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Martzall

(54) **SILHOUETTE ILLUMINATING SOLAR POWERED REGULATORY BUOY**

(76) Inventor: **Jeffrey Scott Martzall**, Fort Wayne, IN (US)

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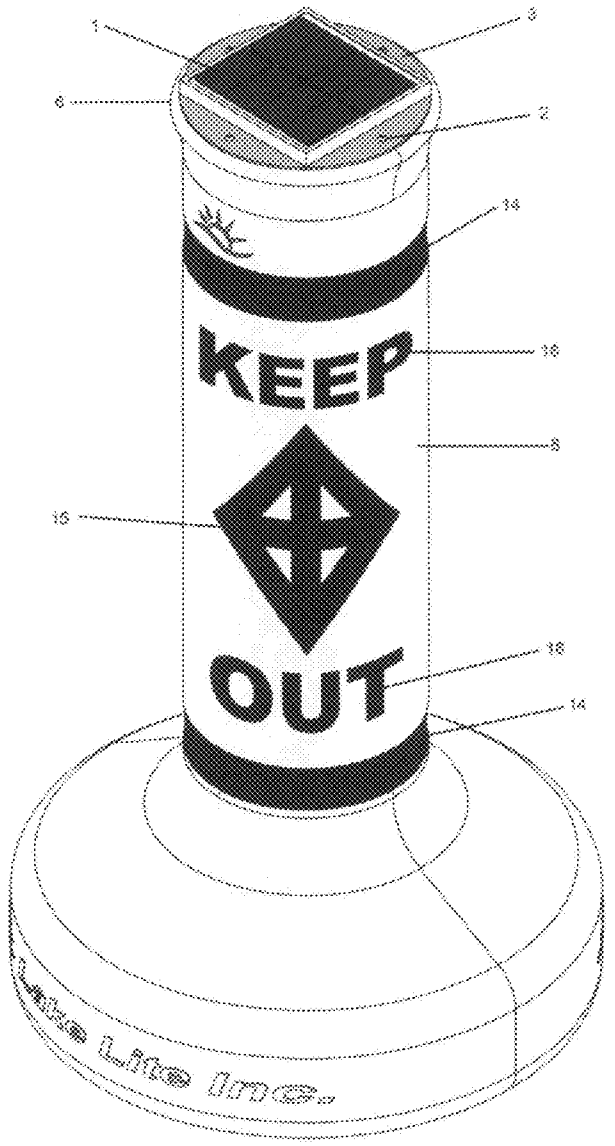
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(57) **ABSTRACT**

A silhouette illuminating solar powered buoy with a protected illumination source such as a solar lighting unit. The buoy body can be shaped, colored, and formed to various and or necessary buoy standards or regulations. The buoy body has an accessible opening to allow the solar lighting unit to be placed in a manor which allows it to internally illuminate the buoy body. Reflective sticker messages and symbols may be placed on the buoy to convey important information to boaters. When the illumination source is turned on at night, the stickers block the emitting light projected from the buoy body, and thus create a highly visible and legible silhouette image of the message and symbol content. The illuminating buoy and silhouette image of the message and symbol content makes the buoy easily visible at night from all angles and thus adds to the safety of person and watercraft operating at night.



