US Patent & Trademark Office
Patent Public Search | Text View

United States Patent	12385611
Kind Code	B2
Date of Patent	August 12, 2025
Inventor(s)	Halliwell; Brian et al.

Multi-operational landscape lighting device

Abstract

A multi-operational landscape lighting device is provided. An example multi-operational landscape lighting device includes a lighting device housing, a lighting device installation arm mechanically coupled to the lighting device housing, and a plurality of landscape lighting LED packages. The landscape lighting LED packages are configured to emit one or more of decorative lighting or pathway lighting.

Inventors: **Halliwell; Brian (Chino Hills, CA), Cisneros; Gerardo (Buena Park, CA)**

Applicant: **FEIT ELECTRIC COMPANY, INC.** (Pico Rivera, CA)

Family ID: **1000008749679**

Assignee: **FEIT ELECTRIC COMPANY, INC. (Pico Rivera, CA)**

Appl. No.: **18/510908**

Filed: **November 16, 2023**

Prior Publication Data

Document Identifier	Publication Date
US 20240084986 A1	Mar. 14, 2024

Related U.S. Application Data

continuation parent-doc US 17969371 20221019 US 11852317 child-doc US 18510908
continuation parent-doc US 17332348 20210527 US 11519574 20221206 child-doc US 17969371
continuation parent-doc US 16863931 20200430 US 11047539 20210629 child-doc US 17332348

Publication Classification

Int. Cl.: **F21S9/03** (20060101); **F21V21/108** (20060101); **F21V23/00** (20150101); F21W121/00 (20060101); F21W131/109 (20060101); F21Y115/10 (20160101)

U.S. Cl.:

CPC **F21S9/037** (20130101); **F21V21/108** (20130101); **F21V23/005** (20130101); F21W2121/00 (20130101); F21W2131/109 (20130101); F21Y2115/10 (20160801)

Field of Classification Search

CPC: F21S (9/037); F21V (21/108); F21V (23/005); F21V (21/0824); F21V (23/04); F21W (2121/00); F21W (2131/109); F21Y (2115/10); Y02B (20/72)

References Cited

U.S. PATENT DOCUMENTS

Patent No.	Issued Date	Patentee Name	U.S. Cl.	CPC
7972030	12/2010	Li	N/A	N/A
8077052	12/2010	Richmond	N/A	N/A
9157591	12/2014	Rozot et al.	N/A	N/A
9458994	12/2015	Khubani et al.	N/A	N/A
9752754	12/2016	Trincia et al.	N/A	N/A
D818153	12/2017	Feit	N/A	N/A
10274188	12/2018	Sculler	N/A	N/A
10619810	12/2019	Hwang	N/A	F21S 9/037
10724690	12/2019	Feit	N/A	N/A
10941914	12/2020	Hollinger	N/A	F21S 9/037
11047539	12/2020	Halliwell et al.	N/A	N/A
11519574	12/2021	Halliwell et al.	N/A	N/A
11852317	12/2022	Halliwell	N/A	F21S 9/037
2005/0207152	12/2004	Maxik	N/A	N/A
2008/0017870	12/2007	Diamantidis	N/A	N/A
2013/0208454	12/2012	Chen	N/A	N/A
2014/0313765	12/2013	Nelson et al.	N/A	N/A
2019/0323686	12/2018	Hanson	N/A	H05B 45/20
2020/0149715	12/2019	Zeman	N/A	F21S 8/022
2020/0370721	12/2019	Scholl et al.	N/A	N/A
2023/0041958	12/2022	Halliwell et al.	N/A	N/A

FOREIGN PATENT DOCUMENTS

Patent No.	Application Date	Country	CPC
3013021	12/2018	CA	N/A
1843402	12/2006	EP	N/A

OTHER PUBLICATIONS

U.S. Appl. No. 16/863,931, filed Apr. 30, 2020, U.S. Pat. No. 11,047,539, Patented. cited by applicant

United States Patent and Trademark Office, Non-Final Office Action received for U.S. Appl. No. 16/863,931, dated Sep. 28, 2020, 9 pages, US. cited by applicant

Wikipedia Contributors, “Flexible Circuit”, Wikipedia: The Free Encyclopedia, last edited on Mar.

11, 2020, 3 pages, retrieved from https:llen.wikipedia.orglwikil Flexible_circuit on Aug. 7, 2020. cited by applicant
Wikipedia Contributors, “LED Filament”, Wikipedia: The Free Encyclopedia, last edited on Jul. 13, 2020, 4 pages, retrieved from https:llen.wikipedia.orglwikil LED_filament on Aug. 7, 2020. cited by applicant

---

Primary Examiner: Raleigh; Donald L

Attorney, Agent or Firm: Alston & Bird LLP

Background/Summary

CROSS-REFERENCE TO RELATED APPLICATIONS (1) The present application is a continuation of U.S. application Ser. No. 17/969,371, filed Oct. 19, 2022 (now U.S. Pat. No. 11,852,317), which is a continuation of U.S. application Ser. No. 17/332,348, filed May 27, 2021 (now U.S. Pat. No. 11,519,574), which is a continuation of U.S. application Ser. No. 16/863,931, filed Apr. 30, 2020 (now U.S. Pat. No. 11,047,539), the contents of which are incorporated herein by reference in their entireties.

