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**Herniter et al.**

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(54) **METHOD FOR CHARGING A BATTERY WITH MAXIMUM POWER TRACKING**

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(\* ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

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**Related U.S. Application Data**

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(51) **Int. Cl.**<sup>7</sup> ..... **H01M 10/44**

(52) **U.S. Cl.** ..... **320/137; 320/163**

(58) **Field of Search** ..... 320/101, 123, 320/137, 139, 140, 143, 163, DIG. 28, DIG. 29; 323/299, 303, 906; 136/290, 291, 293

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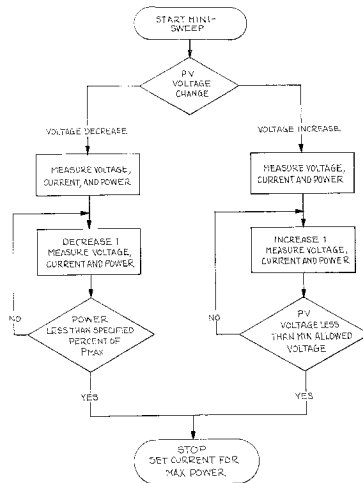
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(57) **ABSTRACT**

Apparatus and attendant methodology for extracting maximum power from an energy source, such as a photo voltaic panel, an array of photo voltaic panels, or a windmill and delivering that power to a battery or an array of batteries is disclosed. The apparatus determines the maximum operating point of the energy source, and circuits and circuit topologies are presented for extracting the energy. The apparatus eliminates the problem of finding local maximum points, and problems attendant variations of the absolute maximum power point as a function of temperature, insolation, array construction, and photo voltaic panel manufacturing tolerances. The energy source supplies power in the form of a voltage and charges the batteries with a controllable current source.

**37 Claims, 17 Drawing Sheets**



MINI-SWEEP ALGORITHM