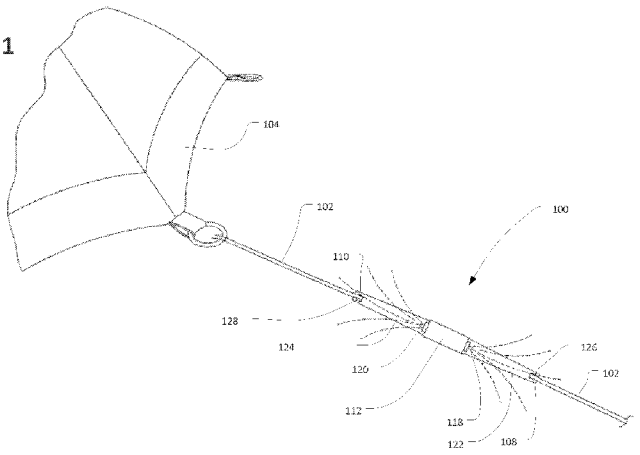
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(54) Title: GUYLINE ILLUMINATOR

FIG. 1



(57) Abstract: Embodiments herein disclosed relate to a guyline illuminator for attaching to a rope or wire guyline supporting a structure such as a tent. The illuminator can shine in one or both directions along the line, is low-profile for packing, and has attachment structures for quick, manual attachment or removal.

GUYLINE ILLUMINATOR

CROSS-REFERENCES TO RELATED APPLICATIONS

[0001] This application is an international application of U.S. Provisional Application No. 61/937,080, filed February 7, 2014, the content of which is incorporated herein by reference in its entirety.

BACKGROUND OF THE INVENTION

[0002] Camping is a popular pastime, whether referring to backwoods camping, car camping, or setting up tent for a music festival in the woods. The open air and freedom of electronic disconnection is marred only by the absence of civilizational services such as well-lit paths and convenient access to medical care.

[0003] Typically, a camper stays in a tent, and may have one or two other shelters in the campsite. Most tents and shelters include guylines for staking the tent to the ground. Similar guylines may be used in other settings, such as for circus tents or flagpoles.

BRIEF SUMMARY OF THE INVENTION

[0004] The following presents a simplified summary of some embodiments of the invention in order to provide a basic understanding of the invention. This summary is not an extensive overview of the invention. It is not intended to identify key/critical elements of the invention or to delineate the scope of the invention. Its sole purpose is to present some embodiments of the invention in a simplified form as a prelude to the more detailed description that is presented later.

[0005] Embodiments herein disclosed describe a guyline illuminator having a casing, at least one light source, and attachment points for clipping the illuminator onto a guyline, for example for a tent. Embodiments may also possess one or more alignment features for aligning a longitudinal axis of the illuminator along the guyline, for directing light from the light source along the guyline, or both.

[0006] For a fuller understanding of the nature and advantages of the present invention, reference should be made to the ensuing detailed description and accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] These and other features, embodiments, and advantages of the present disclosure are better understood when the following Detailed Description is read with reference to the accompanying drawings.

[0008] FIG. 1 is a partial cutaway, perspective view of a guyline illuminator attached to a guyline of a tent in accordance with embodiments.

[0009] FIG. 2 is a perspective view of the guyline illuminator of FIG. 1 in accordance with embodiments.

[0010] FIG. 3 is a top view of the guyline illuminator of FIG. 1 showing interior details in accordance with embodiments

[0011] FIG. 4 is a perspective view of an alternate embodiment of a guyline illuminator having a light source pointing in only one direction, in accordance with embodiments.

[0012] FIG. 5 is a top view of an alternative embodiment of a guyline illuminator having a solar cell in accordance with embodiments.

DETAILED DESCRIPTION OF THE INVENTION

[0013] In the following description, various embodiments of the present invention will be described. For purposes of explanation, specific configurations and details are set forth in order to provide a thorough understanding of the embodiments. However, it will also be apparent to one skilled in the art that the present invention may be practiced without the specific details. Furthermore, well-known features may be omitted or simplified in order not to obscure the embodiment being described.

[0014] Embodiments described herein are directed to an illuminator for a guyline. The illuminator can be attached to a guyline and include a light source. In embodiments, when the guyline illuminator is attached to a guyline, the light source, when turned on, illuminates the guyline, making the guyline visible in low light situations, such as at night.

[0015] In general, a guyline illuminator in accordance with embodiments includes at least one structure for attaching the guyline illuminator to a guyline, and at least one light source for

illuminating a portion of the guyline when the guyline illuminator is attached. For example, FIG. 1 shows a guyline illuminator 100 attached to a guyline 102 running between a tent 104 and a fixed point (not shown), such as a tent stake, in accordance with embodiments. In the embodiment shown in FIG. 1, the guyline illuminator 100 includes a casing 112 with light sources attached at ends of the casing. The casing 112 can be waterproofed and/or sealed to protect the lighting elements or an internal battery. As described more below, parts of the guyline illuminator 100 can be transparent or translucent to permit light to illuminate out of the casing from the light sources.

