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(54) **MODULAR PHOTOVOLTAIC LIGHT AND POWER CUBE**

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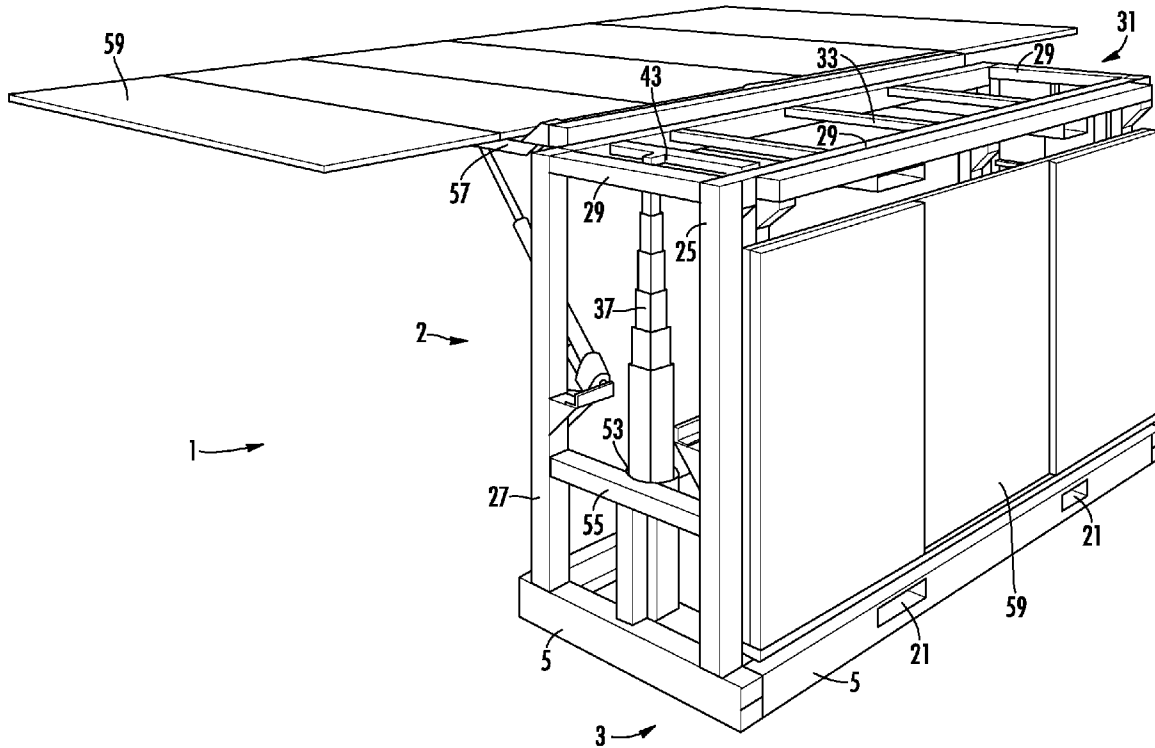
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(57) **ABSTRACT**

Submitted is a modular stationary portable photovoltaic solar powered electrical generation, storage and supply device and light tower. The device consists of an elongated cube or rectangular prism shaped support structure with a flat base, flat sides and a flat decked top to form a protective crate shaped module when the various components, such as the solar panel arrays, telescoping mast, and light assembly or outriggers of the device are retracted to where the boundaries may be defined by the perimeters of the cube or prism. This modular design can allow for the modules to be stored, loaded, or shipped quickly, efficiently, and in greater quantities on flatbeds, in shipping containers, in warehouses, and other settings and modes where they can not only be packed end to end and side to side with no unused space, but can also be stacked up to three modules high for significantly higher storage density. The interconnectivity of multiple modules to create incrementally larger power generation, storage and distribution systems provides an easily adaptable solution to larger temporary power demands.



