

**AXIAL FIELD ROTARY ENERGY DEVICE WITH ~~SEGMENTED~~ PCB STATOR HAVING
THERMALLY CONDUCTIVE INTERLEAVED LAYERS**

[0001] This application claims priority to and the benefit of U.S. Patent App. 16/934,872, filed July 21, 2020, U.S. Prov. App. No. 62/933,598, filed November 11, 2019, U.S. Prov. App. No. 62/933,795, filed November 11, 2019, and U.S. Prov. App. No. 62/960,769, filed January 14, 2020; and UK Patent App. GB2206287.1; each of which is incorporated herein by reference in its entirety.

TECHNICAL FIELD

[0002] The present invention relates in general to an axial field rotary energy device and, in particular, to a system, method and apparatus for motors and generators having one or more printed circuit board (PCB) stators.

BACKGROUND

[0003] Some axial field electric machines, such as motors or generators, use printed circuit board (PCB) stator structures. Examples of such devices are described in US Patents 10,141,803, 10,135,310, 10,340,760, 10,141,804 and 10,186,922. Although those designs are workable, improvements continue to be of interest.

SUMMARY

[0004] Embodiments of an axial field rotary energy device with a PCB stator panel having thermally conductive layers are disclosed. For example, the device can include rotors having an axis of rotation. Each rotor comprises a magnet. The device can further include a stator assembly located axially between the rotors. The stator assembly can include printed circuit board (PCB) panels. Each PCB panel can have layers, and each layer can have conductive coils. The stator assembly can have a thermally conductive layer that extends from an inner diameter portion to an outer diameter portion of the stator assembly. Each PCB panel comprises discrete, PCB radial segments that are mechanically and electrically coupled together to form the respective PCB panels.

[0005] In at least one example, there is provided an axial field rotary energy device has a PCB stator panel assembly between rotors with an axis of rotation. Each rotor has a magnet. The PCB stator panel assembly includes PCB panels. Each PCB panel can have layers, and each layer can have conductive coils. The PCB stator panel assembly can have a