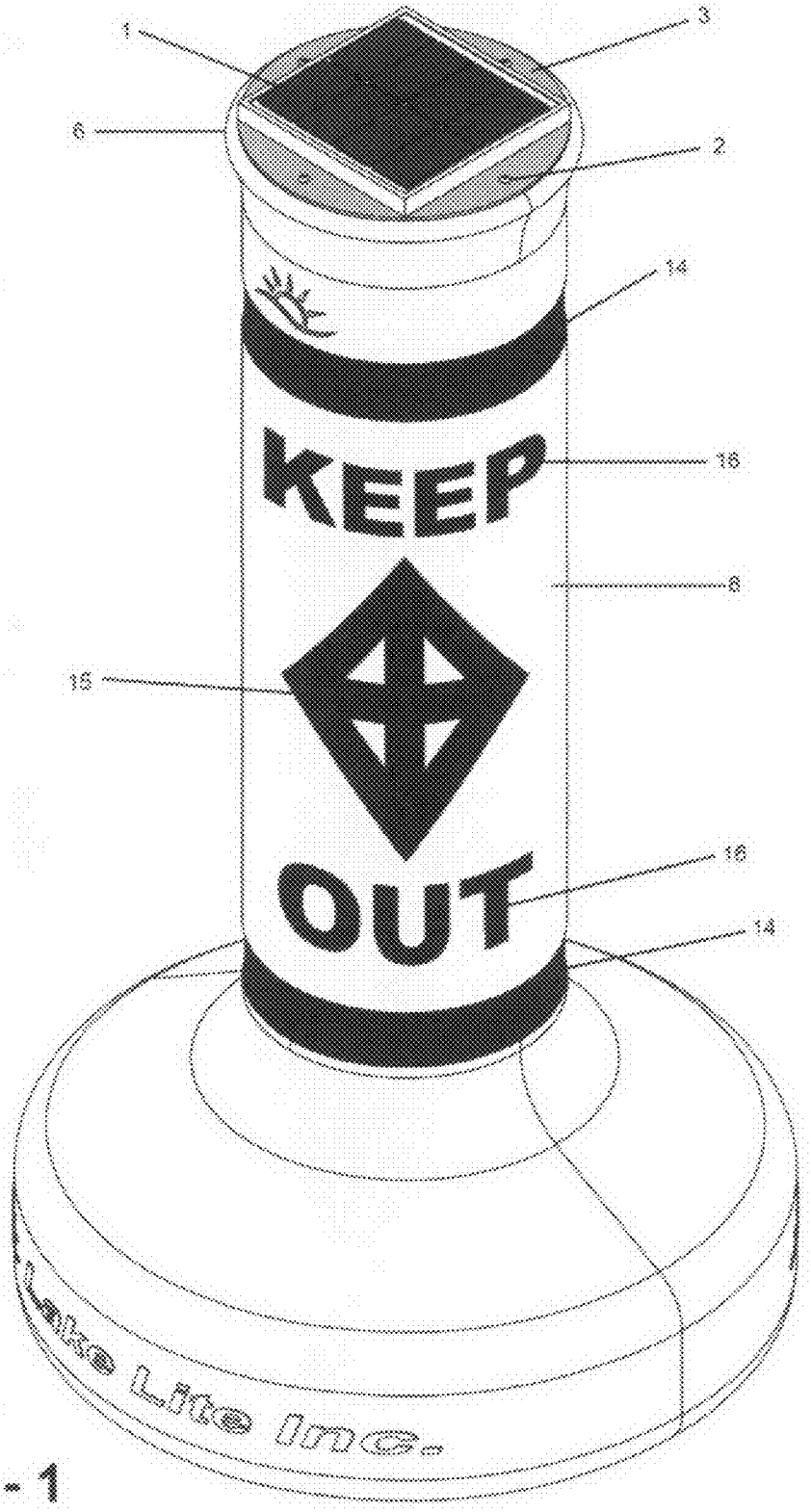


FIG - 1

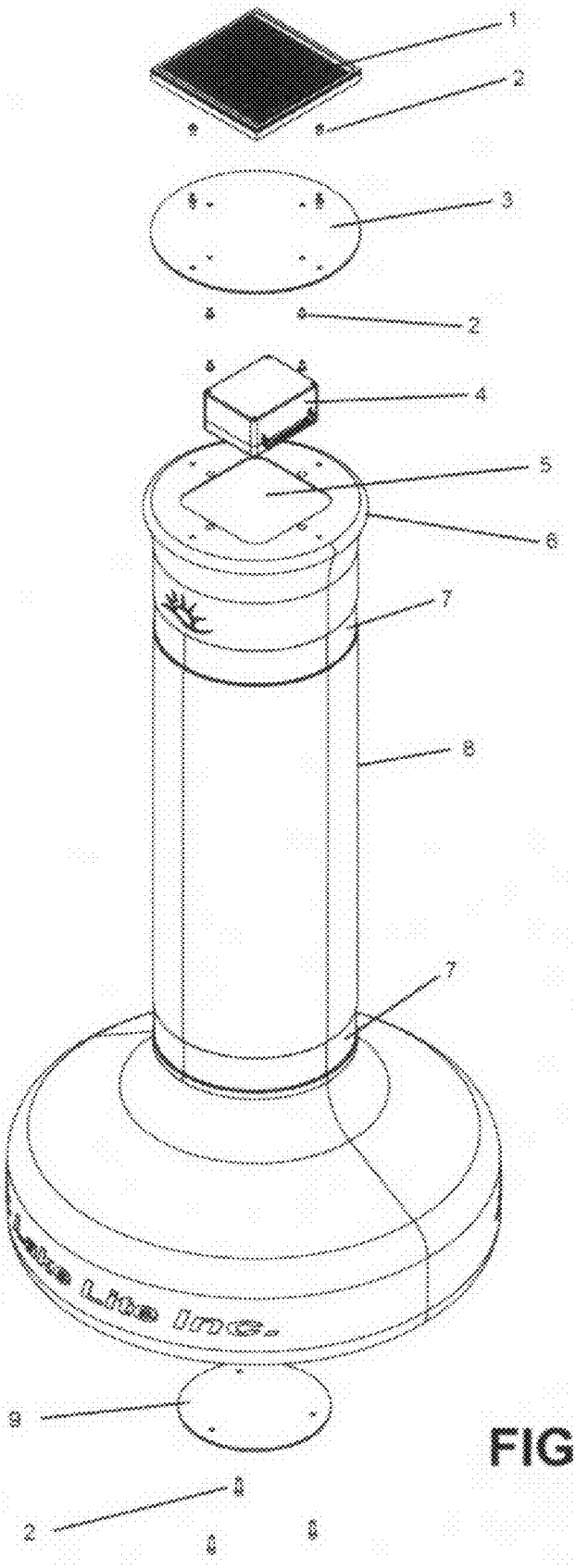