[0016] As previously indicated, in accordance with embodiments, a guyline illuminator includes one or more light sources. In the embodiment shown in FIG. 1, the guyline illuminator 100 includes first and second light sources 118 and 120 mounted in opposite ends of the casing, but light sources could alternatively be mounted on an outside of the casing, and/or a single or more than three light sources could be used.

[0017] In accordance with embodiments, a guyline illuminator includes at least one structure for attaching the guyline illuminator to a guyline. In the embodiment shown in FIG. 1, the guyline illuminator 100 has two hook-shaped attachment structures 108 and 110 connected with each end of the casing 112 and aligned with a longitudinal axis of the guyline illuminator for removably attaching the illuminator to the guyline 102. However, in alternative embodiments, any attachment structure can be used, including one or more of clips, rings, clamps, hooks, snaps, hook and loop closures, straps, ties, or other suitable structures, or a combination of these. In alternative embodiments, attachment structures and alignment elements may be multiple connected parts rather than being formed of a contiguous piece.

[0018] The embodiment shown in FIG. 1 also includes two alignment elements 122 and 124 which are elongate sections of the attachment structures. The alignment elements are configured for aligning the light sources with a guyline and, in various embodiments, may also have features for protecting the light sources, diffusing a portion of the light, and directing a portion of the light. Aligning refers to disposing an axis of the guyline illuminator substantially tangent or parallel to a guyline when the illuminator is attached to the guyline. In embodiments, the axis to be aligned with the guyline is the longitudinal axis of the guyline illuminator casing 112; but in alternative embodiments, alignment may refer to any axis along which a light source is

configured to shine light. In at least one embodiment, the light sources 118, 120 are positioned pointing outward from the ends of the casing 112, along the longitudinal axis of the guyline illuminator. In alternative embodiments, the guyline illuminator may have attachment structures with or without intervening alignment elements.

[0019] The illuminator 100 connects with the guyline 102 by passing the guyline through the first and second attachment structures 108 and 110 at ends of the guyline illuminator 100. When the guyline 102 passes through the attachment structures 108 and 110, the linearity of the guyline is broken, and the guyline presses against a side of the casing 112 of the illuminator 100 and against the attachment structures 108 and 110. Pressure between the guyline 102 and the illuminator 100 caused by tension in the guyline creates resistive static friction that prevents the illuminator from sliding up or down the guyline except with externally applied force.

[0020] FIG. 2 shows the guyline illuminator 100 of FIG. 1, in a detailed perspective view, in accordance with embodiments. The illuminator 100 has a casing 112 configured for protecting a battery 136 (FIG. 3) as well as first and second light sources 118 and 120. A push-button switch 130 located on the casing 112 closes a circuit connecting the battery (internal, not shown) with the light sources. The casing 112 may be any suitable material, such as plastic (polyethylene, polystyrene, polypropylene, polyvinylchloride, etc.) or metal (aluminum, stainless steel, etc.).

[0021] The light sources 118 and 120 shown are light-emitting diodes (LEDs), but in alternative embodiments, a light source may be an alternative to an LED, such as incandescent bulb or filament; or may be any type of LED bulb such as an organic LED (OLED); or a light source may be a collection of two or more LEDs, which may be oriented so as to concentrate or to direct light in one or more directions.

[0022] In alternative embodiments, the switch 130 may additionally act as a rheostat so that the brightness of a light source can be adjusted manually by a user. Various forms of switch other than a pushbutton are possible, such as a sliding switch, a rocking switch, a switch with multiple sequential settings, a rotating switch, or any other switch. A switch may also possess a gasket or a pliable membrane layer for preventing water from passing around the switch and into the casing.

[0023] In the embodiment shown in FIG. 2, the casing 112 is attached with first and second attachment structures 108 and 110 at opposite ends of the casing. The distal ends of the attachment structures from the casing are substantially hook-shaped, having voids 126 and 128 for hooking onto a guyline (or any other line in tension) and grooves 132 and 134 for seating the guyline and resisting detachment in a direction orthogonal to the guyline. The attachment structures shown have a rotationally symmetrical and antiparallel configuration, with voids 126 and 128 facing in opposite directions. However, in various embodiments, the attachment structures can be mirror-symmetrical, or can be arranged at any angle relative to one another about the longitudinal axis of the guyline illuminator. Antiparallel attachment structures, or attachment structures rotated relative to one another, may be used when attaching the illuminator to a guyline to promote a helical or partially helical winding of the guyline about the illuminator in order to achieve a stronger attachment.

