



US008073573B2

(12) **United States Patent**
Chassin et al.

(10) **Patent No.:** **US 8,073,573 B2**
(45) **Date of Patent:** ***Dec. 6, 2011**

(54) **ELECTRICAL POWER DISTRIBUTION CONTROL METHODS, ELECTRICAL ENERGY DEMAND MONITORING METHODS, AND POWER MANAGEMENT DEVICES**

3,862,430 A 1/1975 Lenhart et al.
4,031,406 A 6/1977 Leyde et al.
4,090,088 A 5/1978 McMahon et al.
4,135,101 A 1/1979 Young et al.
4,213,058 A 7/1980 Townsend
4,317,049 A 2/1982 Schweppe
4,385,241 A 5/1983 Peddie et al.

(75) Inventors: **David P. Chassin**, Pasco, WA (US);
Matthew K. Donnelly, Kennewick, WA (US);
Jeffery E. Dagle, Richland, WA (US)

(Continued)

FOREIGN PATENT DOCUMENTS

(73) Assignee: **Battelle Memorial Institute**, Richland, WA (US)

CA 2082914 1/1999

(Continued)

(*) 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.

OTHER PUBLICATIONS

(21) Appl. No.: **11/453,465**

"Distribution Automation;" http://www.dt2003.events.pennet.com/conference_program.cfm; Feb. 2-4, 2003; 20 pps. "Pay-For-Performance;" <http://www.honeywellcannon.com/Designs/Pay-for-Performance.asp>; Mar. 19, 2004; 3 pps.

(22) Filed: **Jun. 14, 2006**

"LCR 5000"; www.honeywellcannon.com/Products/LCR5000.html; Jun. 23, 2003; 3 pps.

(Continued)

(65) **Prior Publication Data**

US 2006/0229768 A1 Oct. 12, 2006

Related U.S. Application Data

(63) Continuation of application No. 10/461,137, filed on Jun. 13, 2003, now Pat. No. 7,149,605.

Primary Examiner — Charles Kasenge

(74) Attorney, Agent, or Firm — Wells St. John, P.S.

(51) **Int. Cl.**
G05B 11/01 (2006.01)

(52) **U.S. Cl.** **700/286; 700/295; 700/296; 700/297**

(58) **Field of Classification Search** **700/295; 700/296, 286, 291, 297, 22, 293, 294, 298; 713/340, 601, 300, 320, 323; 705/400, 412, 705/295, 296, 286, 291; 307/11, 31, 35; 361/601, 622; 702/75**

See application file for complete search history.

(57) **ABSTRACT**

Electrical power distribution control methods, electrical energy demand monitoring methods, and power management devices are described. In one aspect, an electrical power distribution control method includes providing electrical energy from an electrical power distribution system, applying the electrical energy to a load, providing a plurality of different values for a threshold at a plurality of moments in time and corresponding to an electrical characteristic of the electrical energy, and adjusting an amount of the electrical energy applied to the load responsive to an electrical characteristic of the electrical energy triggering one of the values of the threshold at the respective moment in time.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2,238,624 A 4/1941 Clark

67 Claims, 5 Drawing Sheets