FIG - 2

FIG - 3

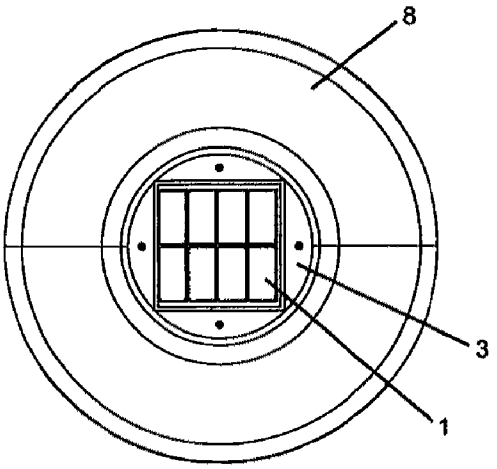
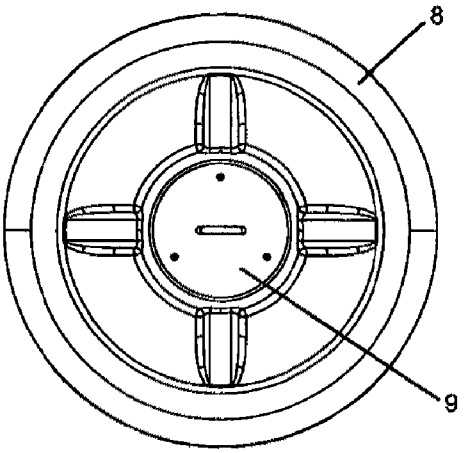