[0024] The attachment structures shown in FIG. 2 are also contiguous with alignment elements 122 and 124 at ends proximal to the casing 112. The alignment elements are at least partially hollow to accommodate light sources 118 and 120. The alignment elements 122 and 124 of this embodiment are semi-transparent such that some light will pass and diffuse through the sides of the elements, and some light will shine substantially parallel with a central longitudinal axis 101 of the illuminator and away from the casing 112. These alignment elements 122 and 124 are attached with the casing 112 by an interference fit.

[0025] In various embodiments, the alignment elements 122 and 124 are frustoconical in shape, with a wide end and a narrow end. The wide end of the alignment element may attach to the casing by way of any of an interference fit, by threads, by the mating of surface features of an end the element to matching surface features on or within the casing, by way of a gasket or O-ring, with a fastener, or any other attaching means. The element may be additionally secured to the casing or may include additional protection from liquid inundation of the casing. For example, an alignment element may be secured with glue or a polymer such as epoxy, by plastic deformation of either the alignment element or the casing, by a polymer coating, or by other securing means.

[0026] The light source may have additional features for directing or altering light. The amounts of light released to the sides and released in the axial direction may be tuned by

focusing and/or reflecting a portion of the light. Features for focusing light may include structural features of the light source, the casing, the alignment element, or the addition of a lens; features for reflecting the light may include reflective surfaces proximate to the light source; and any of these structural features may be static or alternatively adjustable.

[0027] Embodiments of a guyline illuminator may possess additional means for adjusting a focus of the emitted light within an alignment element or elements. For example: a lens may be included in a hollow portion of an alignment element, or the alignment element may itself act as a lens; and the alignment element may be attached with the casing by means of threads, such that a user may be able to adjust the distance between the lens and an LED bulb by rotating the alignment element relative to the casing about a longitudinal axis of the casing. Certain lenses may alter the focus of a light beam depending upon the distance between the lens and the light source; or a lens may have multiple modes of focus depending upon the specific geometry of the lens.

[0028] An alignment element may be fully transparent, partially transparent (or semitransparent) to any degree, translucent, colored, partially opaque, fully opaque with openings or transparent points, and/or may have a graduated or stepped degree of transparency or translucence from one end of the element to the other, in accordance with embodiments. For example, a portion of an alignment element proximal to the casing may be semitransparent, such that light passing through that portion is dimmed and diffuse, while a portion of the elements distal from the casing may be substantially transparent, permitting a greater amount of light to escape the distal end of the element. In this manner, a greater amount of light may be directed out of the distal end of an alignment element than from the sides.

[0029] An alignment element may be polyethylene, polystyrene, polyvinylchloride, or any other suitable material, in accordance with embodiments. An alignment element may also be at least partially reflective along an interior surface, such that light emitted from the light source proximal to the casing will tend to reflect toward the distal end of the element. In at least some additional embodiments, the refractive index of the material making up an alignment element, in combination with the geometry of the inner and outer surfaces of the element, may be such that at least some light undergoes internal reflection within the element and is directed away from the casing. In alternative embodiments, an alignment element may also include a high-visibility

material, for example: glow-in-the-dark, reflective, or fluorescent material, insert, or coating; such that the alignment element may be visible in a dark environment even without electrical illumination.

[0030] FIG. 3 shows the guyline illuminator 100 of FIG. 1 and FIG. 2 in a top view showing interior detail and attachment to a guyline 102, in accordance with embodiments. This view shows the casing 112 containing a battery 136, circuit 138 running from the battery to the two light sources 118 and 120, and the electrical switch 130 that electrically connects the battery and light sources.

[0031] In various embodiments, the guyline may be secured tightly to the guyline by wrapping the guyline about the outside of the illuminator one or more times in a helical configuration as shown in FIG. 3., or may be secured simply by passing the guyline through both attachment structures and alongside the illuminator as shown in FIG. 1. In either case, the guyline illuminator is held parallel to the guyline, such that light emitted from the light sources will illuminate a portion of the guyline for a distance in one or both directions along the guyline away from the illuminator.

[0032] FIG. 4 shows a monodirectional guyline illuminator 300 having only a single light source, in accordance with an alternative embodiment. The illuminator 300 has a casing 312, a light source 318, and an attachment structure 308 connected with alignment element 322 and attached with a first end of the casing. The alignment element is partially hollow for encapsulating the light source. A push-button switch 330 located on the casing 312 is shown, and closes a circuit forming an electrical connection between the light source 318 and a battery (internal, not shown). A second attachment structure 310 connects with the opposite end of the casing 312 from the first. The alignment element 322 and second attachment structure 310 may be attached to the casing 312 in any manner that the alignment elements 122 and 123 attach with the illuminator 100 of FIGS. 1-3. In alternative embodiments, the second attachment structure 310 may have an elongate alignment element as well.

[0033] FIG. 5 shows a guyline illuminator 500 in a top view showing interior detail and attachment to a guyline 502, with a photovoltaic cell 540 for recharging the battery (not shown) in accordance with embodiments.