BACKGROUND
(1) Light emitting devices may comprise light emitting diodes. Light emitting diodes (also referred to herein as LEDs) are semiconductor devices that emit light when an electric current is passed through them. The light is produced when particles that carry the electric current (i.e., electrons and holes) combine together with the semiconductor material of the semiconductor devices. LEDs are described as solid-state devices, which distinguishes them from other lighting technologies that use heated filaments or gas discharge as lighting sources (e.g., incandescent, tungsten halogen lamps; fluorescent lamps).
(2) LEDs are widely used in lighting applications for residential and commercial structures. LEDs utilizing solar power are likewise widely used in lighting applications for residential and commercial structures. One such application is solar landscape lighting.
(3) However, conventional solar landscape lights provide either a downlight effect for pathway lighting or an accent effect for decorative lighting. Deficiencies regarding but not limited to suitable materials, power supply, and control methods have imposed this limitation that conventional solar landscape lights can only provide either pathway lighting or decorative lighting, but not both. There is therefore a need for a solar landscape lighting device providing both pathway lighting and decorative lighting.
(4) Through applied effort, ingenuity, and innovation many deficiencies of such systems have been solved by developing solutions that are in accordance with the embodiments of the present invention, many examples of which are described in detail herein.
SUMMARY
(5) Providing a landscape lighting device having both a downlight effect and an accent effect is advantageous. Various embodiments are directed to an LED landscape lighting device. In embodiments, the landscape light device comprises a lighting device housing, the lighting device housing comprises a lighting device housing exterior, a lighting device bottom face, a lighting device top face, and a lighting device housing interior, wherein the lighting device housing interior comprises a void configured to house a plurality of landscape lighting LEDs therein. In embodiments, the landscape lighting device comprises a lighting device installation arm mechanically coupled to the lighting device housing. In embodiments of the landscape lighting device, a plurality of landscape lighting LED packages are disposed within the lighting device

interior and are configured to emit one or more of pathway lighting or decorative lighting.
(6) In embodiments, the lighting device installation arm further comprises means for making the device free standing, mounting to a wall, or for ground stake installation.
(7) In embodiments, the lighting device housing comprises one or more of glass, acrylic, polycarbonate, an optically transparent material, or other material conducive to the transmission of light and solar energy.
(8) In embodiments, the landscape lighting device is selectively operable in one of a plurality of landscape lighting device operation modes.
(9) In embodiments, a landscape lighting device operation mode is one or more of pathway lighting or decorative lighting.
(10) In embodiments, the lighting device housing comprises a lighting device housing frame and lighting device housing panes.
(11) In embodiments, the lighting device bottom face defines a void configured to house a rechargeable battery therein.
(12) The landscape lighting device of certain embodiments further comprises a rechargeable battery.
(13) In embodiments, a first plurality of landscape lighting LED packages of the plurality of landscape lighting LED packages comprise landscape pathway lighting LEDs and a second plurality of landscape lighting LED packages of the plurality of landscape lighting LED packages comprise landscape decorative lighting LEDs.
(14) In embodiments, a first plurality of landscape lighting LED packages of the plurality of landscape lighting LED packages are configured to emit pathway lighting and a second plurality of landscape lighting LED packages of the plurality of landscape lighting LED packages are configured to emit decorative lighting.
(15) The rechargeable battery of certain embodiments is configured to receive, store and utilize solar power.
(16) In embodiments, the landscape lighting device further comprises a circuit board comprising a first circuit board side and a second circuit board side. In embodiments, the plurality of landscape lighting LEDs is disposed on and/or are electrically and mechanically coupled with the first circuit board side. In embodiments, a plurality of leads/traces are disposed on and/or electrically and mechanically coupled with one or more of the first circuit board side or the second circuit board side and electrically coupled with the plurality of landscape lighting LEDs. In embodiments, driver circuitry is disposed on and/or electrically and mechanically coupled with one or more of the first circuit board side or the second circuit board side. The driver circuitry of embodiments is electrically coupled with the plurality of leads/traces of the circuit board.
(17) In embodiments, the driver circuitry is configured to be driven by solar power.
(18) The landscape lighting device of certain embodiments is further configured for collecting and storing solar power.
(19) In embodiments, collecting and storing solar power occurs within the lighting device housing.
(20) The landscape lighting device of certain embodiments is further configured for collecting and storing solar power at the lighting device bottom face.
(21) In embodiments, the landscape light device comprises a lighting device housing. The lighting device housing of certain embodiments comprises a lighting device housing exterior, a lighting device bottom face, a lighting device top face, the lighting device top face comprising one or more solar panels, and a lighting device housing interior. The lighting device housing interior of certain embodiments comprises a void configured to house a first plurality of landscape lighting LED packages and a second plurality of landscape lighting LED packages therein. In embodiments, the landscape lighting device comprises a lighting device installation arm mechanically coupled to the lighting device housing. In embodiments of the landscape lighting device, a first plurality of landscape lighting LED packages and a second plurality of landscape lighting LED packages are