FIG - 4



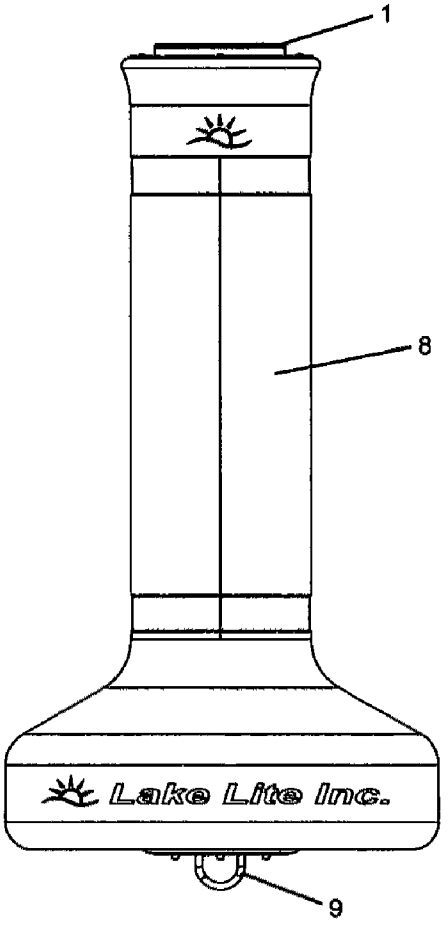


FIG - 5

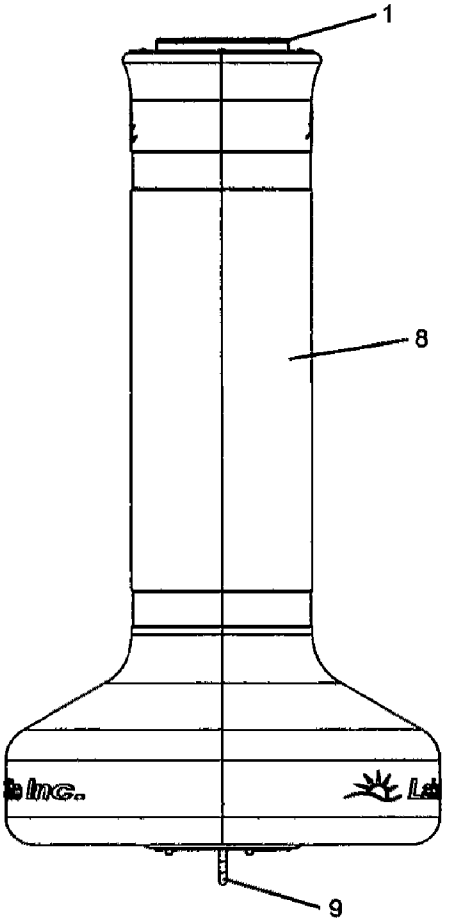


FIG - 6

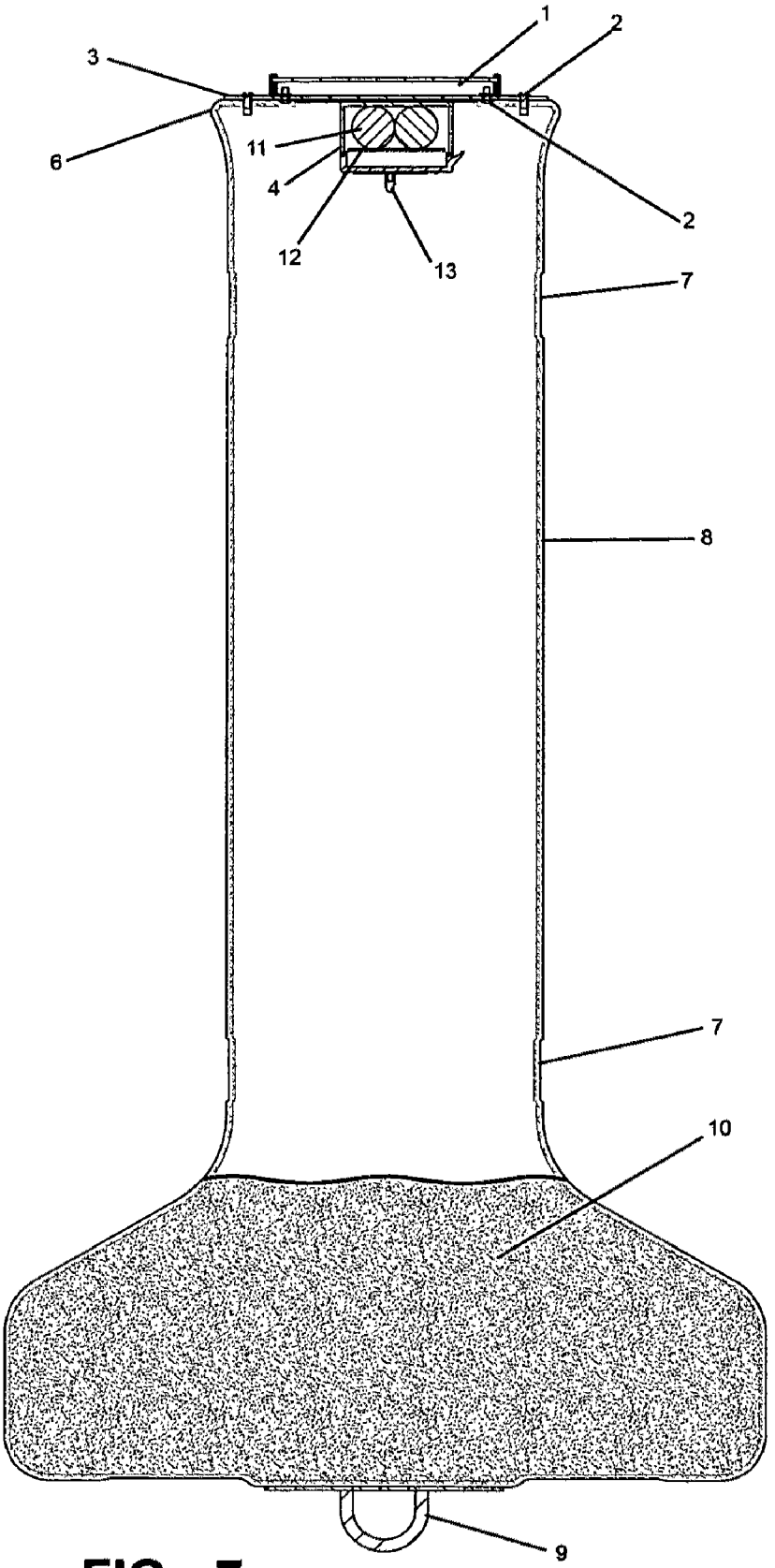


FIG - 7

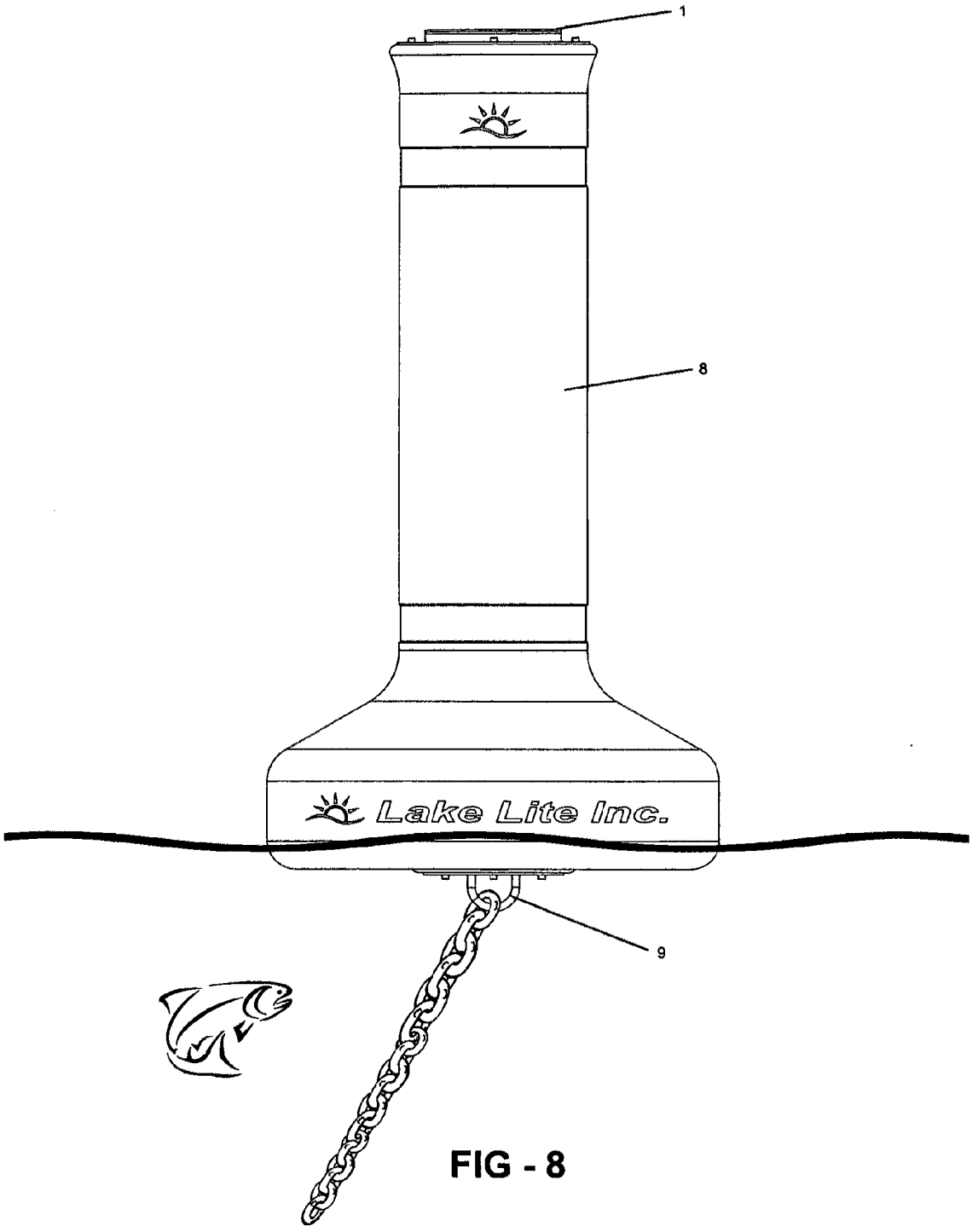


FIG - 8

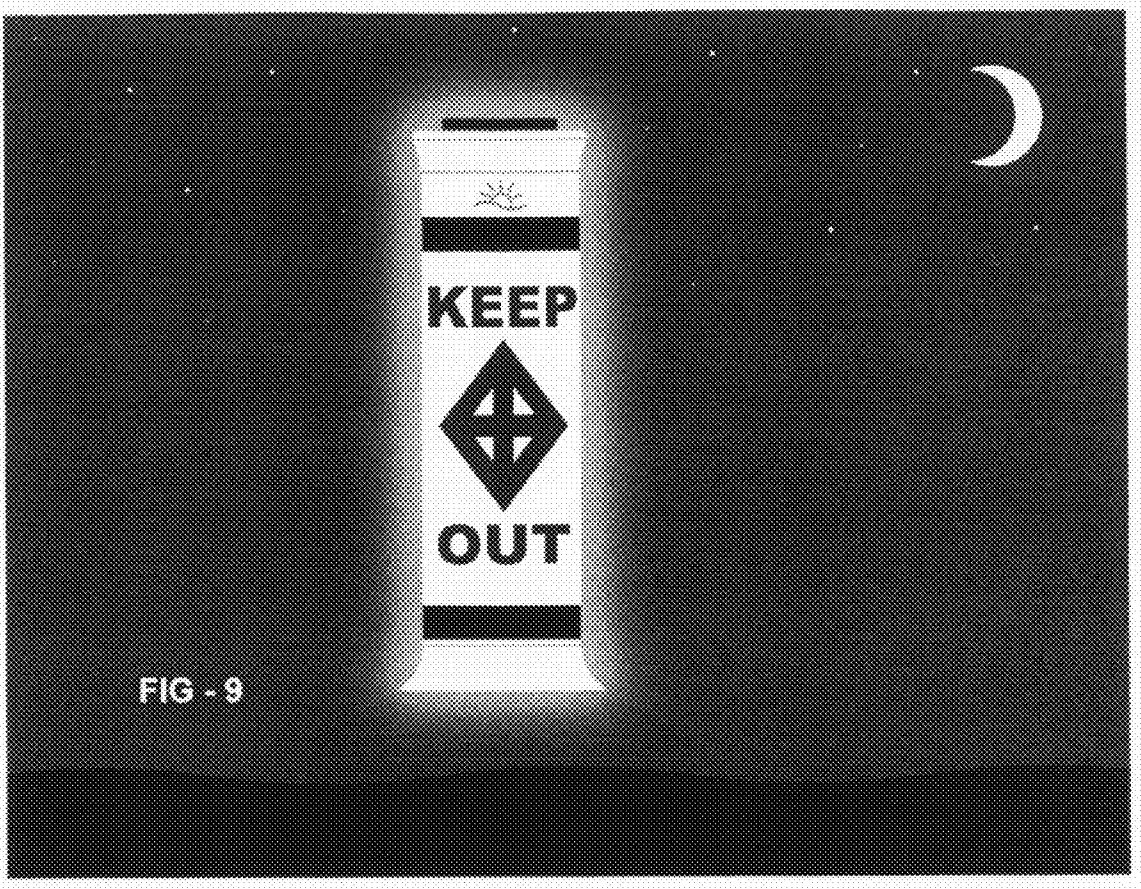


FIG - 9

SILHOUETTE ILLUMINATING SOLAR POWERED REGULATORY BUOY

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] Not Applicable

FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

[0002] Not Applicable

DESCRIPTION OF THE ATTACHED APPENDIX

[0003] Not Applicable

BACKGROUND OF THE INVENTION

[0004] 1. Field of Invention

[0005] This invention relates generally to the field of marine navigational and regulatory markers and more specifically to a regulatory buoy with the ability to illuminate and display the contents of its message at night. Regulatory and marker buoys are used to inform boaters of important information. Much like a road sign conveys important information on our highways; regulatory buoys provide important information to boaters on our waterways. Some common messages may read "Danger Shallow Rocks", "Slow No Wake", "Swim Area", or "Marina Entrance"; however, there are hundreds of messages that can be displayed. These messages are also accompanied by different symbols which provide detailed and important information to boaters. Buoys provide boaters information during daylight, however, at night buoys can be extremely