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(54) **HIERARCHICAL MODEL COMMUNICATION AND CONTROL IN A MANAGED ELECTRICAL SYSTEM**

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CPC G05B 9/02; G05B 13/024; G05B 17/02; G05B 23/0243; G05B 23/0283; G06Q 10/04; G06Q 10/06; G06Q 50/06; Y02E 10/563; Y02E 10/763; Y02E 40/72; Y02E 60/74; Y04S 10/30; Y04S 20/222; Y04S 20/227; H02J 13/0079; H02J 13/0086; H02J 3/14; B64D 2221/00; H04L 67/125

See application file for complete search history.

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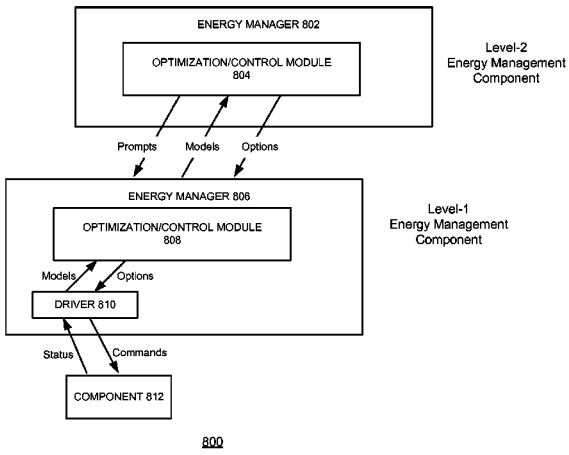
(57) **ABSTRACT**

One embodiment of the present invention provides an energy-management system for managing energy within a predominantly closed power system. The system includes an upper-level energy-management module, at least one lower-level energy-management module coupled to the upper-level energy-management module, and at least one component coupled to the lower-level energy-management module. The component is configured to provide a performance model associated with the component to the lower-level energy-management module. The lower-level energy-management module is configured to provide an aggregated model to the upper-level energy-management module.

19 Claims, 11 Drawing Sheets