[0034] Alternative embodiments may possess rechargeable batteries, and may have additional features for charging the battery or prolonging battery life without necessitating the removal of the battery from the casing. For example, embodiments may have a small photovoltaic cell, as shown in FIG. 5 that partially recharges the battery while the device is exposed to light. Embodiments may have motion-activated electrical generation, such as a human-motion passive generator, that works to recharge the battery when the illuminator is shaken, for example while being carried in a pocket. Embodiments may have a hand-turned crank attached to a small electrical generator, or a socket to attach to a small crank, such that a user can manually activate the generator to store a charge on the battery.

[0035] Other variations are within the spirit of the present invention. Thus, while the invention is susceptible to various modifications and alternative constructions, certain illustrated embodiments thereof are shown in the drawings and have been described above in detail. It should be understood, however, that there is no intention to limit the invention to the specific form or forms disclosed, but on the contrary, the intention is to cover all modifications, alternative constructions, and equivalents falling within the spirit and scope of the invention, as defined in the appended claims.

[0036] The use of the terms "a" and "an" and "the" and similar referents in the context of describing the invention (especially in the context of the following claims) are to be construed to cover both the singular and the plural, unless otherwise indicated herein or clearly contradicted by context. The terms "comprising," "having," "including," and "containing" are to be construed as open-ended terms (i.e., meaning "including, but not limited to,") unless otherwise noted. The term "connected" is to be construed as partly or wholly contained within, attached to, or joined together, even if there is something intervening. Recitation of ranges of values herein are merely intended to serve as a shorthand method of referring individually to each separate value falling within the range, unless otherwise indicated herein, and each separate value is incorporated into the specification as if it were individually recited herein. All methods described herein can be performed in any suitable order unless otherwise indicated herein or otherwise clearly contradicted by context. The use of any and all examples, or exemplary language (*e.g.*, "such as") provided herein, is intended merely to better illuminate embodiments of the invention and does not pose a limitation on the scope of the invention unless otherwise

claimed. No language in the specification should be construed as indicating any non-claimed element as essential to the practice of the invention.

[0037] Preferred embodiments of this invention are described herein, including the best mode known to the inventors for carrying out the invention. Variations of those preferred embodiments may become apparent to those of ordinary skill in the art upon reading the foregoing description. The inventors expect skilled artisans to employ such variations as appropriate, and the inventors intend for the invention to be practiced otherwise than as specifically described herein. Accordingly, this invention includes all modifications and equivalents of the subject matter recited in the claims appended hereto as permitted by applicable law. Moreover, any combination of the above-described elements in all possible variations thereof is encompassed by the invention unless otherwise indicated herein or otherwise clearly contradicted by context.

[0038] All references, including publications, patent applications, and patents, cited herein are hereby incorporated by reference to the same extent as if each reference were individually and specifically indicated to be incorporated by reference and were set forth in its entirety herein

WHAT IS CLAIMED IS:

1. A guyline illuminator, comprising:

a battery;

a casing having retention features for retaining the battery, a first end, and a second end;

first and second attachment structures connected with the casing at the first and second ends, respectively, the attachment structures being configured to removably attach the illuminator to a guyline; and

a light source connected with the casing at the first end, the light source being configured to connect electrically with the battery;

wherein the casing, attachment structures, and light source are aligned such that, when the illuminator is attached to the guyline and the light source is connected electrically with the battery, at least a section of the guyline is directly illuminated by the light source.

2. The guyline illuminator of Claim 1, wherein:

at least one of the attachment structures further comprises an alignment element; the alignment element being disposed between the casing and a distal end of the first attachment structure from the casing and encompassing the light source, the alignment element being configured to direct light from the light source onto the section of the guyline when the illuminator is attached to the guyline.

3. The guyline illuminator of Claim 2 further comprising:

a second alignment element connected between the second casing end and a distal end of the second attachment structure from the casing, the second alignment element encompassing the second light source and being configured to direct light from the second light source onto a second section of a guyline, wherein the first and second sections of the guyline extend outward from opposing ends of the illuminator.

4. The guyline illuminator of Claim 3, wherein the first and second attachment structures are contiguous with the first and second alignment elements.

5. The guyline illuminator of Claim 2, wherein

the alignment element comprises a substantially frustoconical section having a narrow end, a wide end, and an interior void connected with the wide end; the wide end being connected with the casing, and the interior void being configured to receive the light source.

6. The guyline illuminator of Claim 2, wherein

at least a portion of the alignment element is translucent, such that the alignment element is illuminated by the light source when the light source is connected electrically with the battery.

7. The guyline illuminator of Claim 6 wherein the alignment element is substantially transparent at an end of the alignment element distal from the casing.

8. The guyline illuminator of Claim 2, wherein

the attachment structures further comprise hooks at distal ends of the attachment structures, the hooks having grooves oriented parallel to a longitudinal axis of the illuminator and being configured to retain a guyline running substantially parallel to the longitudinal axis of the guyline illuminator.