difficult to see and safety hazards are not apparent. At night boaters often collide with buoys leading to extensive damage to both buoy and boat. Without proper illumination of buoys, boaters without headlight systems will not be able to read the important message displayed on the buoy and as a result, will not be informed of the important information they need to know in order to safely navigate the waterways.

[0006] 2. Prior Art

[0007] Thereafter, inventors created various methods for making buoys visible at night such as attaching reflective materials, or using storage type fluorescent materials, and furthermore, by adding various forms of lights to buoys.

[0008] Buoys that rely on reflective materials to be visible at night have several problems. Reflective materials are often separated from the buoy during boat collisions, water abrasion, element exposure, and wearing off over time. All of these factors reduce the reflective materials visibility. Reflective materials require an initial light source to shine toward the reflective material in order for the reflective material to reflect light back towards the viewer. This is problematic as many nighttime vessels do not use headlights. Buoys and boats move with wave action, which means the angle at which light is directed and reflected may not result in visibility at all times.

[0009] Lighting elements and or beacons are typically affixed to the tops of buoys and therefore are easily damaged or rendered less effective from bird droppings, debris, abrasion, and collision. Signaling lights or beacons are also added to the tops of buoys which blink in accordance with maritime flash codes, however, boaters not familiar with maritime flash codes may not understand the important message the buoy is intended to convey.

[0010] U.S. Pat. No. 4,501,564 to Cairone (1985) is an illuminating foam float that utilizes fluorescent or phosphorescent or luminescent pigments to emit light at night. Phosphorescent pigments are problematic for using on buoys as they are very dim and do not provide visibility at far distances or for prolonged periods of time. Phosphorescent pigments dim rapidly shortly after dark and do not provide the full lighting effect through the duration of the night. If there is an overcast or cloudy day the phosphorescent pigments will not absorb enough sunlight and will result in short illumination times. In addition portions of the buoy which are face down in the water will not absorb sunlight during the day and thus as the buoy rotates at night, it may expose an area that does not illuminate. In general, fluorescent materials at maximum have low luminance and short light emission times. For this reason, phosphorescent or luminescent materials are not typically bright enough or long lasting enough to provide effective means for lighting buoys.