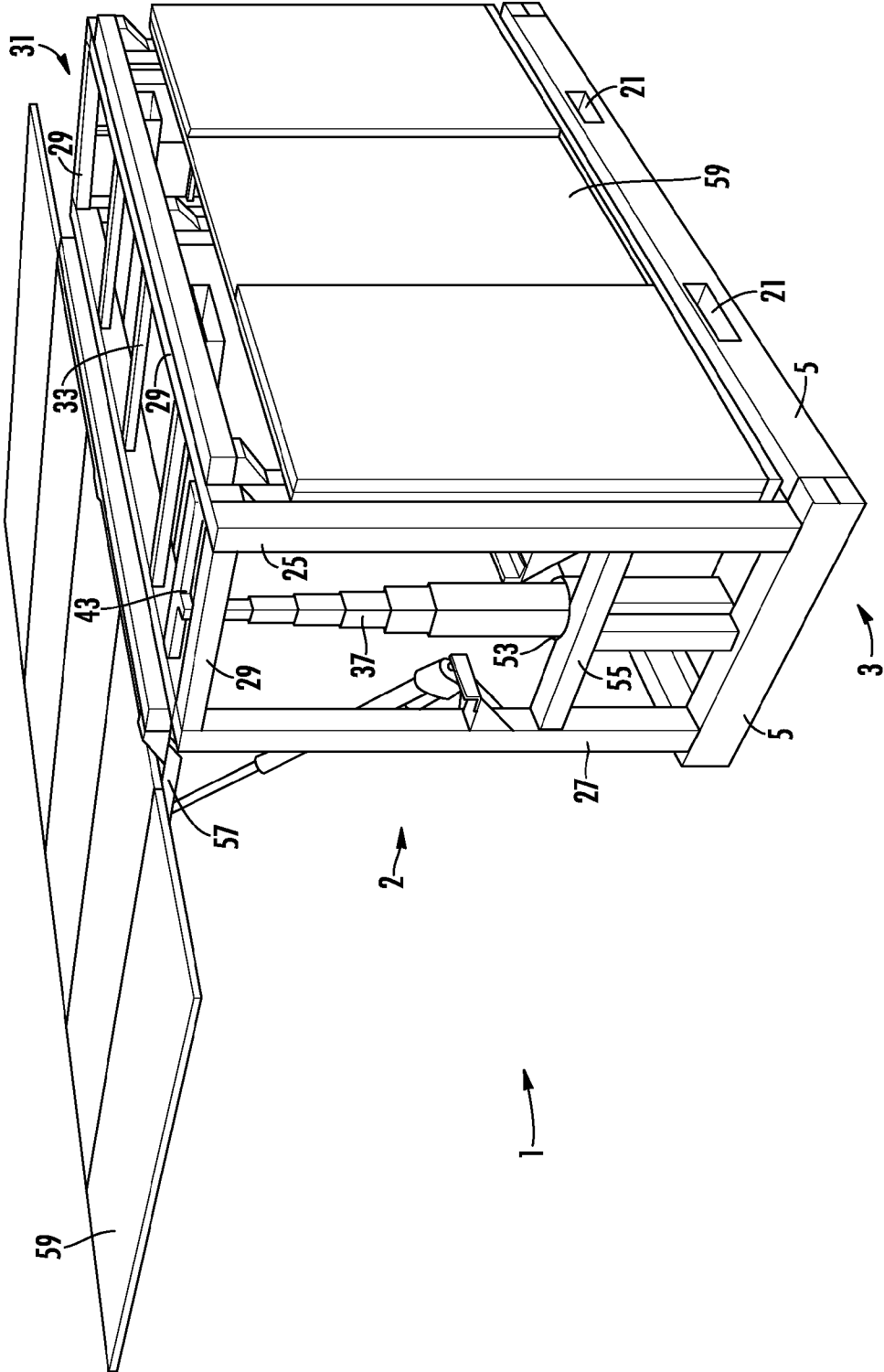


FIG. 2

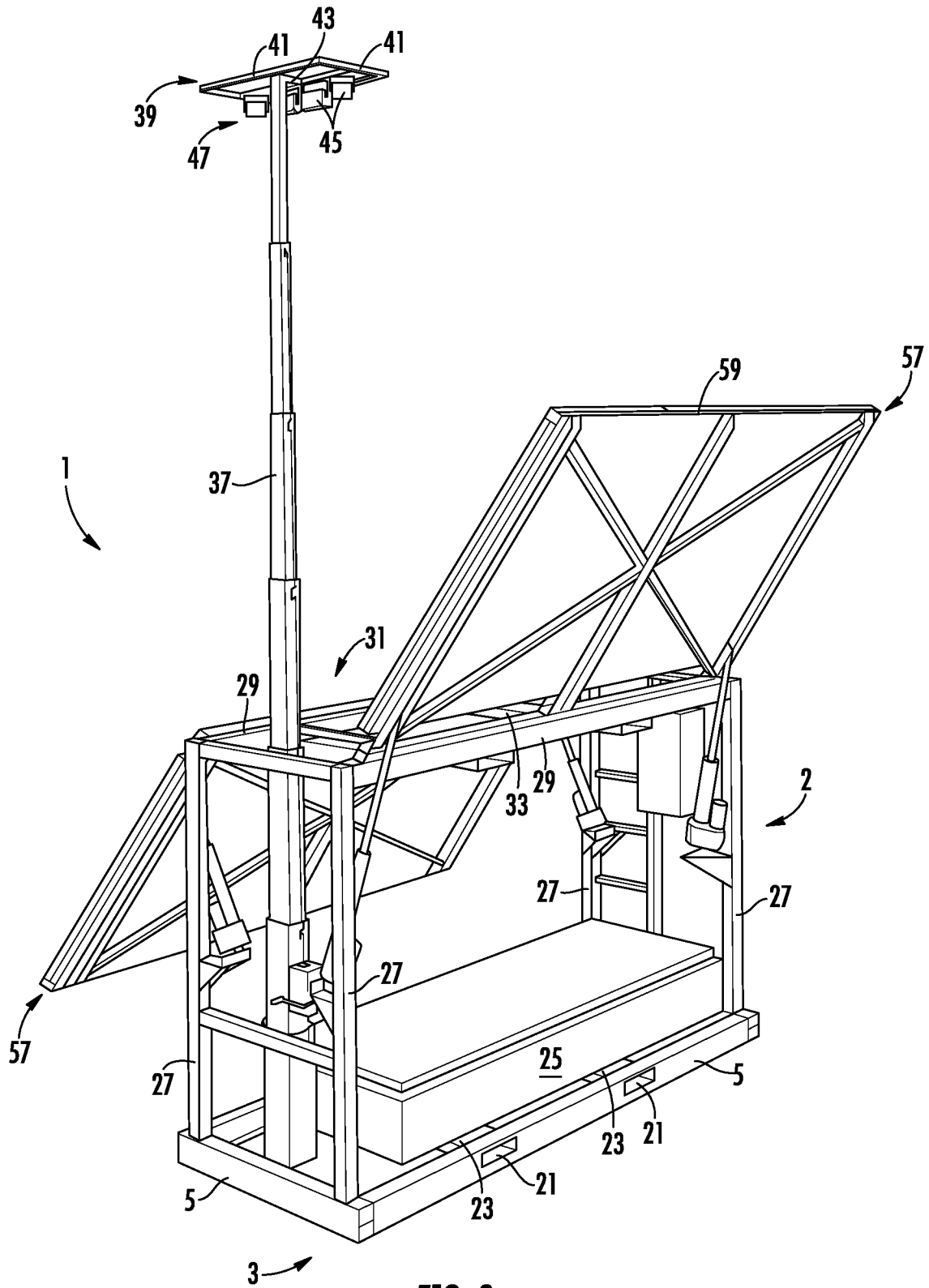


FIG. 3

MODULAR PHOTOVOLTAIC LIGHT AND POWER CUBE

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of priority to U.S. Provisional Patent Application No. 62/254,997 filed Nov. 13, 2015, the disclosure of which is incorporated herein by reference in its entirety.

BACKGROUND

[0002] Many operations in a variety of settings function during the dark hours of the day where activities could not proceed without adequate light. Construction, military operations, facilities management and maintenance operations, parties and special events, athletic events, emergency response, and industrial operations are a few examples. Fixed and mobile light sources are two options that can help to illuminate the setting. Fixed lighting is often characterized by streetlights, area lighting in the form of flood lights, or other permanent structures that are connected to an electric utility and operate off of traditionally delivered electric power. Mobile solutions include trailer mounted gas or diesel powered lights, as well as trailer mounted lights powered with alternative energy.