disposed within the lighting device interior and are configured to emit light.
(22) The landscape lighting device of certain embodiments is selectively operable in one of a plurality of landscape lighting device operating modes.
(23) The lighting device bottom face of certain embodiments defines a void configured to house a rechargeable battery therein.
(24) The landscape lighting device of certain embodiments further comprises a rechargeable battery.
(25) The rechargeable battery of certain embodiments is configured to receive, store and utilize solar power.
(26) The lighting device housing interior of certain embodiments is further configured for collecting and storing solar power.
(27) In embodiments, the first plurality of landscape lighting LED packages comprise landscape pathway lighting LEDs and the second plurality of landscape lighting LED packages comprise landscape decorative lighting LEDs.
(28) This Summary does not attempt to completely signify any particular innovation, embodiment, or example as it can be used in commerce. Additionally, this Summary is not intended to signify essential elements of an innovation, embodiment or example or to limit the scope of the subject matter of this disclosure.
(29) The innovations, embodiments, and/or examples found within this disclosure are not all-inclusive, but rather describe the basic significance of the subject matter. Accordingly, one use of this Summary is as a prelude to a Detailed Description presented later.

Description

BRIEF DESCRIPTION OF THE DRAWINGS
(1) The following Detailed Description, Figures, and appended Claims signify the nature and advantages of the innovations, embodiments and/or examples of the claimed inventions. All the Figures signify innovations, embodiments, and/or examples of the claimed inventions for purposes of illustration only and do not limit the scope of the claimed inventions. Such Figures are not necessarily drawn to scale and are part of the Disclosure.
(2) In the Figures, similar components or features may have the same, or similar, reference signs in the form of labels (such as alphanumeric symbols, e.g., reference numerals), and may signify similar or equivalent functionality. Further, various components of the same type may be distinguished by a second or third label that distinguishes among the similar components (e.g., **1**A and **1**B may refer to components of the same type). If only the first reference label is used in the specification, the description is applicable to any one of the similar components having the same first reference label irrespective of the second reference label. A brief description of the Figures is below.
(3) FIG. **1** is an exploded view of an exemplary landscape lighting device according to various embodiments;
(4) FIG. **2**A is an exploded view of an exemplary landscape lighting device according to various embodiments;
(5) FIG. **2**B is an exploded view of an exemplary landscape lighting device according to various embodiments;
(6) FIG. **3**A is a perspective view of an exemplary landscape lighting device according to various embodiments; and
(7) FIG. **3**B is an exploded view of an exemplary landscape lighting device according to various embodiments.
DETAILED DESCRIPTION

(8) The present disclosure more fully describes various embodiments with reference to the accompanying drawings. It should be understood that some, but not all embodiments are shown and described herein. Indeed, the embodiments may take many different forms, and accordingly this disclosure should not be construed as limited to the embodiments set forth herein. Rather, these embodiments are provided so that this disclosure will satisfy applicable legal requirements. Like numbers refer to like elements throughout.

(9) Embodiments of the present disclosure provide a landscape lighting device configured for dynamic functionality. That is, a landscape lighting device according to embodiments of the present disclosure is configured to provide both pathway lighting and decorative lighting. An example landscape lighting device according to embodiments of the present disclosure may be selectively operable to provide either pathway lighting or decorative lighting at any one time, in any particular operation session. An example landscape lighting device according to embodiments of the present disclosure may be configured for user selection of a plurality of dynamic LED functionalities.

(10) Landscape lighting devices according to embodiments of the present disclosure employ a novel solar panel configuration. Embodiments of a landscape lighting device as described herein are therefore enabled to collect, store and utilize solar power to achieve both pathway lighting and decorative lighting.

(11) Conventional solar landscape lights lack suitable configuration of the solar panel(s) to achieve the user functionality choices including both pathway lighting and decorative lighting as well as dynamic LED functionality. Conventional solar landscape lights configure solar panels at the top of the light fixtures. Consequently, conventional solar landscape lights would further require the use of a rechargeable battery, an accompanying compartment to house the rechargeable battery, and a control method to achieve both pathway lighting and decorative lighting. Such a configuration is not feasible in conventional designs, because a rechargeable battery would need to be housed at the top of the light fixture, thereby inhibiting light emission. Conventional solar landscape lights therefore suffer deficiencies regarding power supply, power consumption, and methods to control the same.

(12) Landscape lighting devices according embodiments of the present disclosure overcome these deficiencies of conventional solar landscape lights by employing a novel configuration of a solar panel. In various embodiments of landscape lighting devices herein, a landscape lighting device may be configured such that solar energy is collected at the lighting device housing bottom face, within the lighting device housing interior. Landscape lighting devices of various embodiments may therefore employ a rechargeable battery(s) in electrical communication with the solar panels, enabling the configuration of a switch for selecting both pathway lighting and decorative lighting. The lighting device housing of various embodiments comprises material conducive for the collection and storage of solar power within the lighting device housing interior. For example, landscape lighting devices according to embodiments of the present disclosure may employ clear glass to allow sunlight into and through the lighting device housing interior to the bottom of the fixture. Absent the novel configuration of the solar panels as described herein, the use of a rechargeable battery is not possible. Hence, sufficient power to provide both pathway lighting and decorative lighting would not be possible.