9. The guyline illuminator of Claim 8, wherein

the second attachment structure is oriented in an antiparallel configuration relative to the first attachment structure, such that the hooks open in opposite directions relative to the longitudinal axis of the guyline illuminator.

10. The guyline illuminator of Claim 1, wherein the light source comprises a light-emitting diode.

11. The guyline illuminator of Claim 1, further comprising:

a switch configured to connect the light source electrically with the battery.

12. The guyline illuminator of Claim 11 wherein the switch comprises a rheostat.

13. The guyline illuminator of Claim 1, wherein the battery is rechargeable.

14. The guyline illuminator of Claim 13, further comprising: a photovoltaic cell configured to charge the battery.

15. The guyline illuminator of Claim 13, further comprising: a passive motion electrical generator configured to charge the battery when the illuminator is moved.

16. The guyline illuminator of Claim 13, further comprising: an electrical generator configured to charge the battery; and a hand-crank attached to the generator configured to allow a user to actuate the generator.

17. A guyline illuminator, comprising: a battery; a casing having retention features for retaining the battery, a first end, and a second end, the casing being elongate; first and second attachment structures connected with the casing at the first and second ends, respectively, the attachment structures being configured to removably attach the illuminator to a guyline, and the attachment structures being elongate; and a first and second light source connected with each of the first and second ends of the casing, the light sources being configured to connect electrically with the battery; wherein the casing and attachment structures are substantially elongate and configured to extend substantially parallel to the guyline and present a narrow profile when assembled together and attached to the guyline.

18. The guyline illuminator of Claim 17 further comprising:

first and second substantially transparent alignment elements connected with and disposed between, respectively, the first and second attachment structures and the casing, wherein

the alignment elements are configured to direct a portion of light emitted by the light sources in a direction parallel to a longitudinal axis of the guyline illuminator.

19. The guyline illuminator of Claim 18 wherein the casing is substantially cylindrical and the first and second alignment elements are substantially frustoconical, the elements having wide ends and narrow ends, the wide ends being in contact with the casing and the narrow ends being distal from the casing.