[0011] U.S. Pat. No. 4,809,458 to Tanikuro & Nagamatsu (1989) is a self-luminous buoy that does not provide illumination to the lower half of the buoy and or hemisphere. Furthermore the general lighting direction is upward and it may be difficult for boaters at distances to view the buoy from the side.

[0012] U.S. Pat. No. 5,362,267 to Forrest (1994) is a solar powered buoy, however, is designed as a signaling buoy and emits a signaling light. Signaling light is generated by flashing the light source on and off at set intervals and patterns. This design incorporates a translucent lens body which makes the buoy more difficult to see as it will visually blend in with the water or background. Furthermore, this buoy only conveys light flashing or signaling messages. Persons or boaters not familiar with maritime flash codes would not understand the meaning of the buoys message.

OBJECTS AND ADVANTAGES

[0013] The primary objective of the invention is to provide a highly visible buoy which conveys a visible and legible message to boaters at both day and night.

[0014] Another object of the invention is to provide a lighted buoy that provides a silhouette or lighted view of the buoys message and symbol content so that it is easily readable by nighttime boaters.

[0015] Another object of the invention is to provide a lighted buoy that boaters can easily identify at night to prevent vessel-buoy collisions.

[0016] Another object of the invention is to provide a lighted buoy with reflective material in which the buoy can be visible at night under reflected light even if the light source is rendered off.

[0017] Another object of the invention is to provide a lighted buoy where attached messages and symbols placed on the buoy body create a silhouette or lighted view of the message and symbol content.

[0018] Another object of the invention is to provide an easily serviceable self contained solar lighting unit which provides illumination to the buoy.

[0019] Another object of the invention is to provide an easily serviceable self contained solar lighting unit which does not require removing the buoy from the water for service such as battery replacement.

[0020] Another object of the invention is to provide a self contained solar lighting unit which is recessed from the buoy body so that it is protected from abrasion and collision with watercraft.

[0021] Yet another object of the invention is to provide a buoy constructed of rotational molded Poly Ethylene material which is translucent enough for illuminating at night yet opaque enough to remain highly visible during the day.

[0022] Other objects and advantages of the present invention will become apparent from the following descriptions, taken in connection with the accompanying drawings, wherein, by way of illustration and example, an embodiment of the present invention is disclosed.

[0023] In accordance with a preferred embodiment of the invention, there is disclosed a solar powered lighted buoy that generates highly visible message and symbol content during the day and at night; A solar powered lighted buoy with specially designed reflective materials to create a silhouette or lighted view of the message and symbol content, A solar powered lighted buoy that is easily identifiable to prevent nighttime vessel-buoy collisions, A solar powered lighted buoy with separate yet integrated self contained solar lighting unit to provide illumination to the buoy; A easily serviceable solar powered lighted buoy which does not need to be removed from the water to service the self contained solar lighting unit; A buoy body which protects the separate self contained solar lighting unit from abrasion and collision; A separate yet integrated self contained solar lighting unit comprising; A solar panel to collect energy; A battery to store energy; A Light Emitting Diode to generate light; A circuit to designate how energy is collected and used.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024] The drawings constitute a part of this specification and include exemplary embodiments to the invention, which may be embodied in various forms. It is to be understood that in some instances various aspects of the invention may be shown exaggerated or enlarged to facilitate an understanding of the invention.

[0025] FIG. **1** A perspective view of the top of a silhouette illuminating solar powered buoy with visible solar panel, mounting plate, buoy body, reflective message, reflective bands, and reflective symbol.

[0026] FIG. **2** A exploded view of a silhouette illuminating solar powered buoy with visible solar panel, mounting plate, electronics compartment, buoy body, buoy body opening, extended lip, band indent, and mooring ring plate.

[0027] FIG. **3** Illustrates a top view of a silhouette illuminating solar powered buoy with visible solar panel, mounting plate, and buoy body.

[0028] FIG. **4** Illustrates a bottom view of a silhouette illuminating solar powered buoy with visible buoy body and mooring ring plate.

[0029] FIG. **5** Illustrates a side view of a silhouette illuminating solar powered buoy with visible solar panel, buoy body, and mooring ring plate

[0030] FIG. **6** Illustrates a side view of a silhouette illuminating solar powered buoy with visible solar panel, buoy body, and mooring ring plate

[0031] FIG. **7** Illustrates a sectional view of a Illustrates a side view of a silhouette illuminating solar powered buoy with visible flotation foam, electronics enclosure, battery pack, circuit board, and LED.

[0032] FIG. **8** Illustrates a side view of a silhouette illuminating solar powered buoy floating in water.