(13) Alternate embodiments of landscape lighting devices described herein may nonetheless be configured to collect and store solar power at the lighting device housing top face, while providing user functionality choices including either or both pathway lighting and decorative lighting as well as dynamic LED functionality. Landscape lighting devices according to alternate embodiments described herein thus employ solar panels both at the top of the lighting fixture and within its interior, as described above. Landscape lighting devices according to these alternate embodiments therefore overcome the deficiencies of conventional solar landscape lights that require that the solar panel(s) remain at the top of the fixture.

(14) FIG. **1** is an exploded view of an exemplary landscape lighting device **100** according to

various embodiments of the present disclosure. In an exemplary embodiment, a landscape lighting device **100** comprises a lighting device housing having a lighting device housing exterior, a lighting device housing interior (not shown), a lighting device housing bottom face **108**, and a lighting device housing top face **110**. The lighting device housing may comprise a single component, or as shown in FIG. **1**, the lighting device housing may comprise a lighting device housing frame **102**A′ and lighting device housing panes **102**A′. The lighting device housing frame **102**A′ may define a substantially prismatic body profile, having two sets of opposing and conjoined lateral faces as shown. The lighting device housing frame **102**A′ may be formed such that each lateral face defines an ornate recess configured for housing the lighting device housing panes **102**A′ therein. The lighting device housing frame **102**A′ may comprise any suitable material (e.g., metal, plastic, wood, etc.). The lighting device housing panes **102**A′ may be interchangeable. For example, the lighting device housing panes **102**A′ may comprise one or more of glass, acrylic, polycarbonate, an optically transparent material, or other material conducive to the transmission of light and solar energy.

(15) Alternatively, the lighting device housing panes **102**A′ may comprise a suitably translucent material such as frosted glass. As shown, the lighting device housing frame **102**A′ and lighting device housing panes **102**A′ may in combination define a profile that is substantially the outer surface a right square prism, being oriented along a longitudinal axis taken through the center of its square cross-section. The lighting device housing interior may thus define the void enclosed by the six faces of the right square prism. Alternatively, the lighting device housing may define a profile of any regular or irregular geometric shape suitable to configure an interior and exterior therefrom (e.g., cylinder, sphere, pentagon, etc.). The lighting device housing interior of embodiments is configured to house a plurality of landscape lighting LEDs **104**A, **104**B therein.

(16) A lighting device bottom face may comprise a first bottom face portion **108**A, which is substantially square shaped and defines a square shaped central recess configured to receive a planar portion therein. The first bottom face portion **108**A may define a recessed ledge about its perimeter so as to be mechanically coupled to the lighting device housing **102**. That is, the lighting device housing may sit atop the first bottom face portion **108**A so as to engage the recessed ledge of the first bottom face portion **108**A.

(17) A lighting device bottom face may comprise a second bottom face portion **108**B that is substantially square in cross section and has a raised planar portion on a dorsal surface. The raised planar portion may be configured to receive a solar panel **302** and to couple to the square shaped central recess of the first bottom face portion **108**A. A ventral surface of the second bottom face portion **108**B may define a square shaped recess configured to house a rechargeable battery therein. By thus configuring the square shaped recess of the second bottom face portion **108**B as a rechargeable battery compartment, a lighting device mode switch **108**C may be configured within the lighting device bottom face. The second bottom face portion **108**B may comprise voids (e.g., bores) configured to receive four fastening means **108**F (e.g., screw caps) at each of the four corners of a ventral surface.

(18) A lighting device mode switch **108**C may be substantially square in cross section and have a toggle switch extending radially from the center of a ventral surface. A toggle switch cover **108**D may be configured in a suitable shape to encase the toggle switch of the lighting device mode switch **108**C, and to enhance the user interface of the toggle switch. The lighting device mode switch **108**C may be configured to couple with the second bottom face portion **108**B. The lighting device mode switch **108**C may be configured in electrical communication with the landscape lighting LEDs **104**A, **104**B, so as to initiate and change the operating mode of a landscape lighting device **100** according to embodiments of the present disclosure. Hence, by manipulation of the toggle switch of the lighting device mode switch **108**C, a user may turn on/off a landscape lighting device **100**, and initiate one or more of pathway lighting, decorative lighting or dynamic LED functionality. For example, a user may toggle the toggle switch of the landscape lighting device a

first time in a first manner to turn on a landscape lighting device **100** from an off mode. A user may then toggle the toggle switch again in the first manner to initiate a first landscape lighting device operation mode. For example, a first landscape lighting device operation mode may be pathway lighting. A second landscape lighting device operation mode (e.g., decorative lighting or dynamic LED functionality) may be initiated by subsequent toggles of the toggle switch in the first manner. When a landscape lighting device is operated in a dynamic LED functionality mode, a user may toggle the toggle switch in a second manner to select between dynamic LED functionalities. For example, a first toggle of the toggle switch in a second manner may initiate a multi-color lighting effect. A second toggle of the toggle switch in a second predetermined manner may then initiate a solid white lighting effect. Subsequent toggling of the toggle switch in the second manner may thus cycle through dynamic LED functionalities. A final toggle of the toggle switch in the first manner may then return the landscape lighting device **100** to an off mode.