20. The guyline illuminator of Claim 19 wherein the alignment elements further comprise a high-visibility material.

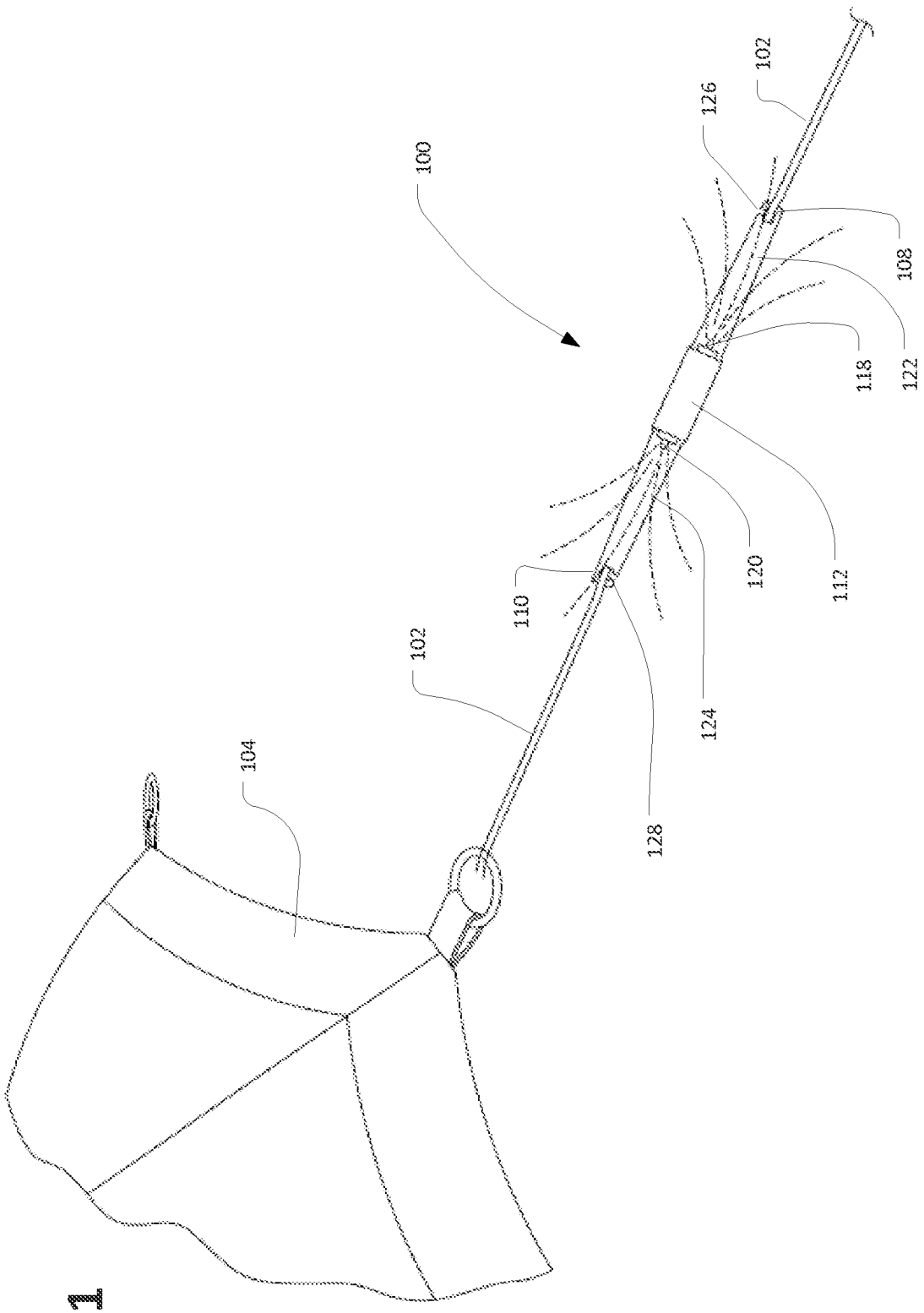


FIG. 1

FIG. 2

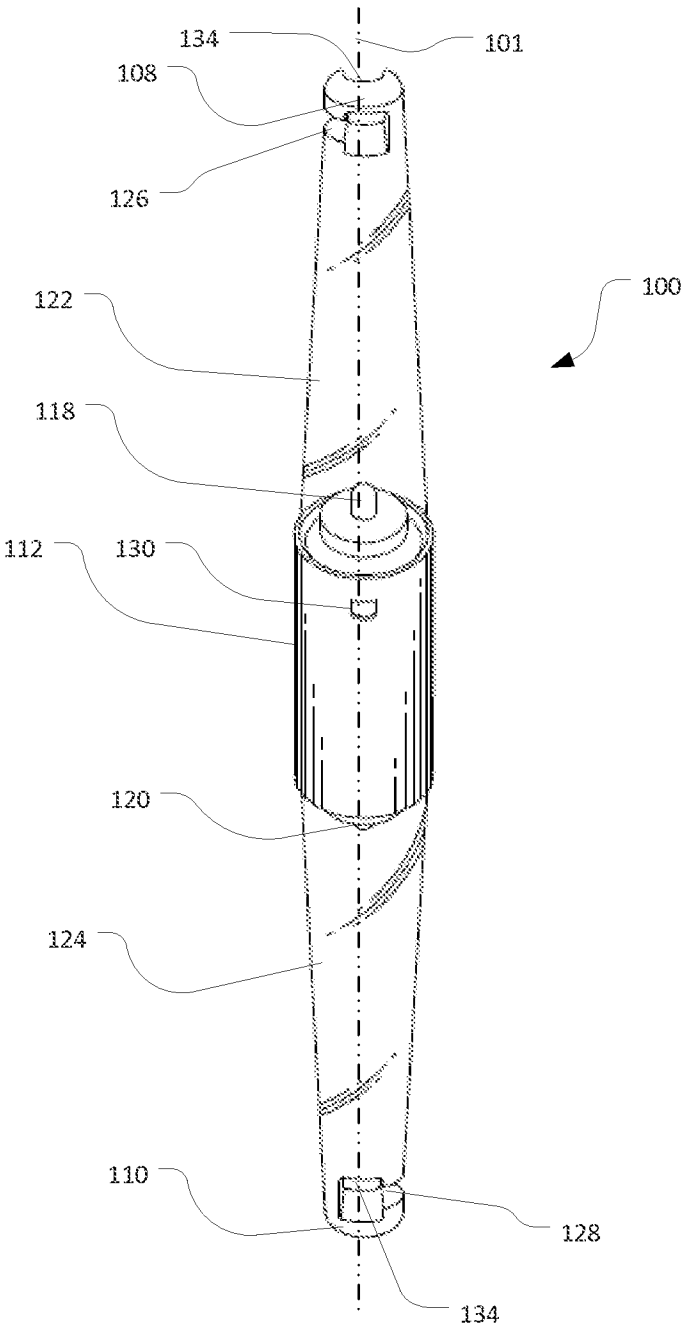


FIG. 3

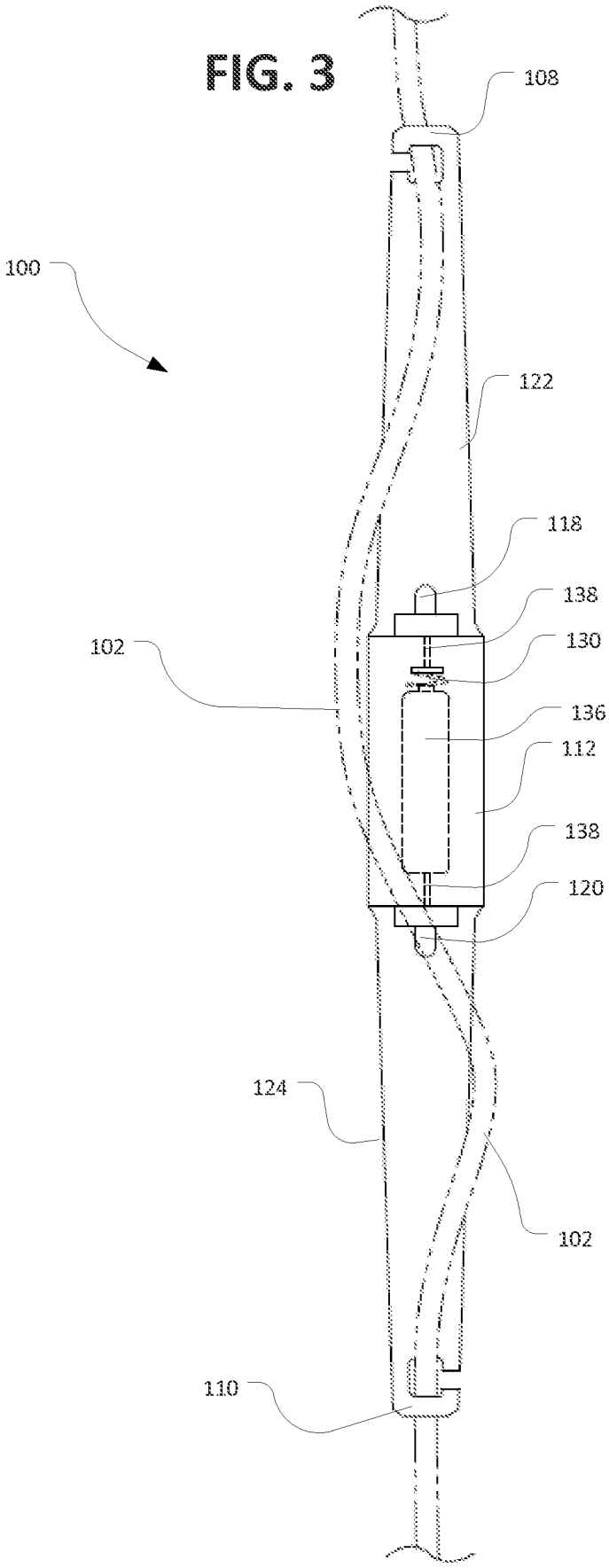


FIG. 4

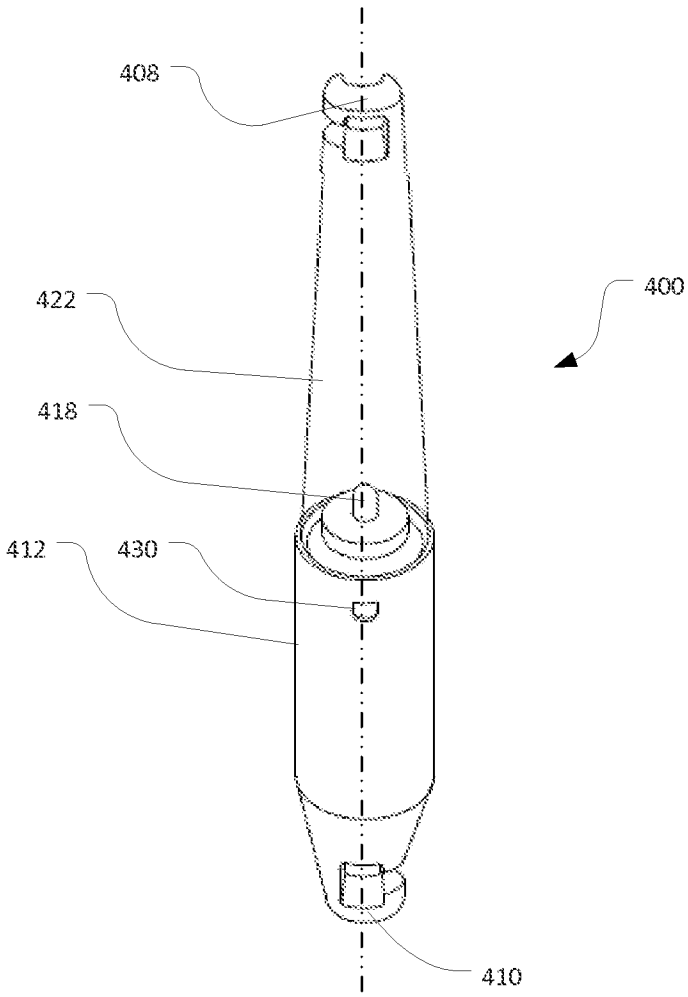
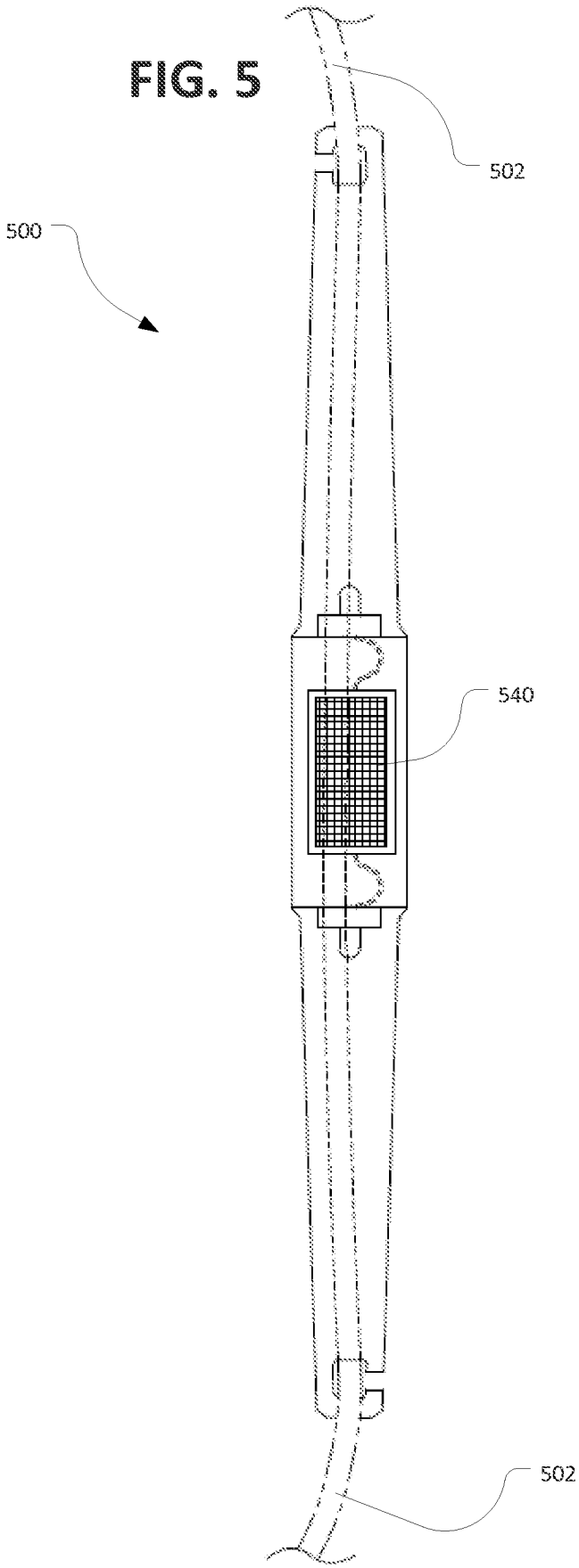


FIG. 5



INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2015/014917

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - F21V 21/34 (2015.01)
CPC - F21V 21/34 (2015.01)
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)
IPC(8) - F21S 17/00, F21V 19/00, F21V 21/00, F21V 21/34 (2015.01)