[0033] FIG. **9** Illustrates a side view of a silhouette illuminating solar powered buoy floating in water, illuminating at night, and creating a silhouette image of the buoys message and symbol.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0034] Detailed descriptions of the preferred embodiment are provided herein. It is to be understood, however, that the present invention may be embodied in various forms. Therefore, specific details disclosed herein are not to be interpreted as limiting, but rather as a basis for the claims and as a representative basis for teaching one skilled in the art to employ the present invention in virtually any appropriately detailed system, structure or manner.

This is the Detailed Description of the Unit

[0035] A silhouette illuminating solar powered buoy comprising of a durable rotationally molded buoy body capable of withstanding mooring forces and boat collisions. The silhouette illuminating solar powered buoy has a separate yet integrated solar powered lighting unit which illuminates the body of the buoy making it visible at night. Reflective sticker bands, symbols, and messages may be placed on the buoy body to create a highly visible silhouette image of those stickers when the buoy illuminates at night.

[0036] Referring to FIGS. **1** through **9**, a durable rotationally molded silhouette illuminating solar powered buoy body (**8**) formed with buoy body opening (**5**) which allows placing a solar powered lighting unit within buoy body (**8**). The buoy body (**8**) is formed with a smooth surface on band indents (**7**) for placing reflective bands (**14**). Buoy body (**8**) also has a smooth surface between band indents (**7**) for adhesion of reflective message (**16**) and reflective symbol (**15**). Buoy body (**8**) has a protective extending lip (**6**) which protects the solar panel (**1**) from possible collision damages. Buoy body (**8**) is also equipped with internal flotation foam (**10**) which prevents the silhouette illuminating solar powered buoy from fully sinking in the event of damage. Buoy body (**8**) is also equipped with a mooring ring plate (**9**) which allows for attaching ropes or lines to anchor the silhouette illuminating solar powered buoy in place.

[0037] The separate yet integrated solar powered lighting unit consist of, a solar panel (**1**) for collecting energy from the sun, a mounting plate (**3**) for attaching the solar panel (**1**) to buoy body (**8**) with fasteners (**2**), and a storage cell (**11**) for storing energy collected from the solar panel (**1**), a circuit board (**12**) to designate how power is stored from solar panel (**1**), and how power is released from storage cell (**11**) to a light emitting diode (**13**). The circuit board (**12**) also controls the function of turning the light emitting diode (**13**) on at sunset and off at sunrise. Circuit board (**12**) also controls the brightness of light emitting diode (**13**). Furthermore circuit board (**12**) protects storage cell (**11**) from being overcharged by solar panel (**1**). Circuit board (**12**) also protects the light emitting diode (**13**) from over discharging storage cell (**11**). Components such as storage cell (**11**), and circuit board (**12**) should be placed within a protective and weatherproof electronics compartment (**4**) to protect them from external elements. Electronics compartment (**4**) may be mounted to mounting plate (**3**) with fasteners (**2**).

[0038] While the invention has been described in connection with a preferred embodiment, it is not intended to limit the scope of the invention to the particular form set forth, but on the contrary, it is intended to cover such alternatives, modifications, and equivalents as may be included within the spirit and scope of the invention as defined by the appended claims.

What is claimed is:

1. a silhouette illuminating solar powered buoy comprising a body where an embodied illumination source can emit light within said body which illuminates through said body then further emitting and projecting said light outward from said body wherein various stickers may be placed on said body which block said emitting and projecting light to create an area of darkness where said stickers are placed.

2. a silhouette illuminating solar powered buoy as set forth in claim **1** wherein said body may be shaped, formed, or colored to comply with standards or necessary buoy requirements and or regulations.

3. a silhouette illuminating solar powered buoy as set forth in claim **1** wherein said stickers create a silhouette image on said body at night when said illumination source is on.

4. a silhouette illuminating solar powered buoy as set forth in claim **1** wherein said body is formed of opaque light translucent material.

5. a silhouette illuminating solar powered buoy as set forth in claim **1** wherein said illumination source and said solar panel are recessed from said body to protect them from collisions said body may encounter.

6. a silhouette illuminating solar powered buoy as set forth in claim **1** wherein said illumination source may illuminate different colors.

7. a silhouette illuminating solar powered buoy as set forth in claim **1** wherein said illumination source can be steady on or flash to convey maritime flash codes and or morris code.

8. a silhouette illuminating solar powered buoy as set forth in claim **1** wherein a solar lighting unit may exist within said body providing a method for said illumination source emitting and projecting said light.

9. a silhouette illuminating solar powered buoy as set forth in claim **1** wherein said illumination source is said solar lighting unit, comprising:

(a.) a solar panel

(b.) a storage cell

(c.) a circuit board

(d.) a light emitting diode

(e.) wherein said solar panel is electrically connected to said circuit board which is further electrically connected to said storage cell and said light emitting diode.

10. a silhouette illuminating solar powered buoy as set forth in claim **1** wherein said solar lighting unit is removable securable to said body and allows serviceability without removing said body from its environment.

* * * * *