(19) A lighting device bottom face may comprise a third bottom face portion **108**E. The third bottom face portion **108**E may be substantially square in cross section and have a toggle switch receptor that is a substantially rectangular void configured to receive the toggle switch of the lighting device mode switch **108**C and the accompanying toggle switch cover **108**D at the center of a ventral face. The third bottom face portion **108**E may define four circular voids arranged in an equilateral perimeter about the toggle switch receptor that are configured to receive four landscape pathway lighting LEDs **104**A. The third bottom face portion **108**E may define four voids at its periphery that are configured to receive fastening means **108**F so as to couple the third bottom face portion **108**E to the second bottom face portion **108**B. Thus configured, the second bottom face portion **108**B and third bottom face portion **108**E may simultaneously encase the lighting device mode switch **108**C, the toggle switch cover **108**D, and landscape pathway lighting LEDs **104**A and couple, via fastening means **108**F, to the landscape decorative lighting LEDs **104**B.

(20) A lighting device housing top face may comprise a first top face component **110**A and a second top face component **110**B that are mechanically coupled to one another. The first top face component **110**A may be substantially square in cross section with recessed ledges configured to engage the second top face component contouring its perimeter and may define on a ventral surface a central void (e.g., a bore) configured to receive fastening means **110**C (e.g., a bolt) for coupling to the second top face component **110**B. The fastening means **110**C may receive an endcap (e.g., a screwcap) **110**C′ at a proximate end for securing the first top face component **110**A to the second top face component **110**B. The fastening means **110**C may receive, for example, a washer **110**C′ and nut **110**C″ at a distal end for securing the first top face component **110**A to the second top face component **110**B. The first top face component **110**A may define on a ventral surface peripheral voids configured to receive the distal ends **104**B′ of the landscape decorative lighting LEDs **104**B. Washers **110**D may be configured to secure the distal ends **104**B′ of the landscape decorative lighting LEDs **104**B to the first top face component **110**A.

(21) The second top face component **110**B may define a substantially pyramidal profile, having a substantially square cross section. The second top face component **110**B may define an inner void configured to house lighting device components therein, and have recesses configured to engage the recessed ledges of the first top face component **110**A contouring an inner surface. The second top face component **110**B may define a central void configured to receive the fastening means **110**C in order to couple a lighting device installation loop **112**A and installation loop washer **112**B to the second top face component **110**B. The lighting device installation loop **112**A may comprise a substantially ring-shaped body configured to couple to the hook portion of the lighting device installation arm by inserting the hook portion of the lighting device installation arm through the ring of the lighting device installation loop **112**A. A battery **116** may be housed within the inner void of the second top face component **110**B. The battery **116** may be, for example, a dry cell such as Alkaline, Nickel oxyhydroxide, Zinc chloride or the like. Alternatively, the battery **116** may be a rechargeable battery such as NiCd, NiMH, Lead Acid, Li-ion, Li-ion polymer, Aluminum-ion,

Magnesium-ion, or the like. The battery **116** may be of any suitable size, e.g., 4.5V, D, C, AA, AAA, AAAA, 9-volt, etc. The battery **116** may comprise, as illustrated in FIG. **1** for example, a cylindrical cell body, and be electrically couplable with a positive terminal **114**C, and a negative terminal **114**D. The cylindrical cell body of the battery **116** may define a longitudinal axis terminating in a first circular plane surface at a posterior end along the longitudinal axis and a second circular plane surface at an anterior end along the longitudinal axis. The positive terminal **114**C may thus be disposed at or on the circular plane surface of the posterior end, and the negative terminal disposed at or on the circular plane surface of the anterior end. The positive terminal **114**C and negative terminal **114**D couplable with the battery **116** may be in electrical communication with the first and second plurality of landscape lighting LED packages to provide electrical power thereto. The battery **116** may be secured within the void of the second top face component **110**B by securing means. For example, a rectangular brace **114**A may straddle the battery **116** laterally. The rectangular brace **114**A may define a void (e.g., a bore) at a first end that is configured to receive a securing means **114**B (e.g., a screw). Thus, configured the rectangular brace **114**A and securing means **114**B may secure battery **116** in place.

(22) In embodiments, the landscape lighting device **100** comprises a lighting device installation arm **106**. The lighting device installation arm **106** of various embodiments is mechanically coupled to the lighting device housing **102**. In various embodiments, the lighting device installation arm **106** is configured for coupling the lighting device installation arm **106** to an environment. For example, as shown in FIG. **1**, the lighting device installation arm **106** may be substantially crook shaped and may comprise constituent installation arm elements. A lighting device installation arm **106** may comprise a first installation arm portion **106**A. The first installation arm portion **106**A may be substantially shaped as the crown of a shepherd's crook and define an inner void at a distal end configured to longitudinally receive a fastener **106**B (e.g., a threaded bolt) therein.

(23) A lighting device installation arm **106** may comprise a second installation arm portion **106**C. The second installation arm portion **106**C may be cylindrical in profile, defining inner voids at proximal and distal ends configured to longitudinally receive fasteners **106**B therein. Thus, the first installation arm portion **106**A may be mechanically coupled, via the fasteners **106**B, to the second installation arm portion **106**C.

(24) A lighting device installation arm **106** may comprise a third installation arm portion **106**D that is mechanically coupled to the second installation arm portion **106**C. The third installation arm portion **106**D may comprise a cylindrical portion having screw threads configured radially on a portion of its outer surface, and a hook-shaped projection extending radially from the unthreaded cylindrical portion. The unthreaded cylindrical portion of the third installation arm portion **106**D may define an inner void such that the third installation arm portion **106**D may be mechanically coupled, by a fastener **106**B and via the inner void, to the second installation arm portion **106**C.

