

While there has been described what at present is believed to be one preferred embodiment of the invention, it will be appreciated that modifications therein can be made by those skilled in the art without departing from the spirit of the invention and it is intended that all such modifications are to be covered as are within the scope of the appended claims.

It is claimed:

1. Thermionic-thermoelectric generator system comprising:

a pair of thermionic-thermoelectric generator apparatus, each including a pair of axially aligned and concentric metal electrode cylinders closed at both ends to form an enclosed and evacuated space therein, at least the inner surface of the outer cylinder being coated with a thermionic electron emissive material to form a cathode and at least the facing surface of the inner cylinder being coated with graphite to form an anode, and including a thermopile series nested within the inner cylinder, the positive end of the series being electrically coupled to the anode, the negative end of the series being electrically coupled to the cathode, the generator apparatus further including external positive and negative terminals coupled to the anode and cathode, respectively;

a pair of output terminals adapted to be coupled to a load impedance;

and circuit means for alternately coupling each of the generator apparatus to the output terminals to provide a continuous electric current flow to the load impedance,

said circuit means comprising a pair of charging capacitors, a first pair of controlled current switching devices, each connecting a generator apparatus to a respective charging capacitor, a second pair of current switching devices, each connecting a charging capacitor to the output terminals of the system, and timing control circuits for operating the current switches in sequentially alternations so that, as one generator is coupled to its charging capacitor, the other generator is uncoupled from its charging capacitor, and during this time the charging capacitor of the other generator is coupled to the output terminals while the charging capacitor of the one generator is uncoupled from the output terminals, the timing circuits being adapted to periodically reverse this sequence of connections.

2. The system of claim 1 in which the thermionic electron emission material comprises a mixture of barium oxide, calcium oxide and strontium oxide in the ratio of about 1:1:1 by weight.

3. The system of claim 1 in which the thermopiles comprise an alternating series of wafers of silicon carbide and carbon with the silicon carbide wafer at one end of the series connected thermopiles being electrically coupled to the inner cylinder to form the positive terminal of the generator apparatus and the carbon wafer at the other end of the series connected apparatus being electrically coupled to the outer cylinder to form the negative terminal of the apparatus.

4. The system of claim 1 which the outer cylinder is provided at one end with an end cap having sealable vacuum connections and, on the interior thereof, a plurality of heat resistant mounting means for holding the end of the inner cylinder fixed in position relative to the outer cylinder.

5. The system of claim 4 in which the outer cylinder is provided at the other end with an end cap and an elongated tube both being electrically conductive and electrically coupled to the outer cylinder and the thermopile to form the negative terminal of the generator apparatus, and the end of the inner cylinder adjacent the negative terminal end of the first cylinder being provided with an end cap and an elongated rod projecting concentrically through said tube, the end cap and rod combination being electrically conductive and electrically coupled to the inner cylinder and thermopile to form the positive terminal of the generator apparatus, the remote end of the rod being held in position within the tube by means of an electrically and thermally insulative seal to maintain the vacuum within the apparatus.

6. The system of claim 5 in which the thermopiles comprise four thermopile sections electrically connected in series by tungsten terminals and folded back on each other to form a compact thermopile series within the inner cylinder, and in which an electrically insulative heat resistant thermopile support means is provided in the inner cylinder, the support means being shaped to hold the thermopile sections fixed in place relative to the inner cylinder and electrically insulated therefrom along the axial length of the inner cylinder.

7. The system of claim 5 in which the interelectrode spacing between the outer and inner cylinder facing surfaces is at least about two centimeters.

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