USPC -43/17, 362/23.01, 362/227, 362/235, 362/249.14, 362/257, 362/362, 362/382, 362/457, 362/551, 362/600

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
CPC - F21S 17/00, F21V 19/00, F21V 21/00, F21V 21/34 (2015.01) (keyword delimited)

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

Orbit, Google Patents, Google.
Search terms used: guy line, guyline, lighting, illuminator, light sticks, LED

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2013/0298845 A1 (BLANCHARD) 14 November 2013 (14.11.2013) entire document	1-7, 10-20
Y	US 2006/0109676 A1 (MAN LO) 25 May 2006 (25.05.2006) entire document	1-7, 10-20
Y	US 2014/0003026 A1 (FRIEDSON) 02 January 2014 (02.01.2014) entire document	2-7
Y	US 2011/0277370 A1 (MCMANIGAL) 17 November 2011 (17.11.2011) entire document	5, 19, 20
Y	US 7,550,934 B1 (DENG et al) 23 June 2009 (23.06.2009) entire document	12
Y	US 2012/0020060 A1 (MYER et al) 26 January 2012 (26.01.2012) entire document	14
Y	US 4,423,334 A (JACOBI et al) 27 December 1983 (27.12.1983) entire document	15
Y	US 2013/0308310 A1 (WILK) 21 November 2013 (21.11.2013) entire document	16

☐ Further documents are listed in the continuation of Box C. ☐

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
03 April 2015	14 MAY 2015
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	Authorized officer: Blaine R. Copenheaver PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/210 (second sheet) (July 2009)