(25) A lighting device installation arm may comprise a fourth installation arm portion **106**E. The fourth installation arm portion **106**E may define a profile that is substantially arrow shaped, and have a cylindrical portion defining an inner void configured at a cranial end. The cylindrical portion of the fourth installation arm portion **106**E may be configured to couple with the threaded outer surface of the cylindrical portion of the third installation arm portion **106**D. Thus configured, a lighting device installation arm may act as a ground stake to couple a landscape lighting device **100** to an environment. However, the lighting device installation arm **106** may be any other suitable installation means for coupling a landscape lighting device **100** with an environment, including but not limited to tree mounts, flag pole mounts, wall mounts or the like.

(26) In certain embodiments, the landscape lighting device **100** comprises a plurality of landscape lighting LEDs **104**A, **104**B disposed within the lighting device housing interior. Landscape pathway lighting LEDs **104**A may be any suitable LED type configured for pathway lighting including fixed downlights, gimble downlights, can lights, pot lights or the like. Landscape decorative lighting LEDs **104**B may be any suitable LED type configured to provide a decorative

aesthetic, including pendants, string lights, fairy lights or the like. For example, as shown in FIG. **1**, landscape decorative lighting LEDs **104**B may be pendant lights. The landscape decorative lighting LEDs **104**B may therefore be substantially rectangular-prismatic in shape and be configured at proximal and distal ends to mechanically couple **104**B′ to the lighting device housing bottom face and lighting device housing top face. For example, as shown, the landscape decorative lighting LEDs **104**B may be configured with radially threaded proximal and distal ends so as to mechanically couple **104**B′ to the lighting device housing bottom face and lighting device housing top face. Landscape decorative lighting LEDs **104**B may be configured in electrical communication with driver circuitry so as to mimic a variety of effects (e.g., a single color lighting effect, a multi-color lighting effect, a solid white lighting effect, a solid single color lighting effect, a solid multi-color lighting effect, a flame lighting effect, a flashing lighting effect, a twinkling lighting effect, a shimmering lighting effect, a chasing lighting effect, a sequencing lighting effect, or a color cycling lighting effect). For example, landscape decorative lighting LEDs **104**B may configure an oscillator having a regular frequency to achieve a twinkling lighting effect. Or, for example, landscape decorative lighting LEDs **104**B may be driven so that individual LEDs are turned on and off in a predetermined and repeating sequence thus creating a sequencing lighting effect. Thus, landscape decorative lighting LEDs **104**B are configured for use in a plurality of dynamic functionalities.

(27) FIGS. **2**A-**2**B are exploded views of an exemplary landscape lighting device **100** according to various embodiments of the present disclosure. As shown in FIG. **2**A, an exemplary landscape lighting device **100** may further comprise a circuit board **202**. The circuit board **202** of various embodiments comprises a first circuit board side **202**A and a second circuit board side (not shown). The plurality of landscape lighting LEDs **104**A, **104**B of various embodiments are disposed on and/or electrically and mechanically coupled with the first circuit board side **202**A. The exemplary landscape lighting device **100** of various embodiments comprises a plurality of leads/traces **204** disposed on and/or electrically and mechanically coupled with one or more of the first circuit board side **202**A or the second circuit board side (not shown) and electrically coupled with the plurality of landscape lighting LEDs **104**A, **104**B. As shown, the circuit board **202** of various embodiments may be disposed within the lighting device housing interior **102**B. However, the circuit board **202** need not necessarily be in the geometric relationship to the landscape lighting LEDs **104**A, **104**B that is shown. Rather, the circuit board **202** may be configured in any feasible manner within the landscape lighting device **100** as is conducive for electrical communication between the circuit board **202** and landscape lighting LEDs **104**A, **104**B.

(28) The exemplary landscape lighting device **100** of various embodiments comprises driver circuitry **206** disposed on and/or electrically and mechanically coupled with one or more of the first circuit board side **202**A or the second circuit board side. The driver circuitry **206** of various embodiments may be electrically coupled with the plurality of leads/traces **204** of the circuit board **202**. The driver circuitry **206** of an exemplary landscape lighting device **100** may be any suitable driver circuitry **206**, including but not limited to, linear LED driver circuitry, linear regulator, specialized linear LED controller, switch mode LED driver circuitry and/or the like.

(29) Driver circuitry **206** is configured to enable dynamic functionality (e.g., a single color lighting effect, a multi-color lighting effect, a solid white lighting effect, a solid single color lighting effect, a solid multi-color lighting effect, a flame lighting effect, a flashing lighting effect, a twinkling lighting effect, a shimmering lighting effect, a chasing lighting effect, a sequencing lighting effect, or a color cycling lighting effect). An appropriate driver circuitry **206** may be, for example, a 16-channel LED driver. Such an example driver circuitry **206** may be configured such that each channel is individually adjustable. For example, an example driver circuitry **206** may be configured with DOT correction and grayscale PWM control.