[0003] Infrastructure limitations to fixed lighting require that each site to be lit be hardwired to the utility in order to function, a requirement which may mandate continual use of the same site to justify the time and expense of such an installation. This often does not meet the needs of the activity. Mobile lighting in various forms may be moved to accommodate the location and timing of the activity, and may be temporary in nature; however, can be expensive and loud to run, as well as can impose environmental ramifications as a result of emissions from the system. Mobile options, while easy to transport individually, do not allow for efficient use of limited deck space on a tractor trailer or cargo space in a shipping container or other cargo transport in order to ship maximum multiple units at one time.

[0004] The incorporation of a trailer base into a mobile light tower adds wheels and fenders to the mobile light tower, an addition that may introduce adverse effects while having no positive impact on performance capabilities. The use of wheels makes the unit more unstable during transport, thus requiring a more secure and labor intensive restraint system. The addition of wheels and fenders as well as the requisite tow bar and hitch on the front of the mobile units that define the present art add width and length to the light tower. The stowed mast and light assembly projecting from the back of the current mobile units add more length and further impede packing and shipping, and therefore impose significant limitations on the quantity of light towers that can be shipped, also significantly increasing the time and difficulty required to load mobile light towers. The additional design challenges created by an exposed light assembly and solar panels to an already inefficient footprint produce an even more cumbersome and fragile package. Also, using rubber tires as a foundation of a mobile light tower increases the maintenance regimen and wear and tear on the unit. It also introduces the vulnerability of having a worn or damaged tire render the unit inoperable.

associated wiring. They require a unique DOT administered VIN and, therefore, a title. Many states require a light tower to be registered and assigned a state license plate, which is renewed annually.

[0006] Mobile lighting units powered by renewable energy sources offer power only to the on board light fixtures, denying users the ability to power other devices such as phones, computers, small electrical tools, or other electrically powered devices directly from the unit.

SUMMARY OF THE INVENTION

[0007] There remains a need in the market for a compact modular unit powered by renewable energy that is portable but stationary, robust in design so as to withstand rigorous use and transport, able to be tightly packed and stacked to meet shipping and storage needs, compact so as to fit more units in a single transport carrier, and with area and directional lighting capability as well as AC and DC power delivery capability for use powering other electrical devices external from the module.

[0008] Accordingly, the present invention is directed to modular photovoltaic light and power cube that obviates one or more of the problems due to limitations and disadvantages of the related art.

[0009] An advantage of the present invention is to provide a solar powered energy generation module, comprising a first plurality of rails forming a base perimeter and defining a footprint of a support structure; at least two openings extending laterally one rail of the first plurality of rails; at least two stabilizer rails extending through at least two corresponding ones of the first plurality of rails; vertical posts extending perpendicularly from the first plurality of rails; a second plurality of rails forming an upper platform and extending perpendicularly from the vertical posts; an upper platform comprising upper rails above the frame support structure corner posts positioned near intersections of two of the plurality of rails; and at least one mounting frame comprising a solar panel array; the at least one mounting frame connected to the upper platform via by an articulating means to provide a range of motion for the mounting frame with respect to the upper platform.

[0010] Additional features and advantages of the invention will be set forth in the description which follows, and in part will be apparent from the description, or may be learned by practice of the invention. The objectives and other advantages of the invention will be realized and attained by the structure particularly pointed out in the written description and claims hereof as well as the appended drawings.

[0011] To achieve these and other advantages and in accordance with the purpose of the present invention, as embodied and broadly described, in one embodiment, A power generation device comprising a plurality of solar powered energy generation modules, each module of the plurality in electrical communication with another of said modules, each module comprising a first plurality of rails forming a base perimeter and defining a footprint of a support structure; at least two openings extending laterally one rail of the first plurality of rails; at least two stabilizer rails extending through at least two corresponding ones of the first plurality of rails; vertical posts extending perpendicularly from the first plurality of rails; a second plurality

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