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## [54] FLYWHEEL BASED ENERGY STORAGE SYSTEM

4007424 10/1990 Germany ..... 310/74  
WO92/05617 4/1992 WIPO .

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### [57] ABSTRACT

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A compact energy storage system includes a high speed rotating flywheel and an integral motor/generator unit. The rotating components are contained within a vacuum enclosure to minimize windage losses. The flywheel rotor has a unique axial profile to both maximize the energy density of the flywheel and to maximize the volumetric efficiency of the entire system. The rotor is configured with hollowed-out regions at each axial end to accommodate magnetic bearing assemblies. The integral motor/generator is disposed on a tail shaft of the flywheel rotor, outboard of the magnetic bearing assembly. The motor/generator stator is mounted on a translation carriage for axial movement. During normal operation, the stator is in operative alignment with a rotor on the flywheel shaft. However, when neither motor nor generator operation is required, the stator is extended to an axial position where it is effectively decoupled from the rotor. A magnetic shield surrounding the rotor confines the lines of magnetic flux to minimize eddy currents, and thereby minimize parasitic energy losses that would otherwise slow the flywheel during idle periods.

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[51] Int. Cl.<sup>6</sup> ..... **H02K 7/02; H02K 1/12**

[52] U.S. Cl. .... **310/74; 310/191; 310/254**

[58] Field of Search ..... 310/74, 191, 209,  
310/254, 256; 290/15, 38 A; 322/4; 74/572

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**16 Claims, 9 Drawing Sheets**