(30) As shown in FIG. **2**B, an exemplary landscape lighting device **100** may further comprise a solar panel **302** for collecting and storing solar power. Specifically, an exemplary landscape lighting device **100** is configured so that collecting and storing solar power occurs within the

lighting device housing interior **102**B. Thus, the solar panel(s) **302** of various embodiments may be disposed within the lighting device housing interior **102**B. The solar panel(s) **302** may be configured in any feasible manner within the lighting device housing interior **102**B as is conducive for electrical communication between the circuit board **202**, solar panel(s) **302** and landscape lighting LEDs **104**A, **104**B.

(31) The lighting device housing panes **102**A′ of various embodiments comprise glass, acrylic, polycarbonate, an optically transparent material, or other material conducive to the transmission of light and solar energy. This further facilitates collecting and storing of solar power occurring within the lighting device housing interior **102**B. Collecting and storing of solar power within the lighting device housing interior **102**B allows sufficient solar power to be stored for operating in simultaneous landscape lighting device operation modes.

(32) The lighting device installation arm **106** of certain embodiments may comprise a single component, as shown in FIGS. **2**A-**2**B. Alternatively, the lighting device installation arm **106** may comprise constituent lighting device installation arm components.

(33) FIG. **3**A is a perspective view of an exemplary landscape lighting device **200** according to various embodiments of the present disclosure. FIG. **3**B is an exploded view of an exemplary landscape lighting device **200** according to various embodiments. A landscape lighting device **200** may be configured such that collecting and storing solar power occurs either within the lighting device housing interior **102**B, or at the second top face component **110**B. For example, as shown in FIG. **3**A, one or more solar panels **302**A of various embodiments may define one or more exterior surfaces of the second top face component **110**B. The one or more solar panels **302**A defining one or more exterior surfaces of the second top face component **110**B may thus accommodate users who require the solar panels to remain on the top of the fixture (or when the landscape lighting device comprises frosted or otherwise opaque glass surfaces such that sunlight may not efficiently reach the bottom of the device). Alternatively, one or more solar panels **302**B may be housed within the lighting device housing interior **102**B, as shown in FIG. **3**B. In embodiments, the one or more solar panels **302**B may be positioned near the bottom of the device when the device comprises clear or transparent glass surfaces such that sunlight may efficiently reach the solar panel at the bottom of the device.

(34) It will be appreciated that, in some embodiments, solar panel **302**A is configured at a top of the device while solar panel **302**B is configured near a bottom of the device as described herein.

(35) The one or more solar panels **302**A, **302**B may be in electrical communication with a rechargeable battery (not shown, however an example may be seen in FIG. **1**). Such a configuration of the one or more solar panels **302**A, **302**B of an exemplary landscape lighting device **200** may therefore simultaneously provide sufficient power to operate both pathway lighting and decorative lighting while allowing an end user flexibility in form factor. For example, when storing and collecting solar power occur at the second top face component **110**B, the lighting device housing panes **102**A′ of a landscape lighting device **200** may comprise translucent or less than transparent material, such as frosted glass. Thus configured, an exemplary landscape lighting device **200** may provide an LED flame effect. The lighting device housing frame **102**A′ of various embodiments may comprise a suitable material (e.g., metal, plastic, wood, etc.) formed so as to define one or more ornate recesses configured for housing the lighting device housing panes **102**A′ therein. Alternatively, when storing and collecting solar power occur within the lighting device housing interior **102**B, a user may circumvent the need to maintain the solar panels at the top of the fixture. In this case, the lighting device housing panes **102**A′ of a landscape lighting device **200** may comprise suitably transparent material such as glass, acrylic, polycarbonate or the like. The use of such optically transparent material is therefore conducive to ensure sufficient solar power is stored and harnessed to enable both pathway lighting and decorative lighting.

(36) The landscape decorative lighting LEDs **104**B of various embodiments may comprise string lights as shown, or any other suitable LED type configured to provide a decorative flame aesthetic,

including pendants, fairy lights or the like. Landscape decorative lighting LEDs **104**B of a landscape lighting device **200** are configured for dynamic LED functionality. For example, landscape decorative lighting LEDs **104**B may be configured to enable dynamic selection between a solid white lighting effect and a flame lighting effect. Thus, when enabled as a flame lighting effect, landscape decorative lighting LEDs **104**B may be driven in a rising and falling pattern thereby imitating a flame aesthetic. Such a flame lighting effect may be employed to provide an appropriate ambiance. When enabled to produce a solid white lighting effect, landscape decorative lighting LEDs **104**B may glow with a soft white color temperature. Landscape pathway lighting LEDs **104**A may be any suitable LED type configured for pathway lighting including fixed downlights, gimble downlights, can lights, pot lights or the like.

(37) The lighting device installation arm **106** of various embodiments may comprise a single component, as shown in FIG. **3**B, or may comprise constituent lighting device installation arm components. Further, the lighting device installation arm **106** of various embodiments may comprise means for making the device free standing, mounting to a wall, or for ground stake installation.

(38) Many modifications and other embodiments will come to mind to one skilled in the art to which this disclosure pertains having the benefit of the teachings presented in the foregoing descriptions and the associated drawings. Therefore, it is to be understood that the disclosure is not to be limited to the specific embodiments disclosed and that modifications and other embodiments are intended to be included within the scope of the appended claims. Although specific terms are employed herein, they are used in a generic and descriptive sense only and not for purposes of limitation.

Claims

1. A lighting device, comprising: a plurality of LED packages; a lighting device housing bottom; a housing that defines a closed interior and sits atop the lighting device housing bottom, the plurality of LED packages being disposed within the housing, at least one solar panel in electrical communication with the plurality of LED packages and disposed within the housing, wherein the at least one solar panel is received by the lighting device housing bottom; and a lighting device mode switch in electrical communication with the plurality of LED packages and actuatable for selective activation of two or more distinct lighting operation modes of the lighting device.

2. The lighting device of claim 1, wherein: the lighting device comprises a lighting device housing top, the at least one solar panel comprises at least a first solar panel and a second solar panel, the first solar panel is received by the lighting device housing bottom, and the second solar panel defines one or more exterior surfaces of the lighting device housing top.

3. The lighting device of claim 1, further comprising a rechargeable battery in electrical communication with the at least one solar panel.

4. The lighting device of claim 1, wherein a first plurality of LED packages of the plurality of LED packages comprise landscape lighting pathway LEDs.

5. The lighting device of claim 4, wherein a second plurality of LED packages of the plurality of LED packages comprise landscape lighting decorative LEDs.

6. The lighting device of claim 5, wherein the first plurality of LED packages is configured to emit pathway lighting simultaneously with the second plurality of LED packages emitting decorative lighting.

7. The lighting device of claim 1, wherein: a first plurality of LED packages of the plurality of LED packages comprise landscape lighting pathway LEDs, a second plurality of LED packages of the plurality of LED packages comprise landscape lighting decorative LEDs, and the two or more distinct lighting operation modes of the lighting device comprises: a first landscape lighting device operation mode that initiates operation of the landscape lighting pathway LEDs; and a second

landscape lighting device operation mode that initiates operation of the landscape lighting decorative LEDs.

8. The lighting device of claim 7, wherein the landscape lighting pathway LEDs are configured as fixed downlights, gimble downlights, can lights, or pot lights.

9. The lighting device of claim 7, wherein the landscape lighting decorative LEDs are configured as pendants, string lights, or fairy lights.

10. The lighting device of claim 7, further comprising driver circuitry electrically coupled with the plurality of LED packages, wherein the driver circuitry is configured to cause the landscape lighting decorative LEDs to achieve a twinkling lighting effect or a sequencing lighting effect.

11. The lighting device of claim 1, wherein: the housing comprises lighting device housing panes that comprise a material conducive to transmission of light and solar energy, and the material conductive to the transmission of light and solar energy is positioned to allow the light and solar energy to be transmitted to the at least one solar panel that is received by the lighting device housing bottom.

12. The lighting device of claim 1, further comprising driver circuitry electrically coupled with the plurality of LED packages, wherein the driver circuitry is in electrical communication with the at least one solar panel, and wherein the driver circuitry is configured for one or more of collecting solar power, storing solar power, or to be driven by solar power.

13. The lighting device of claim 1, wherein the plurality of LED packages are configured for one or more of a single color lighting effect, a multi-color lighting effect, a solid white lighting effect, a solid single color lighting effect, a solid multi-color lighting effect, a flame lighting effect, a flashing lighting effect, a twinkling lighting effect, a shimmering lighting effect, a chasing lighting effect, a sequencing lighting effect, or a color cycling lighting effect.

14. A method of manufacturing a lighting device, the method comprising: electrically coupling at least one solar panel with a plurality of LED packages; electrically coupling a lighting device mode switch with the plurality of LED packages; disposing the lighting device mode switch within a housing of the lighting device, wherein the housing comprises lighting device housing panes; disposing the at least one solar panel within the housing of the lighting device; and receiving, by the at least one solar panel, light that is transmitted through the lighting device housing panes of the housing, wherein the lighting device mode switch is actuatable for selective activation of a set of distinct lighting operation modes of the lighting device.

15. The method of claim 14, wherein a first plurality of LED packages of the plurality of LED packages is configured to emit pathway lighting and a second plurality of LED packages of the plurality of LED packages is configured to emit decorative lighting.

16. The method of claim 15, wherein the first plurality of LED packages is configured to emit the pathway lighting simultaneously with the second plurality of LED packages emitting the decorative lighting.

17. The method of claim 14, further comprising: electrically coupling the plurality of LED packages with driver circuitry configured for one or more of collecting solar power, storing solar power, or to be driven by solar power.

18. A lighting device, comprising: a plurality of LED packages; a lighting device housing bottom; a housing that defines a closed interior and sits atop the lighting device housing bottom, the plurality of LED packages being disposed within the housing; and at least one solar panel in electrical communication with the plurality of LED packages and disposed within the housing, wherein the at least one solar panel is received by the lighting device housing bottom.

19. The lighting device of claim 18, wherein: the lighting device comprises a lighting device housing top, the at least one solar panel comprises at least a first solar panel and a second solar panel, the first solar panel is received by the lighting device housing bottom, and the second solar panel defines one or more exterior surfaces of the lighting device housing top.

20. The lighting device of claim 19, further comprising a rechargeable battery that is positioned

within the housing, wherein the rechargeable battery is in electrical communication with the plurality of LED packages, the first solar panel, and the second solar panel.